DESIGN CONSIDERATIONS FOR THE "NEW NORMAL" WORK ENVIRONMENT USING THEMATIC ANALYSIS

An Undergraduate Research Scholars Thesis

by

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Submitted to the LAUNCH: Undergraduate Research office at
Texas A&M University
in partial fulfillment of the requirements for the designation as an

UNDERGRADUATE RESEARCH SCHOLAR

Approved by
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May 2022

Major: Computer Science

RESEARCH COMPLIANCE CERTIFICATION

Research activities involving the use of human subjects, vertebrate animals, and/or biohazards must be reviewed and approved by the appropriate Texas A&M University regulatory research committee (i.e., IRB, IACUC, IBC) before the activity can commence. This requirement applies to activities conducted at Texas A&M and to activities conducted at non-Texas A&M facilities or institutions. In both cases, students are responsible for working with the relevant Texas A&M research compliance program to ensure and document that all Texas A&M compliance obligations are met before the study begins.

I, Elinor Krits, certify that all research compliance requirements related to this Undergraduate Research Scholars thesis have been addressed with my Research Faculty Advisor prior to the collection of any data used in this final thesis submission.

This project required approval from the Texas A&M University Research Compliance & Biosafety office.

TAMU IRB #: 2021-0674M Approval Date: 07/07/2021 Expiration Date: 07/06/2024

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ABSTRACT

Design Considerations for the "New Normal" Work Environment Using Thematic Analysis

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The coronavirus pandemic that first began sweeping the globe in 2020—and more commonly referred to as COVID-19—caused the world to shut down with little notice. Every organization had the capacity to do so rapidly switched over to a virtual environment, but this transition was unfortunately far from seamless. That is, individuals who had never interacted with technology for purposes other than recreation—such as reading the news, watching shows or playing video games—were forced to quickly learn how to adapt to using technology that support working virtual, in order to complete tasks that were required of them while at work or school. In this work, we discuss the findings of a study that was conducted for the purpose of collecting information about people's experiences in different work environments (i.e., in-person, virtual, hybrid), in order to learn more about whether age, profession, distance to work, and several other factors make a difference in how people were affected by the transition to virtual environments due to the coronavirus pandemic. By analyzing the survey results of 104 individuals and the interview data of 12 of those individuals using both qualitative and quantitative approaches, we identified some of the key

issues that people were facing. Despite discovering a variety of issues that were brought up in the survey results and interview data, we also discovered several common themes that were present that also often appeared to irritate users the most. Through a deep comparison of individuals' experiences in in-person, online, and hybrid spaces, we describe how issues that were previously faced by people when attending work, school, events, or other activities in-person were reduced or eliminated by the shift to virtual. However, we also observed that some new issues surfaced and that existing issues were aggravated. In conclusion, we propose best practices for enabling individuals to be better informed and to more seamlessly transition to virtual environments.

ACKNOWLEDGMENTS

Contributors

I would like to thank my faculty advisors, Dr. Tracy Hammond and Dr. Paul Taele, as well as Seth Polsley, for their guidance and support throughout the course of this research.

Thanks also go to my family, friends and colleagues and the department faculty and staff for making my time at Texas A&M University a great experience.

The data analyzed for this work was provided by the Sketch Recognition Lab through collaboration with Amanda Lacy, Seth Polsley, and Samantha Ray. This work builds upon a study in which the Sketch Recognition Lab was examining the impacts of virtual and in-person meetings before and after COVID-19.

All other work conducted for the thesis was completed by the student independently.

Funding Sources

This project received no funding.

1. INTRODUCTION

1.1 A Virtually Overnight Transition

In early 2020, the daily activities of many people around the world were greatly transformed due to the rise of the COVID-19 pandemic. Along with the pandemic, fear was spreading just as fast, if not faster and in an attempt to allow individuals to isolate properly, all non-essential employees that could be sent to work from home, were. As a result, the majority of America's workforce transitioned into working virtually where they "turned into little boxes on a screen" in a relatively short time [1]. This change did not come easy, however. However, adjusting to working virtually was a challenge overall to a variety of vocations. While some vocations such as software engineering and graphic design had required employees to be tech savvy, other vocations—such as in psychology and teaching—did not and required people in these vocations to adapt quickly.

Figure 1.1: A virtual meeting in progress[1]

As could be expected with any major change taking place on a dime, more than one major hiccup was bound to arise. With rapid changes throughout society due to addressing the global

[1]Royalty-free image by Lucas Law sourced from Unsplash: https://unsplash.com/photos/ecELcxmJTk4

challenges stemming from the pandemic, there have also been technological setbacks from the sudden surge due to more people utilizing online technologies to maintain their previously in-person activities. For example, aside from growing occurrences of internet delays and other technology, popular virtual meeting platform Zoom (**Figure 1.1**)—which was widely used by schools and companies to conduct meetings—crashed globally in April 2020 [2].

This caused yet another frantic scramble to find alternatives since the current option had proven to not be reliable. The growth in transitioning to virtual environments and its corresponding technological challenges has motivated companies, schools, and individuals to explore different virtual platforms to best address their various needs [3]. Furthermore, as more people began adapting to virtual technologies to transition from former in-person activities due to the pandemic, technological challenges became more visible with demographics who may be less technologically savvy, have accessibility needs, or less experience with technology in general [4, 5].

1.2 The Great Divide

One of the largest factors that appears to have created frustration with the transition to virtual work—specifically for those lacking prior familiarity—is the age of the user [4, 6]. The young population overwhelmingly took the transition well, with some instead being disappointed by the prospect of having to transition back [7]. That is, people from the millennial generation and younger grew up in a world with ever changing technology and have learned how to quickly adapt to such changes [8]. For example, the first mobile phone prototype came out less than five years before the start of the millennial era [9]. People from older demographics, however, may face multiple setbacks including a potential lack of skill at working with technology for anything past email, checking the news and making phone calls [10]. Yet another issue facing the older population is that they were also far more likely to have accessibility needs, in particular for auditory and visual disabilities, as those grow in number as people age.

Many in the older generation are also largely set in their ways and there was widespread belief that no work would get done with employees working from home. This turned out to not be the case however, with productivity actually increasing over the past two years [11]. Due to

this, the push to go back to in-person full time has dropped significantly, with most people instead desiring to have a hybrid option where they can have the flexibility to come into work on some days, but stay home on others.

1.3 A Middle Ground

A hybrid approach is one which combines in-person events with online ones [12, 13, 14, 15]. This approach gives people the ability to choose what works best for themselves and allows for greater flexibility than being confined to solely in-person or virtual events. With that being said, it comes as no surprise that the overwhelming consensus amongst people today is that the best move going forward is to have a hybrid system in place, with 83% of people believing it to be optimal [16]. This approach would help keep both the people committed to going back to work in-person full time content, as well as those who discovered that they thrive in the virtual sphere. Not only that, but it would also satisfy those that thrive in both environments and would therefore like to choose based on their current obligations in their work and their private life where they would like to work or study from that day (**Figure 1.2**).

Figure 1.2: Woman working from the comfort of her own home[2]

[2]Royalty-free image by Ave Calvar sourced from Unsplash: https://unsplash.com/photos/BbQXZ7UyX0w

Regardless of individual reasoning, there is potential benefit in leveraging the best aspects between in-person and virtual approaches, and is also a focus of interest for companies to implement [17].

2. BACKGROUND

In this section, thematic analysis, qualitative studies of hybrid approaches, hybrid approach models, qualitative studies of the "new normal" and related works are covered. In the thematic analysis subsection, one of the methodologies used for the interview analysis is covered. The subsections on hybrid approaches and hybrid approach models discuss where a hybrid approach has been found to be beneficial, as well as what techniques have been used to implement it. Next, the subsection on the "new normal" covers how people adjusted to the different lifestyle that COVID-19 had forced them into. Lastly, the related works section highlights works that share similar themes to this one. These topics join together to help explain the importance of this work, and to demonstrate the foundation that this work has been built on.

2.1 Thematic Analysis

Thematic analysis is a method for identifying, analyzing and reporting patterns, or themes, within data [18]. Although it is very similar to content analysis, it does differ in one key feature. While thematic analysis is often thought of as more qualitative method, content analysis is considered to be quantitative [19, 20]. One of the reasons that thematic analysis was chosen as one of the forms of data analysis for the study was that it was qualitative, since statistical analysis was already going to be used for any quantitative comparisons. However, there are many other forms of qualitative analysis including Interpretative Phenomenological Analysis (IPA) and grounded theory [21, 22, 23]. Both of these, along with thematic analysis, "share a search for certain themes or patterns across an (entire) data set, rather than within a data item" [18]. They also, however, "require a more detailed theoretical and technological knowledge of approaches" which thematic analysis does not, thereby making it more beginner friendly [18]. Therefore, thematic analysis was the qualitative method of choice for this study.

2.2 Qualitative Studies of Hybrid Approaches

The most common approach that companies are currently taking for how their employees will be working in the future is the hybrid approach [24]. In order to best implement this, some companies are trying to find ways to get their employees' perspective. By conducting surveys and using analysis tools on them, companies are trying to understand things such as "where their team members feel most energized, whether they have a well-functioning home office, and what their needs are for cooperation, coordination, and focus" [25]. Utilizing this approach should help companies to foster a better work environment for all of their employees, with the least number of people seeing a negative impact as their opinions would have been taken into consideration ahead of when the decisions were made. An example of one such company is the Norwegian company, Equinor. This particular company used the surveys they conducted to create nine different models for hybrid work, so that every employee would be able to fit into at least one of them [25].

While studies have shown that the hybrid approach works well for offices, it proved to be highly ineffective for schools [26, 27]. The strange and confusing schedules that some schools imposed frustrated both teachers and students, and caused needless chaos (**Figure 2.1**).

Time	Activity
8:00-9:00am	Algebra I (in-person)
9:00-10:00am	History (synchronous video)
10:00-10:15am	Morning break
10:15-11:15am	Biology (synchronous video)
11:15-11:45am	Elective (synchronous video)
11:45am-12:30pm	Lunch
12:30-1:30pm	English I
1:30-2:30pm	Enrichment (art, P.E., etc.)

Figure 2.1: Example of a hybrid school schedule [28]

Many teachers found "found juggling students in person and online at the same time to be a near-impossible act" [26] and hated the system almost instantly. Additionally, hybrid actually turned out to be worse than a fully in-person approach at keeping infection rates down, with staff infection rates being higher at schools using hybrid as opposed to those who conducted all of their classes in-person [27]. This trend is not confined to grade schools either, with many college professors and some of their students holding similar views [29]. Overall, while hybrid may be a great option for office jobs, as far as education is concerned, in-person, if possible, is the way to go.

2.3 Hybrid Approach Models

As the pandemic wore on, universities, schools and workplaces all came up with their own strategies for how to move forward. For the majority, they settled on some form of hybrid approach that involved some people going in-person and others remaining virtual [30]. One way that schools and workplaces approached this is by having groups rotate when they get to come in-person. For example, around 50% of employees expect some form of hybrid model, such as a on-off daily or weekly schedule, to be implemented or already have one in place where they work (**Figure 2.2**) [31, 32].

Another approach which was employed by companies such as Microsoft and Amazon was to give a number of days that they wanted their employees to come into the office for each week, or even simply asked that employees only come into work only as much as they feel comfortable, or even allowed them to not come in-person at all [34, 35]. Universities and schools also took a variety of approaches to creating a hybrid model, with some universities choosing to offer both in-person and virtual classes simultaneously thus allowing students to choose what works best for them [36, 37, 38]. However, the researchers observed an increase in the workload on the instructors, who generally did not enjoy having to try to teach to both the physical students in front of them and the ones that they could not really see online simultaneously [26]. Overall, it appears that while a hybrid model has a tendency to work well in the workplace, it does not do nearly as well in the realm of education. While having an online class can be convenient, and can be an

Figure 2.2: Example of a hybrid work schedule [33]

option if that is the only way the teacher is teaching it at that moment, having them teach live and online simultaneously is not the way to go.

2.4 Qualitative Studies of the "New Normal"

COVID-19 threw most, if not all people's lives wildly off track, and one group of people that found themselves particularly affected were college students. Suddenly facing an enormous amount of uncertainty concerning how the rest of their lives and careers would be playing out, many college students' mental health was adversely affected, with the majority of students reporting higher than normal, or even overwhelming amounts of anxiety [39, 40, 41]. While it was found that older adults faced less negative mental health outcomes, they were disproportionately negatively impacted by the pandemic in other ways including having "difficulty in adapting to technologies like telemedicine" [42]. Overall, those seeing the greatest net benefit from the new normal are middle-aged individuals, especially those with families (**Figure 2.3**). Researchers have found that the increased flexibility that many companies are now providing has allowed them to spend more time with their families and makes running errands easier to do, which has led to this

group being the least enthusiastic about going back to work in-person full time [43].

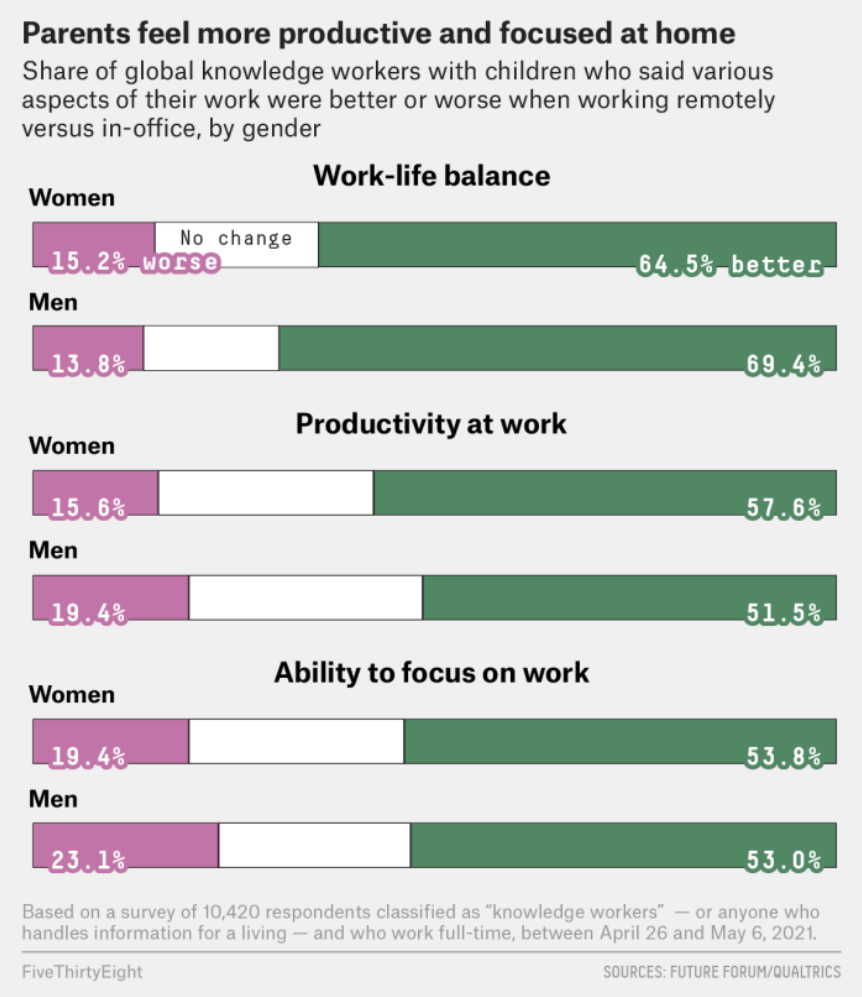

Figure 2.3: Chart showing productivity differences between men and women [43]

2.5 Related Works

In the time since the pandemic started, numerous researchers have been looking into its effects. Depending on the study, these effects can range from long-term health effects, to the impact on mental health, to business outcomes, education and everything in between. In this paper, the analysis focuses on the experiences people had with adapting to a world that is more technology centered than ever before.

A discovery made by Kunal Chaturvedi, Dinesh Kumar Vishwakarma, and Nidhi Singh in their paper, *COVID-19 and its impact on education, social life and mental health of students: A survey* is that the average time students were spending on their schoolwork decreased as student age increased. Considering the time being spent on schoolwork was shorter, it was hypothesized that those spending less time on it would also be the most pleased with the virtual learning environment. However, this did not prove to be the case. Instead, there was a 20% difference in satisfaction levels between students aged 7 to 17 and those aged 18 to 22 [44]. A potential reason behind this, and one that would also extend to older adults, is that as one ages both their ability and desire to adapt decreases (**Figure 2.4**). This is confirmed by a recent study done on workplace satisfaction that found that twice as many workers over the age of 30 were dissatisfied by working remotely as compared to those under the age of 30 [45].

Figure 2.4: Older individual frustrated with technology [1]

While the youth did seem to be more satisfied with their newly virtual lives, they were also less motivated to actually complete their work. 42% of workers between the ages of 18 and 49 claim that it became more difficult for them to focus on their work after the pandemic started, as compared to just 20% of workers over the age of 50. Additionally, among those aged 18 to 29, 53% of them claim that their lack of motivation became an impediment to them [46]. Overall, it appears that the impact made on different age groups has a tendency to vary. This variation potentially increases the importance of these types of studies as they can help ensure that people of all ages can be properly accommodated in the areas that they appear to be lacking the most in.

These works support some of the findings in this paper, as survey data analysis showed that some of the largest differences between groups of people could be attributed to the age of the individual. Additionally, the findings for the differences based on education level were similar to those based on age, showing larger differences between groups the more different they were from one another in the majority of cases. The study on motivation differs slightly from the findings in this paper, as it was found that virtual met peoples' goals most often if they were between the ages of 36 and 45, and the least if they were either 56 to 65 or 26-35. Overall, this paper strives to build on previous works and to observe what patterns are either repeated or broken, along with looking for what additional new patterns can be seen.

[1]Royalty-free image by Andrea Piacquadio sourced from Pexels: https://www.pexels.com/photo/man-in-blue-sweater-sitting-by-the-table-using-laptop-and-cellphone-3783201

3. METHODOLOGY

This section discusses the design of the study, including its components, the ethical considerations, and the analysis. The study consisted of two components: survey and interview. The survey reached roughly 100 people, and out of those some elected to participate in the interview as well. The survey asked participants to consent to taking it and to participate in an interview. The study ensures that no release of identifying information about participants occurs. The analysis subsection describes the approaches used to analyze both the survey and interview data.

3.1 Study Design

Research collaborators in this lab originally collected the data that utilized in this study for a different study that they were conducting on addressing accessibility issues in the virtual sphere. Their study focused more on inclusion and social issues, while this study looks more broadly at factors that could impact peoples' adjustment to online school/work [47]. The design of this study entailed the use of both a survey and interviews. A survey was the first part of the study conducted. Survey questions included ones about how much time one spends on a computer, which is helpful for judging their familiarity and comfort level with technology, and ones about how well the individual feels their needs were being met with the virtual replacements of previously in-person interactions, which is helpful in showing how well people were able to adjust to a virtual life. Other themes examined by the survey included issues experienced with technology, how well social norms were upheld (such as striving to be on time and interruptions), and the intuitiveness of the user interface. Next, some of the survey takers participated in an interview, which gave them the opportunity to expand on, explain their original responses, or both and provided additional data for analysis.

3.2 Survey Construction

The survey consisted of an introduction followed by three sections of questions created using Google Forms. In total, these sections contained 36 questions (**Appendix A: Survey Ques-**

tions). In the first section, survey takers answered a series of questions relating to their demographics, including but not limited to age, gender, time spent on a computer and introversion. The next section covered their experience in the virtual world, and the last section covered their experience with in-person events. The questions in these two sections were very similar to the corresponding one in the other section. For example, the questions asked 'how early/late do you arrive to these types of meetings' and 'were you able to gain access to the resources that you needed' in both the virtual and in-person section of the survey. This made comparison of peoples' experiences simpler, as any contrast was more apparent. Overall, the virtual section contained eight multiple choice questions and four free response questions. Similarly, the in-person section contained eight multiple choice question, but it contained five free response questions rather than four. Questions asked in these sections assessed things such as people's comfort in these situations, satisfaction obtained from such interactions and whether accessibility had improved or not.

3.3 Interview Construction

The last question on the survey asked whether that individual would like to participate in a follow-up interview (**Appendix A: Survey Questions**). If they selected yes, they would then enter their contact information and were later contacted via email for an interview. As a result, twelve individuals interviewed live over Zoom. The format of the interview was semi-structured and each interview lasted approximately an hour on average with a couple lasting roughly forty-five minutes, and a couple lasting closer to an hour and a half. While most of the interviews started with the same question or two, the remainder of questions asked relied on the interviewees responses. Generally, the first question asked of the interviewees focused on their survey responses relating to preference of either virtual or in-person meetings. This question created the opportunity for interviewees to speak openly about their experiences, and often resulted in widely differing follow-up questions, since not unexpectedly, every individual's experience and therefore perspective on the matter was different. Keeping the structure of the interviews fairly loose encouraged open discussion and resulted in widely varying conversations that often emphasized different points of their experience.

3.4 Procedure

One of the most critical components of this studying was to first ensure that approval was granted by the Institutional Review Board (IRB). Once the IRB had granted their approval, the aforementioned survey was sent out via email to students at Texas A&M University. The link to the Google Form was also posted in several social media groups. For those who opted into being contacted in the last question of the survey, they were individually emailed and asked if they would like to interview for the study. Since these users had also taken the survey, this gave a base off of which to build in the interviews. Once some of the contacted individuals had consented to being interviewed, two of the researchers on the afore mentioned team conducted the interviews [47].

3.5 Ethical Considerations

Researchers conducted a survey in a properly informed set up and individuals gave consent to participate. The interview was also conducted in a properly informed set up with consent being obtained from individuals before asking any further questions. No individual participated against their will in either the survey or the interview. Additionally, no revealing of any potentially identifying information about any of the individuals who participated in this study occurred.

3.6 Analysis

Researchers collected survey results and conducted interviews over a period of two months. When analyzing the results of the survey, this study utilized both quantitative and qualitative methods. For the multiple choice questions, each option translated to a numerical value and the study applied statistical analysis. The statistical analysis used either a t-test or an ANOVA test depending on the number of categories. The p-value used in order to determine that a result is statistically significant was 0.05. In an attempt to provide a more black and white comparison of whether people felt differently about the transition to virtual depending on their age and/or how much time they spent utilizing technology on a regular basis, the study also analyzed interviews. For the interviews, thematic analysis was first used to distinguish some common themes. The interviews and survey responses were first coded, and then these codes were grouped by themes to allow for

comparison. The inclusion of specific individuals' testimonies strengthened the purely numeric analysis by adding a more human side to the results which occurred in the form of several case studies that used individuals who encompassed most of the themes seen.

4. SURVEY RESULTS

4.1 Effects of Locale

The first group of factors looked at were those related to where the individuals being surveyed were located at the time of survey conduction. Since location often has effects on factors such as social connectivity and access to technology/stable internet, it made it an interesting factor in how people adjusted to a more tech-oriented life in such a short time span as was necessary at the start of the coronavirus pandemic.

4.1.1 Distance to Work

One factor that appears to have had an effect on how people adjusted to the pandemic was how close they were located to their place of work. For the purposes of this analysis, near was defined as people who reported that it took them less than 15 minutes to get to work and far was defined as anyone who reported that it takes them longer than 15 minutes to get to work. The results are reported in **Table 4.1**:

Table 4.1: Effect of Distance to Work

Distance	Virtual Meets Goals	In-Person Meets Goals	Found Virtual Accessible	Found In-Person Accessible	Socially Satisfied
Far	0.25	0.44	0.19	0.74	-0.09
Near	0.11	0.48	0.24	0.74	0.09

From all of the statistics above, the socially satisfied one sticks out the most, followed closely by whether virtual is meeting goals. Neither of these were found to be statistically significant when running a t-test, however, with a p-value of 0.2564 and 0.4479 respectively. It was also interesting that the amount of people who found in-person to be accessible was the same for both categories.

4.1.2 Population Size

Another factor observed was whether the population size of the area that people were located in had an effect. For the purpose of this analysis, a city was defined as an area having greater than 65,000 people and a town was defined as an area having up to 65,000 people. The results are reported in **Table 4.2**:

Table 4.2: Effect of Population Size

Population Size	Virtual Meets Goals	In-Person Meets Goals	Found Virtual Accessible	Found In-Person Accessible	Socially Satisfied
City	0.15	0.40	0.28	0.71	-0.03
Town	0.25	0.63	0	0.81	0.04

The results here were similar to those for the effect of the distance from one's workplace. Those who were used to having more in-person social interaction appear to be more dissatisfied with virtual activities. For instance, city people are usually located in closer proximity to one another and were used to running into each more on a daily basis. Similarly, those who had a short commute to work also had a higher likelihood of being near other people-filled places, like grocery stores and bars. For both groups, virtual met far fewer peoples' goals on average than it did for those used to less interactions pre-COVID. Additionally, although far fewer townspeople found virtual to be accessible, this result was still not statistically significant, yielding a p-value of 0.1824 when conducting a t-test.

4.2 Effects of Demographic Factors

4.2.1 Age

A demographic factor that has consistently had an effect on adaptive abilities, especially in the realm of technology is age. Since the transition to a virtual environment significantly increased the amount of time most people interacted with technology, this made it a factor of particular interest. The results are reported in **Table 4.3**:

Table 4.3: Effect of Age

Age	Virtual Meets Goals	In-Person Meets Goals	Found Virtual Accessible	Found In-Person Accessible	Socially Satisfied
18-25	0.11	0.57	0.21	0.86	-0.11
26-35	0.08	0.62	0.69	0.46	0.08
36-45	0.64	0.18	0	0.64	0.09
46-55	0.73	0.27	-0.18	0.82	0.36
56-65	-0.36	0.18	0.18	0.64	-0.18

Looking at the differences between the age groups provided a variety of findings. At first glance, it appears that virtual met the goals of the fewest people in the highest age range examined, and they were followed closely by the two youngest age ranges. Virtual turned out to be meeting the goals of the most middle-aged people, which would in fact, make sense. People in this category are the most likely to have a young family that would be easier to care for when working from home. On the other hand, younger people are missing the social interactions of physical meetings, while older people are having more issues with adapting to a fully virtual world. Running an ANOVA test proved these results to indeed be significant, with a p-value of 0.0203. Additional p-tests run between the age groups also showed a general trend of age groups that are next to each other not having a significant difference in goals being met, but the larger the age difference, the more significant the difference became. The main outlier to this trend was the 56-65 age group since it was actually the most similar to the 26-35 age group.

Another interesting discovery was that the difference in how accessible people found the virtual environment to be was significant between the 18-25 and 26-35 age groups, with a p-value of 0.0338. It is most likely that this was caused by the difference in whether the virtual environment was being used for education or work, as those in the younger age group were more likely to be using it for school, and were also less satisfied. Having a p-value of 0.0213, there was also a significant difference between the 26-35 and 46-55 age group, which was strange seeing as there wasn't a significant difference with any of the other age groups. The 46-55 age group category seemed to be somewhat of an outlier in this category, with a result that seems to clash with the

same group having reported that virtual is meeting their goals the majority of the time. None of the other categories had statistically significant results.

4.2.2 Gender

Another demographic factor that was examined was gender. The other category is comprised of people who chose not state their gender as well as those who identify as agender or two-spirited. The results are reported in **Table 4.4**.

Table 4.4: Effect of Gender

Gender	Virtual Meets Goals	In-Person Meets Goals	Found Virtual Accessible	Found In-Person Accessible	Socially Satisfied
Female	0.38	0.41	0.39	0.68	0
Male	-0.21	0.54	-0.18	0.89	0.04
Other	-0.17	0.67	0	0.67	-0.33

One of the most significant differences found overall in this study was whether virtual is meeting peoples' goals based on gender. When running an ANOVA test, the p-value was 0.0077 and for a pairwise t-test the p-value between males and females was 0.005. The results for pairwise t-testing between male with other and female with other did not produce statistically significant results, which implies that the majority of the difference lies between males and females. Similarly, there was a very apparent significant difference when running an ANOVA test on virtual accessibility which gave a p-value of 0.016 and for a pairwise t-test between males and females which gave a p-value of 0.008. These results are particularly interesting since they appear to go against the stereotype of men being more tech savvy than women, as they both found the technology to be less accessible and found it to be meeting less of their goals than women did.

4.2.3 Education Level

Education level has a clear impact on the types of jobs people are able to get and therefore also on their experience with the pandemic. For instance, a majority of essential workers that were

in the fast food and retail industries only had a high school diploma, if that. This meant that those who stopped their education earlier would have been more likely to have experience with a fully virtual life. Therefore, education was chosen as another factor to look at. The results are reported in **Table 4.5**:

Table 4.5: Effect of Education Level

Education	**Virtual Meets Goals**	**In-Person Meets Goals**	**Found Virtual Accessible**	**Found In-Person Accessible**	**Socially Satisfied**
Some HS	0.33	0.67	0.33	1	-0.33
Some College	-0.07	0.59	0.10	0.79	-0.14
Associate's	0	0.63	-0.13	0.75	0
Bachelor's	0.39	0.28	0.33	0.67	0.14
Master's	0.07	0.43	0	0.64	-0.07
PhD	0.43	0.43	0.71	0.71	0.29

Since education level correlates with age, it is unsurprising that the results here were similar to those for age. Running an ANOVA test on whether virtual is meeting peoples' goals returned a p-value of 0.0215, which indicates there being a significant difference. In follow-up paired t-testing, there was also a significant difference found between a Bachelor's degree and both some college and some high school, as well as between a Master's degree and some college and some high school. While there wasn't a significant difference between PhD and some high school, the p-value was still fairly small at 0.056. It is possible that these results can be attributed to the fact that schooling was perhaps one of the least successful areas in transitioning to the a more virtual environment. This could also help to explain why there wasn't a significant difference between those with a PhD and those who are most likely still in school, as it is probable that respondees to this survey who have a PhD are professors and would have encountered similar issues with the virtual transition as their student's did.

There was no significant difference found with virtual accessibility when running an ANOVA test, but with a p-value of 0.067, the difference also isn't negligible. There was an extremely sig-

nificant difference found, however, when running a follow-up paired t-test for Bachelor's degree versus some college. The p-value for it was 0.0052, so this result backs the earlier theory that the difference is being caused by what the virtual environment is being used to accomplish. Based on these results, it appears that those in the workforce were more generally satisfied with a virtual environment, than those still in school. Additionally, since none of the other categories returned a significant difference, it means that the majority of the difference in impact based on education level has to do with the type of work that needs to be done. In-person had been meeting everyone's goals at a fairly equal level, and was also relatively equally accessible. Social satisfaction was also fairly low across the board, which means that while the transition did make people less socially satisfied, it did so evenly across the board.

5. INTERVIEW RESULTS

This section discusses the case studies of three individuals (**Table 5.l**), who span a wide age range and all had different home lives, personalities and experiences. P1 and P2 both touch on some of the benefits of hybrid work, while P3 explains why for his profession, hybrid is not ideal.

Table 5.1: Interviewee Descriptions

Person ID	Description
P1	Young, female professional
P2	Middle-aged, working mother of two
P3	Older, working male

5.1 Case Study 1

The first interview that a case study was performed on was P1. One of the first things that P1 mentioned was that they are an extrovert, and that they “gets a lot of her energy and joy from other people". Due to this, while being optimistic about getting to work from home at first, a few months in P1 realized they were not enjoying the isolation. A particularly interesting point that was made was that if working from home had been some sort of experiment and that they had been informed ahead of time about it and had some say in how it would go, the experience would have likely been very different and more enjoyable. P1 also stated that the pandemic restrictions took a toll on their mental health talks in length about how they miss being able to see their friends and co-workers in person. Additionally, P1 mentions that they miss getting to go to lunch with their co-workers, and that not being able to do so was detrimental to them. P1 also believes that conversations, including brain storming sessions, always went better when they were meeting in-person and that interrupting someone in-person is far less awkward than interrupting someone in a virtual setting. Some of the reasons given for this was that it was more difficult to apologize to

someone if they did cut them off, and that sometimes they did not even realize that they had cut someone off because there was an internet connectivity issue.

P1 also had some particularly interesting insights on camera use as well as professionalism. P1 believes that one of the main reasons that people did not like having their cameras turned on when in Zoom meetings is that seeing yourself on camera can be extremely awkward and can create a lot of self-degradation because it is like looking at yourself in a mirror for extended periods of time. Therefore, turning cameras off helped to decrease a lot of people's anxiety revolving virtual meetings. Their perspective on professionalism was particularly interesting because it was in part contradictory. On the one hand, P1 claims that they felt they had to be more "put-together" in a virtual setting as compared to a physical one, claiming that in-person, saying something stupid is more acceptable. However, they considered tardiness—which they considered to be unprofessional in-person—to be more acceptable and less embarrassing virtually. The reasoning given for this perspective was that you can sneak into a virtual meeting with relative ease, especially if there are a lot of people in it.

While their job did consider moving to a hybrid approach of three days in the office, and two at home, they eventually decided to bring everyone back to the office full time instead. Despite that decision, P1 said that they would "love the idea of a hybrid format that is not forced upon somebody" and that getting some different scenery every once in a while is helpful. P1 also added that if their job did decide to go back to virtual in the future, they should "at least try to have some meeting, maybe bi weekly maybe once a month that still has an in person element to it" to prevent people from feeling too isolated. Overall, P1 had experiences and perspectives similar to those predicted. As an extrovert and someone who appears to be living alone, it was not unexpected that they did not particularly enjoy their virtual experience and were eager to get back to in-person interactions. However, they did see the benefits of a hybrid system and would not be against it, assuming that the employees had some say in how it was implemented.

5.2 Case Study 2

This case study focuses on the interview of P2. The company that they had been working for when COVID first started had already allowed for a hybrid working model, with them having one day of telework a week, and some other teams having up to three. So for P2, when COVID first started, it was not too big of a deal. However, P2 did notice a difference in negative impact on employees in departments that were not conducting meetings as regularly as theirs was. While P2 claimed that they and their family family got lucky as far as internet and lack of other major technical difficulties were concerned, some people such as their parents had bigger issues and P2 had to invest in getting them a hot spot. Additionally, a limit on bandwidth had an impact on whether people in their meetings had cameras on or not. For example, in order to maximize the bandwidth, if the meetings had more than six people they were instructed not to use their cameras. P2 did however state that they enjoy the flexibility of being able to turn their camera on or off depending on whether they are a primary participant in the meeting. Like the interviewee in the first case study, this interviewee also discussed interruptions and said that due to all of the background noise that having their kids around and their husband in the office entailed, P2 would "find [them]self interrupting just because [they were] trying to get a word in while [they] could" without the background noise completely overwhelming whatever it was that they was trying to say. P2 also talked about "the social aspect of the awkwardness of a new medium, a new way to communicate and being okay with that awkward silence, if you will, and allowing someone else to respond." This provides a different take on how to deal with interruptions because rather than simply considering them to be a fact of life, they believe that people need to embrace awkward silences and allow those to indicate that someone new can now start to talk.

In their line of work as an auditor, P2 believes that virtual interactions as opposed to in-person ones made it harder for them to do their job. One of the reasons that they gave for this was that it is a lot easier to get to know a person when you are in a physical space with them because you are far more likely to engage in small talk rather than get right down to business. Additionally, you can not see nervous tics such as pen clicking when you are meeting with someone online, but

you would certainly notice them if you were in the room with them. P2 also mentioned that virtual meetings could sometimes be more draining than physical ones, however they were very grateful for the amount of time that they were saving by not having to commute to the meetings, some of which were over two hours away from where they lives. The flexibility of being virtual provided them with many benefits. For example, P2 could now grab a bite to eat in between meetings, can be more productive at home, can take brain breaks whenever they want rather than when someone pops over to chat and have the flexibility to choose their own tasks for the week. Additionally, P2 is an introvert who has anxiety and says that driving somewhere and having to make sure that they do not have a hair out of place and that no other detail is missed increases their anxiety and is exhausting. However, P2 says that while "the flexibility to move around was nicer virtually, there is that that relational component that really can not be replaced."

Going forward, P2 thinks that a hybrid option would work very well for them because then they could choose a day that would be really convenient for them to work from home on because P2 has activities that their kids are attending and it makes coordinating that easier, which decreases their anxiety and improves their mental health. P2 also found that while they did not mind working from home once their kids went back to school, while they were at home in the spring of 2020, having to work, be a mom and be a schoolteacher all at the same time was really overwhelming. When their kids were at home, they needed their undivided attention, but they had to work and could not provide that, but P2 was overall surprised by how well her kids did with the new technology they had to learn to use and attributed it to the amount of time that they had already been spending with it. P2 also mentioned that they were extremely lucky to have had a device for every family member to use and that nobody had to share, which would have further increased the strain of the rapid adaptation. P2 added, while "there are those who had isolation, there are [also] those of us who, [had] a little bit too much family togetherness" during the peak of COVID. Overall, P2 saw the pros and cons of both in-person and virtual environments and therefore unsurprisingly believes that a hybrid would be an ideal future work model.

5.3 Case Study 3

The last case study looks at P3, who had been studying technology and online learning for 25 years before the pandemic started. This made P3 more technologically adept than a lot of other people their age, but based on their observations, peoples' ages should not have made a difference. In fact, P3 found that personality seemed to be what made the biggest difference as opposed to age or experience. P3 also said that they expected to see better "netiquette" such as looking into the camera the entire time that you are talking from younger people, but found that those from generation Z and millennials were no better than those from generation X or boomers. P3 also backs what the interviewees in the other two case studies said regarding tardiness, saying that there is less embarrassment and social awkwardness from showing up late to virtual meetings as opposed to in-person ones. A reason that P3 gives for this is that being late in-person is more disruptive because you may have to crawl over people to find a seat, as opposed to when you are late to a virtual meeting and all you have to do is apologize. P3 also discussed camera use and said that they found that people who were camera shy before the pandemic and had not liked making videos before, were often the same people who were reluctant to turn their cameras on in meetings. The lack of camera requirements was convenient however, as it allowed them to multitask without offending anyone. They also mentioned that they can allow themselves to be less professional in a virtual meeting since they can roll their eyes or laugh at someone, assuming that they have their camera off and microphone muted.

Another common theme that was addressed by P3 was interruptions. In order to avoid interrupting people themselves, they came up with a system where they "scan[s their screen] really quickly to see [if] no one has released their mic or activated their mic first and then [they] will release [their] mic." Additionally, when P3 is conducting a meeting, they turn on a setting that mutes people upon entry so that if anyone has a lot of background noise, they would not be as disruptive. P3 also had a suggestion for a queue feature that could be implemented where people who want to talk can get into a line and whenever the current speaker is done, they could call on the next person to start talking. Something P3 touched on that the other interviewees did not was that

platforms such as Zoom having mobile apps allowed for even more flexibility, since you could now attend a meeting from anywhere that had internet. P3 added that students actually really enjoyed seeing them take advantage of this and have different scenery in their backgrounds because they claim it made P3 seem more real and it felt like they were "taking the time out of [their] schedule to talk to them." P3 also mentioned that "engagement was lacking and that created dissatisfaction with the students" because a lot of them wanted to engage in peer studying and be in groups, but they were unable to because everything being conducted virtually due to COVID.

Overall, P3 believes that the hybrid model is what should be done for students. P3 suggests that meetings are conducted physically and then what is done in the physical environment can be expanded on virtually, adding that more training needs to be devoted to hybrid models. The worst experience that P3 had, and therefore the model that they would least recommend is one where he was teaching students both in-person and virtually simultaneously. Aside from coordinating being difficult, it was also hard for them to find ways to make sure that everyone could participate in the activities he was conducting in class. For example, if they were having a competition and would normally give the winner a candy bar, they now had to come up with an alternative for someone who won but was attending virtually. Additionally, P3 believes that while some working professionals want to remain virtual, a lot of businesses would not go for it because they want to fill their multi-million dollar buildings with people which motivates them to ask people to return to in-person work as soon as possible. College online programs however, are seeing continued growth due to their convenience.

5.4 Takeaways

When looking at these case studies, a few common themes emerged. All of them at some point mentioned technical difficulties, professionalism, their feelings on being late to virtual meetings compared to in-person ones and commented on the additional flexibility that working remotely provides, among several others. Additionally, some of their commentary seemingly confirmed hypotheses that had emerged when looking at the survey results. For example, the level of self-identified introversion affected how eager the individual was to go back to work in-person.

Additionally, the P2 did like being able to work at home on specific days because it allowed her to better care for her children's needs.

6. CONCLUSION

The rapid transition to a virtual workplace or school environment threw many people off balance and led to lasting impacts worldwide. Despite enjoying the flexibility that virtual environments provided, the vast majority of people missed the social aspects of being in-person and wanted to go back, at least part-time. A hybrid system would therefore help in meeting their goals, as it would allow them to meet in-person several days out of the week and work from home on the others. The survey results showed that the two categories that would affect people's satisfaction the most are their age and gender, with education level also playing a role, albeit a smaller one. The case studies appear to back these results, as well as throwing the level of one's extroversion into the mix, as the more extroverted the individual identified themselves as, the more they missed having in-person interactions.

In the future, we believe it would be interesting to look more into how much of a role one's extroversion plays. As more companies embrace a hybrid approach moving forward, exploring whether people ended up liking that method seeing as it was what they claimed would work best for them, could provide some compelling results. It would also help to determine whether changing to a hybrid system as so many are doing is in fact the right move. Moving forward, there are now a plethora of previously unconsidered avenues for how work can be conducted that can now be explored and will hopefully aid in creating the most ideal work environment for all.

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APPENDIX A: Survey Questions

Table A.1: Survey Question Categories

Category	Description
Demographics and Background	This section of the survey tries to learn more about the individual taking the survey
Virtual Access	This section of the survey allows the survey taker to describe what their experiences using virtual platforms have been like
In-Person Access	This section of the survey allows the survey taker to describe their experiences with events that are held in-person

Demographics and Background Questions

- What is your gender? (Multiple choice)
- Which disabilities (if any) do you have? (Multiple select)
- How would you best describe yourself? (Multiple choice)
- How old are you? (Multiple choice)
- About how large is your community? (Multiple choice)
- How much time would you need to travel to meet someone in-person who shares your interests? (Multiple choice)
- What transportation services do you use to travel to in-person events? (Multiple select)
- What is your highest completed education level? (Multiple choice)

- On average, how many hours each week do you spend using a computer for work or schoolwork? (Multiple choice)
- On average, how many hours each week do you use a computer for entertainment? (Multiple choice)
- How introverted or extroverted do you consider yourself to be? (Multiple choice)

Virtual Access Questions

- How well does the virtual setting facilitate meeting people, or social interactions for you? (Multiple choice)
- In virtual spaces, how often do you feel heard, like you are talking to another person, and experience a satisfying sense of social connectedness when you leave? (Multiple choice)
- When you attend virtual events, how often are you able to access and use the things you need to participate, e.g. the technology, a quiet space, etc.? (Multiple choice)
- How early/late do you typically arrive at virtual events? (Multiple choice)
- If you are late to a virtual meeting, how embarrassed are you by your tardiness? (Multiple choice)
- When other people arrive late to a virtual event, do you find their tardiness inappropriate? (Multiple choice)
- In virtual meetings, do you have freedom to move as much as you'd like? (Multiple choice)
- Which of the following would you say applies to you in virtual spaces? (Multiple select)
- Do you feel that the virtual format allows you to get your work done and meet your goals? Why or why not? (Free response)

- Has a virtual space provided you with unexpected access to experiences that you did not have before? If so, explain. (Free response)
- Have virtual meetings ever reduced your access, e.g., due to technical issues? If so, please explain how. (Free response)
- Do you feel that the virtual format fits within your life? Feel free to describe why or why not. (Free response)

In-Person Access Questions

- How well do in-person settings (e.g., classrooms, meeting rooms, conference hotels, restaurants) facilitate meeting people, or social interactions for you? (Multiple choice)
- When sharing physical spaces with other people, how often do you feel heard, like you are talking to another person, and experience a satisfying sense of social connectedness when you leave? (Multiple choice)
- When you attend in-person events, how often are you able to access and use the things you need to participate, e.g. the technology, a quiet space, etc.? (Multiple choice)
- How early/late do you typically arrive to in-person events? (Multiple choice)
- If you are late to an in-person meeting, how embarrassed are you by your tardiness? (Multiple choice)
- When other people arrive late to an in-person event, do you find their tardiness inappropriate? (Multiple choice)
- In in-person settings, do you have freedom to move as much as you'd like? (Multiple choice)
- Which of the following would you say applies to you in in-person events? (Multiple select)
- How much does it typically cost you (in time, money, or other resources) to attend an in-person event near you? (Free response)

- Do you feel that in-person formats allow you to get your work done and meet your goals? Why or why not. (Free response)
- Has an in-person event provided you with experiences that you would not have had in a virtual space? (Free response)
- Have physical environments ever reduced your access to events? (Free response)
- How well does the in-person format generally fit within your life? (Free response)

Misc. Questions

- Would you be open to participating in a followup interview regarding the in-person and virtual comparisons? (Multiple choice)
- If yes selected to previous, option to enter email address is provided. (Free response)