The Effects of the Sudden Switch to Remote Learning Due to Covid-19 on HBCU Students and Faculty

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Abstract. The outbreak of the Covid-19 pandemic had wide-reaching effects on the education system. The general response of schools and universities was to shut down non-essential campus operations, as learning and instruction became remote. The switch to remote learning protected against the spread of Covid-19, but it also had secondary effects, like the closure of university labs and libraries. This study seeks to understand if students and faculty had the tools and workspace conditions to continue to teach and learn effectively. The sudden switch to remote learning had the most significant impact on participants whose home environment does not provide for a private workspace. There was a clear trend to engage less. Participants overall find video lectures less engaging. Some participants struggle learning materials. Others changed their approach to academic learning to rely more on self-learning.

Keywords: Remote learning · Covid-19 · HBCU · Technology access · Adequate remote learning environment · Adequate working environment

1 Introduction

1.1 The Switch to Remote Learning Due to the Covid-19 Pandemic

The outbreak of the Covid-19 pandemic had wide-reaching impact on the education system. The general response of schools and universities was to shut down non-essential campus operations, as learning and instruction became remote. Students and faculty had to suddenly change their instruction and learning methods from in-person to remote. Some switched from one day to the next, others had a week or two to prepare. In any case, it was a very sudden and significant change. Universities and schools provided learning and teaching tools so that all students could have access with the necessary to be successful. The switch to remote learning helped reduce the spread of Covid-19, but the decision to close down campus operations and facilities such as university labs and libraries created detrimental impact on education and learning.

On the onset of the pandemic, there were already educational inequalities in place that affect student success [8, 9, 14, 18, 22, 23]. Much previous research clearly documents the correlation between low-socioeconomic status (SES) and low academic performance in children [9, 14, 15]. Students from marginalized racial groups are also

known to have limited access to learning resources [18]. Students with low resources are at a disadvantage to their more affluent peers [9, 14, 15, 22, 23]. Recent research shows such gap has widened after the pandemic [15, 17, 19].

In this research, we document (1) how HBCU students experienced the sudden societal and educational changes, and (2) how Covid-19 affected HBCU students. This research also aims to explore the extent to which the switch to remote learning exacerbated already existing inequalities.

We found that students and faculty were impacted by the pandemic directly, and also by the challenges presented by remote learning. The former was loss of life or health of persons close to participants, reported by some, and the fear and stress of living in a pandemic, more frequent and pronounced in the case of participants with high-risk family members. Remote learning presented participants with challenges and in some cases obstacles that had not been present in the in-person learning environment.

With respect to the remote learning environment, the sudden switch to remote learning had the most significant impact on participants whose home environment does not provide for a private workspace. The participants that faired best in remote learning were those that adapted to the remote situation by managing those distractions or finding new ways of learning. There was a clear trend to engage less in lectures. Participants overall find video lectures less engaging. Some participants struggle learning materials. Others changed their approach to academic learning to rely more on self-learning.

With respect to engagement, there was a clear trend toward less engagement both among peers and between students and their instructors. Exceptions were participants who were able to adapt to new technologies to replace in-person communication in order to create or maintain connection. The remote classroom seems to be a more difficult place for students to participate, because social interaction is less "natural" in an online classroom than in an in-person classroom.

Finally, we address the resourceful ways participants are adapting. Participants are changing the ways and spaces in which they learn. They are adapting new technologies to create and maintain connections.

2   Related Works

2.1   Research on Online Learning

Online learning has provided an alternative mode of education for students who cannot physically be present on the college campus that they are enrolled at. Some students have used online learning as a way to learn if they don't have transportation to their campus or if they have a job that interferes with their class times [5]. Several studies have investigated online learning in regard to student/teacher interaction (e.g., [16]), mental health (e.g. [3, 7, 10, 13]), and student engagement (e.g. [3, 13, 16, 20]).

A research study looked into online learning platforms and the benefits that it provides. In the study, the authors list greater freedom of access, lower education prices, flexibility of education, and the ability to keep up with modern pace of life as

the main advantages of online learning [16]. Scholars have also investigated technology issues that students may encounter while taking online classes [6, 10]. Such technology issues may prevent students from completing their assignments on time or even leading them to miss their class sessions. Previous research also reports that some students have limited or no access to internet connection which is a necessity when taking online or remote learning courses [1].

2.2 Research on Remote Learning and Learning Management Systems (LMS)

Remote learning has become the primary source of education for many students since the outbreak of the Covid-19 pandemic [5]. Students experienced the sudden transition from in-person learning to being in their houses and having to figure out how to continue learning from their homes. Being remote also means that students can no longer interact with their professors and classmates in person, which can be an essential part in their learning [16]. Also, social gatherings on college campus may have helped many students de-stress from schoolwork while socially engaging with other students. An article investigating remote learning suggests that college institutions recreate the in-person gathering experiences on the online settings as well as enable social interactions amongst students so that they can still feel a sense of connectivity to their campus and the school body [11].

Many students are now relying on their college's LMS to receive their work and to communicate with their teacher and classmates. Previous research has investigated the use of LMS in education and its disadvantages and advantages [2, 10, 16, 21]. Alokluk [2], for instance, shares a list of online teaching principles that can be considered as best practices. These principles include encouraging active learning, giving student feedback, and encouraging faculty and student interaction.

3 Methodology

3.1 Overview

The analysis in this paper is based on data from an interview-based study and also from a survey study we conducted during the Fall of 2020. To investigate the effects of the sudden switch to remote instruction, we conducted interviews with students and faculty from four different universities in Virginia. We also conducted an online survey with students and faculty whose studies and instruction, respectively, became remote due to the Covid-19 pandemic to understand their experience in the remote learning environment.

3.2 Participants

We recruited participants from a pool of faculty, students and alumni from Virginia State University, a historically black public land-grant university in Petersburg, Virginia. We also used the snowballing method to recruit additional students from NSU

(Norfolk State University), UVA (University of Virginia), and Old Dominion. A total of twenty-four participants were interviewed (13 males, 11 females). The participants' ages ranged from 18 to 40. Twenty-three participants were students or faculty at an HBCU. Twenty-two participants were at Virginia State University, while one participant was from another HBCU, Norfolk State University. Of the twenty-two Virginia State University participants, one participant first experienced the switch to remote learning at VSU during the Spring semester of 2020, and joined University of Virginia, a Predominantly White University (PWI) where he again experienced remote learning in the Fall of 2020. We also had one participant attending Old Dominion University, which is now considered a Minority serving institution (MSI).

Twenty-one participants (88%) identified themselves as African American, one participant as Hispanic/Latino, one as Asian, and one as other. Nine participants (38%) were between 22–25 years old, eight participants (33%) between 18–21, four participants (17%) between 26–29, two participants (8%) between 30–35, and one participant (4%) between the 36–40. Nine participants (38%) were graduate students, nine participants (38%) were seniors, two participants (8%) were faculty, two participants (8%) were juniors, one participant (4%) was a sophomore, and one participant (4%) was a freshman. The participants were also asked if they had taught or taken an online class before. Thirteen participants (52%) stated "yes", and twelve participants (48%) stated "no".

3.3   Interview

Interviews were semi-structured and conducted over a video conferencing platform. The interviewer had both their video display and microphone activated. The participant had their microphone activated and was given an option to turn their video on. Some left their video off and others had it activated. Interviews lasted from 15–45 min. The interviews were audio-recorded and transcribed. We also collected demographic information for each participant prior to the interview through a pre-study questionnaire.

3.4   Survey

Along with conducting interviews with college students and staff, we also conducted a survey that was distributed to current college students. The survey was distributed by the second author to students who then distributed it to their peers. She also distributed survey via college chat groups. No monetary compensation was provided to participants. We received a total of 56 survey responses. The survey covered a range of questions that dealt with Covid-19 and how it may have impacted the life of a college student. To get a clear idea of its impact, we asked questions regarding their educational and personal experience. Questions regarding feelings and emotions, social life, and educational experiences were asked. The participants were asked to rate their responses to the questions by using Likert Scale sliders or button selections to indicate their ratings from 0 to 7 or in some cases, 1 to 7. There were a few yes/no questions that were also asked.

3.5 Interview Data Analysis

The interview data were fully transcribed and read multiple times by the researchers. During the initial analysis, both first and second authors looked at the interview data together and developed an initial coding scheme. The first author went through the interview data in multiple iterations to find recurrent themes in participants' data. After developing the first-round coding scheme, the first and second authors again refined the coding categories and finalized the coding scheme by conducting open and axial coding [4, 24]. The final coding scheme consisted of three top-level categories, eleven second-level categories and fifty third-level categories.

4 Findings

There were three areas of interest in our findings: Health, Life, and Education. The findings in Health revealed that participants have been affected by anxiety and fear of losing family members, caused by the Covid-19 pandemic. Those most affected were participants that had high-risk family members. Participants in general reported mental drain from the remote learning modality, though there were also benefits reported in that remote learning provided participants with the flexibility to work and the access to recorded lectures. In Life, findings reveal that a significant number of participants have had social costs of remote learning. It is more difficult to make connections with peers and have the same level of communication with instructors. However, it's important to note that several participants noted little effect on their social life, and some benefit of not having to interact as much in social and academic spaces. Education findings reveal that in the remote learning environment, it is a significant advantage to have a private study space. Also, participants generally adapted to having campus resources removed, but were not able to fully replace them. This is significant because it creates a significant disadvantage for students unable to access private reliable internet, dedicated study space, appropriate technology tools to replace the campus-wide resources lost in the switch to remote. There was a general trend to engage less in the remote classroom than the in-person classroom, and decreased communication both among peers and between peers and their professors.

4.1 Health

We asked participants how they had been affected on a personal level by Covid-19. Overall, the significant impact that the pandemic has had on the participant has been the death of family members in two cases, the serious infection of family members, and the high-risk status of family members that created anxiety and fear in participants. One participant reported having been infected with Covid-19. Three participants (P1, P17, P13) reported having family members that had been sick with Covid-19. Participant 13 reported having a family member that had to be hospitalized for approximately two months due to Covid-19. Three participants reported having family members that were high-risk. Three of the participants mentioned here described being "scared" or the situation as "scary" when describing their family members being sick with Covid-19 or

having a family member that is high-risk. One participant had two family members that were infected.

These are participants for whom living through the pandemic entails living with the fear of losing a family member. These are members of a group of participants living with anxiety and fear directly caused by the pandemic's health risk to people close to them. Participant 9, who lives with a person who is high-risk, explained having to travel to attend a funeral (not Covid-19-related). She stated that traveling made them "*anxious*," and described worry not know "*who was taking it seriously*," referencing their high-risk family members and participant's concern for them. Participant 10 and 22 have family members that are high risk and describe living with some level of fear:

> *"my parents are old and they have health conditions that put them at risk, so I have to be very careful. And it's scary because they still have to work."* (P10)

> *"No, um because my dad is high uh he's highly like he's high like rate, like he can get it faster than a lot of people, and he's bed bound, so I've been too scared to try to go out, and I don't wanna bring anything in the house that he may not be able to fight off."* (P22)

The participants with high-risk family members are most directly affected by the health risks of the pandemic. As demonstrated in this section, the risk of infection increased their level of fear, having an effect on their mental state. In the following section we explore the overall affect of the pandemic and remote learning on participants' mental health.

Mental Health

Stress and Mental Drain

We asked participants about how the pandemic and the switch to remote learning had affected their mental health. Although, often participants gave descriptions of their mental state in response to more general questions. For example, when asked about their overall viewpoint of Covid-19, participant 9 used "*scary*" to describe how they were experiencing it. As mentioned in the preceding section, participants who reported having a high-risk family member or member of their household, or who had family members infected with Covid-19 reported feeling "*anxious*," "*worried*," or "*scared*," or a combination of these (P9: "*scary*," "*anxious*," high risk family members; P10: "*scary*," parents high-risk; P17: mom, brother infected with Covid-19, mom's illness "*scary*"). Participant 10 also described their experience of the pandemic as "*scary*," and refers to their parents being high-risk.

Participant 17 reported that they were "*nervous to be outside*" after switching from a job in which they could work from home to one that didn't allow for remote work. They also said they had seen people around them with Covid-19, and "*how scary it is.*" Participants reported some level of mental drain from dealing with the pandemic, citing the risk of doing simple activities, the drain from not being able to see family members, or the burnout from being in front of a screen so repetitively. Participant 7 reported losing their job due to Covid-19 and having to move back in with their parents.

> *"it's scary being around other people because you don't know if you're gonna catch it, and I'm less worried about me catching it and more worried about me giving it to my parents."* (P7)

Motivation and Morale

One theme that various participants brought up was the morale and motivation level. Often participants mentioned benefits of remote learning—not having to commute, greater flexibility in their schedules that allows them to work, etc.—contrasting this with the drawbacks they've faced. For various participants, one of these drawbacks was the toll on their and others' motivation and morale. Participant 4 said that the difference that they experienced regarding the communication they have with their professors was that *"they're not as excited."* Participant 5 reported that this experience of remote learning made them realize that their routine of getting ready and commuting to class actually played a role in mentally preparing them to study, and that learning from home has presented a challenge in morale. Participant 7 also struggles with motivation attending video lectures:

> *"It's harder to stay motivated and it's easy to get distracted. It's really difficult to pay attention during a Zoom lecture…it's hard to like stay excited and engaged, and that's affecting our professors as well. So you can like, by the way that they're teaching, especially cause they're not getting active feedback anymore.*` (P7)

Not all participants experienced increased stress and mental drain as participants in remote learning. Participant 24 has decreased anxiety learning from their remote environment due to the fact that the in-person learning environment is anxiety-producing:

> *"I just never liked being in class. It's not my thing. It gives me high anxiety. So being remote you know I have the option if I want to turn on my camera or not. And I usually don't, I mostly don't. And so that helps me with my anxiety a lot…The workload doesn't affect my anxiety. Like what affects my anxiety is the one day we had to turn on our cameras. And I haven't been turning on my cameras, so I was panicking like oh I haven't had to turn on my camera in months and now look I got to turn on my camera."*(P24)

4.2   Life

Social Impact

One of the patterns emerged in our data analysis was ***reduced or changed social routines***. Participant 22 went from seeing friends almost daily to no longer participating in these social activities, explaining that it is because their dad is high-risk, and she is too scared to go out and possibly bringing home infection that their father couldn't fight off. Participant 16 explained that before, they would hang out with their friends at their house. Now, they rely on the connection via online games to interact with some friends, and they have lost connection with other friends who they used to see regularly in person. Participant 15 used to see their friends in person on Saturdays, and since the pandemic, they talk mostly via Snapchat or similar platforms.

Participant 12 realized a lack of support socially, that the situation showed them that not everyone in their social circle is a genuine friend. They are focusing on working on themselves. In the case of participant 7, they ended various relationships, with a partner and with some friends, due to the way those people approached the pandemic without following the safety protocols (e.g., continuing face-to-face meetings in groups).

There were various participants that reported little change due to the fact that they didn't socialize much generally anyway either because they were focused on work/school or because they were just not generally social, *"homebody," "introvert,"* etc. (P1, P3, P5, P17, P24). However, a significant number of participants reported experiencing a change in relationships.

Participant 9 reported a similar situation in not having seen friends since the pandemic began in March 2020 and that a contributing factor to following protocols so strictly was concern for her high-risk family member. Participant 14 also stopped seeing *"multiple people"* completely with no idea as to when he will once again be able to see them. Participant 22's social life had changed in that they can no longer do community outreach which was an important activity for her. Participant 13 is one of various participants that spoke to the fact that social interactions among peers was much more limited in remote learning:

> *"you meet these people, you know these people, get their numbers, exchange numbers and stuff, like that. Now it's just like it's just a whole bunch of random people in a chat room and we all go our separate ways when class is over."* (P13)

On the other hand, participant 8 had a positive social outcome from the pandemic. Because their classes and work switched to remote, they were able to quarantine with their mom and spend more time together.

Economic
A significant number of participants reported economic effect. A small number reported economic benefits from less spending, or a job opportunity offered by the pandemic. More frequent, participants reported income loss and job loss. In one example, participant 22's hours at their job were reduced from approximately 45 h weekly to approximately just five. Several participants lost jobs due to Covid-19.

Benefits
Overall, participants like elements of remote learning that were unavailable in in-person learning. They tended to prefer the access to recorded lectures and the flexibility that remote learning affords them: this allows them to work or saves them resources by not having to commute. Although participants tended to prefer in-person learning overall, there was a distinct tendency to prefer *elements* of remote learning: access to recorded lectures, and the flexibility to learn from a remote location.

Participant 17 highlighted that they usually don't have space in their schedule to both have a job, study, and play sports. But due to current circumstances, they thankfully can work. Participant 3 also cites this benefit: *"I don't mind remote because like I said I work full time and it be kind of hard for me to take off work to make it to class."*

For some of the participants that identified as an introvert or homebody or not socializing much (even prior to the pandemic), it is a benefit to not have to go out continuously, or not having to be around people as one of the benefits of the secondary effects of the pandemic, even noting a decrease in anxiety in one case.

4.3   Education

In this section we examine the effect that remote learning and the sudden switch from in-person to the distance model had on the participants. We present these findings in three subsections. Subsection one, Remote Learning Experience, examines the overall impact on learning and general issues that were caused by the pandemic and the measures put in place in response to the pandemic. The second subsection examines how being remote changed the communication and relationships among peers and between students and their professors, as well as among faculty. Subsection three examines participant's remote environment: did they have access to an adequate working space and technology? Was their remote location the cause of costs or benefits in learning or listed in other sections? Here, we would like to point out two key focus points. The first point is that a significant portion of the difficulties reported by participants seem to be difficulties inherent in remote learning for a student or teacher that is not used to carrying out this learning modality. The second key point is that any additional costs to student beyond these difficulties are costs relating to a lack of resources. An example is internet connection that impedes a student's ability to attend all class times or do coursework, because not all households have access to a high-speed reliable internet connection. Another example are the participants that don't have a workspace dedicated to study or work, because there is no extra space in the home to be converted to an office space. The pandemic caused the closure of some of the resources that previously gave students options. We are concerned to what extent Covid-19 exacerbated already existing inequalities by reducing access to university and public resources that allow for universal access to educational materials that support student success.

Remote Learning Experience. Overall, students reported that learning had become more difficult and more independent. Participants that reported the increased difficulty experienced it in a range of ways: some participants reported that they became better self-teachers, that the experience of studying through the pandemic built their character, that they developed discipline. Some participants reported being a student was harder, and academically things were worse: less learning, issues retaining information, distracted learning. A significant number of participants reported both benefits and costs. As mentioned in previous sections, there was a trend to have benefited from the flexibility provided by remote learning, but costs were reported in terms of difficulty learning the material.

The Transition. Some participants were unable to complete research or coursework because they suddenly lost access to labs and research facilities. One participant reported not being able to access adequate technology to complete a course:

> *"When Covid hit…and they shut everything on campus down I couldn't take my test because they were on lockdown browser and my camera wasn't working at the time. So I ended up failing the class because I couldn't go any place to get my camera fixed and then on top of that my professor was not trying to work with me."* (P11)

The speed at which remote learning was implemented meant that significant parts of participants' lives were changed. Participant 17 was active in university sports and found out the day of that the season was canceled. Her team tried to continue with

distance training, but it was too much for the coaching team and various members of coaching staff left during the Spring 2020 transition. Participant 14 was left without housing. His solution was housing with a friend, but this entailed traveling across state lines before social distancing on planes was implemented. He considers himself lucky to have not been infected on this trip.

Discipline, Self-learning, Distracted Learning, Issues Retaining Information

All participants reported less structure and more freedom after the switch to remote learning: they no longer had to be physically present. Most participants interviewed do not have to be visibly present even virtually. Another new freedom is access to course materials. There were interesting results with respect to this less structured learning and in a sense more freedom as a student. One result is the self-learning by students. For example, participants 10 and 14 both reported a new pacing in their learning that was less dependent on the course pace: they took advantage of the availability of the materials to advance at times ahead of the lecture-to-date. Participant 10 said that her professors were "*on it*" in terms of making sure the materials were available for students so that she could take initiative to study ahead. Participant 24 said that in the new learning modality, you *"definitely"* have to self-teach. Participants 10 and 17 explained how they have adapted to distance learning:

> "*I would say depending on the class it was beneficial because um I kind of learned how to uh do things my own way without anyone watching…*" (P10)

> "*so I never ever log into class or do work in my room because my room is not an environment I'm in when I'm focused…Whenever I'm doing homework or I'm in class I literally sit at the same place in my dining room, I prop my laptop up, I get all of my stuff out to get focused for… And now I'm more engaged in my classes, at first, I wasn't. I wasn't comfortable with zoom or getting on the camera and talking like it just wasn't my cup of tea. But now I come to enough of my classes where I'm attentive, I turn my camera on, I'm engaged and that's always been helpful.*" (P17)

There was a clear trend of the benefit of having access to the class recording. A significant number of participants cited this as a benefit of distance learning. For example, participant 14 stated that he like being able to work through the material and not necessarily have to wait on the lectures. Participant 17 cited recordings as a positive also:

> "*But some record them and post them so you can go back and watch them and take notes on it. So that's one thing I really do like. So even if you do miss a class you don't miss it because you can watch it later.*" (P17)

Harmed Learning, Learning Quality Change, Lack of Explanation, Unconcerned Teachers

Overall, participants reported that there were new challenges in the remote environment. There were participants that reported a negative impact in the quality of their education. There were participants that reported no impact in the quality of their education. One notable finding was the perceived loss of the ability to interact with the professor's explanation in real time: multiple participants said that in the in-person classroom, there was more opportunity to interject if they didn't follow a topic, or more opportunity for professors to see who was struggling to give space for review. Some of

these participants had no way to interact with professors during lectures because professors posted pre-recorded lectures (asynchronous classes). Others reported it was more difficult to interject in the online (synchronous) classroom. Participants explained that in a physical environment, professors can *"see"* who is not grasping a topic and make the decision to review or address confusion. Participants explained that in an in-person classroom, they can ask their neighbor to explain a point they didn't understand. Or that multiple people can speak at once in a classroom in a natural way, without obstructing the other conversations, and this allows for greater interaction than in and online space.

Participants 10 and 12 are examples of students that view their education as negatively impacted; participant 10 had some classes that were asynchronous. Some of her professors decided to just "put the work up," citing that they didn't meet (for class). Participant 12 does view her education as being negatively impacted:

> *"I feel like I'm not really learning anything. Because they're just reading PowerPoints… We're not practicing, we're not trying to store the information in our brains."* (P12)

She cited study groups led by her SI leader as an activity that helped her learn prior to remote learning, that hasn't been replaced by a new technology. Participant 17 also identify with this perspective: *"I feel like remote learning now for some bizarre reason I don't understand because it's so backwards"* (P17) Participant 9 cited the added stress in general during the pandemic as a cause of a decrease in education quality:

> *"people are really stressed out about this time of uncertainty so I think a lot of professors aren't necessarily intentionally not doing their job well but you know they have their own families and their own kids they have to worry about."* (P9)

She explained that because of this, their teaching responsibilities come second or third. She also cited that some professors *"throw so much work at you,"* not considering students' other classes or even that some students are parents as well. As to preference, she stated that while she stills does well learning remotely, *"education value-wise, in-person is way better."*

Participant 17 reported that some professors do a great job while others do a very poor job in remote teaching. Referring to one of her professors, participant 17 said that she (professor) is "*the best in regards to communication… she does really well with communicating on blackboard, giving us descriptions to the assignment.*" She contrasted this with one professor from a different class she is taking*: "…We are at finals and I still haven't seen a syllabus."* She described the policy of another professor:

> *"…that's one of the professors that has no exceptions at all like he doesn't care that its covid like it's very hard… and when you give him an excuse like hey like I'm doing blah blah blah will you still take the assignment, he's like no sorry there's no exceptions no. Nothing no and I'm just like you can't have a little bit of leeway, like we are literally in a pandemic."* (P17)

Students seem to view the online courses as less responsive especially when students struggle in the class. Students in general stated that asynchronous classes do not allow for students to signal when they need more explanation or when they don't understand (e.g., P14). But participants also stated that it is still more difficult to signal or interject in the remote learning synchronous classroom than in a physical classroom (e.g., P18). One participant (P10) conjectures it may be because students are in an

environment where they won't be heard. It is worth examining if this is generally the case, and the implications for students that don't have access to a quiet space, or if there are other reasons why students find professors less accessible during remote class. We found that students do not find it as easy to interrupt a lecture to signal they are not understanding in a remote classroom.

> *"Compared to in person they can tell you like…'oh yeah you are struggling here' or like 'everyone in the class got these wrong so we are going to work on this'…Compared to remote learning some people don't turn their cameras on some people don't even respond when the professor is talking to say they got it. Or ask questions because they are not in a location where they can be heard…So I think that what I didn't like. And that's why I prefer in person."* (P10)

> *"Instead of watching a recording and you hit a point in the video where you're completely lost, and you're lost from that point on, and you can't really progress until the next time you interact with the professor."* (P14)

> *"At times I feel like I've learned more in person than remote learning again because of the situation where I could walk up to my professor if I had a question in the middle of class or right after class. But other than that I don't think much has really changed."* (P18)

One interesting finding was the clear trend in perceived increased workload from Spring to Fall 2020. Sometimes participants conjectured that professors were assigning more work because they were assuming that students were at home and idle. Various participants referenced the increased workload. Some participants said that they were overwhelmed by the increase. One participant described it as professors *"throwing work"* at students.

Communication and Relationships Between Teachers and Students, Among Faculty, and Among Peers

Communication Teacher-Student
Communication has been predictably impacted in a significant way as teacher-student interactions have become remote. One faculty member reported that their freshman students do not all check email regularly or even open Slack, the two methods he uses to communicate: *"So even though I uh communicate multiple times, there are still students who will miss the memo, as they say."* (P1).

In response to how is has been to interact with professors and classmates since the switch to online learning, participant 5 explained: *"Oh…much worse. You know like it's really hard to interact."* Participant 6 actually prefers remote learning in general, but cited the interaction with professors as one of the losses in the move to remote:

> *"I miss the one-on-one interaction with the um professors. And in person you're still getting that um but a big part of the reason why I um love my program…"* (P6)

Participant 13 also cited a lower interaction, saying*: "it's like we really don't interact that much, it's like the professor gets on, or teaches, and then that's it. Like I I personally don't interact too much."* For participant 17 and 15, it is harder to ask questions in the remote classroom and to communicate with instructors and peers. Whereas, participant 22 has had a very positive experience, citing one professor she regularly communicates with when questions come up:

"And I feel like it's kind of harder for me to ask questions on Zoom because one I don't want to take up someone's time and I like to have one on one with my professors after class or go to their office hours." (P17)

"The interaction with like with other students, or uh the um professor, you know, it's you know it's online, it's not like. You can't just talk to 'em, like straight, like any time during the class." (P15)

"They're awesome… Yeah, like Slack has been like I uh Doc—uh I speak to one of my professors all the time, like when I have questions. So Slack is that thing that that's very convenient for these times." (P22)

Participant 9, 10 and 14 had a professor that weren't available, seeming to take advantage of the remote learning to be less responsive. Participant 10 was another student that cited less review of topics compared to in-person learning:

"Compared to in person they can tell you like… "oh yeah you are struggling here" or like "everyone in the class got these wrong so we are going to work on this" That didn't happen anymore like with remote learning." (P10)

Communication Among Faculty

The faculty members interviewed reported that colleagues are responsive in email, and that there are weekly department meetings that allow for communication with other faculty members. One faculty member cited that when staff and faculty worked on campus, it was very convenient to convene or collaborate having everyone in the same place. He also continued to communicate with colleagues remotely but did highlight that it was not as beneficial as working in the same physical space.

Communication Among Peers

As in the case of instructor-student interactions, communication and interactions among peers has overall decreased. Overall, we note a trend to decreased interaction among peers that in general was a difficulty for students. However, there was at least one participant who stated that she benefitted from not having to be in class with peers. There were participants that cited the interaction with peers from in-person learning as something that they missed. Participant 5 described remote learning as having little social interaction among peers. He stated that while in-person learning gives space to talking with colleagues and friends before and after class, there isn't space for this in the virtual classroom. Participant 7 highlighted pros and cons to remote learning. She cited the zero commute (which allows her the time to work) as a pro, but the lack of peer interaction as the main drawback:

"But the negative part is kind of harder to connect with your classmates. I've made a few friendships but they're all like through text or Facetime or something and it's just it's not the same…I think unlike in a real classroom, it's distracting when multiple people are talking, um, like if you're in a room, and there's a group of people who are talking or someone's talking and a professor's talking, it's just it's more natural. But through video, if multiple people are talking, it's confusing." (P7)

Participants 13 and 14 described decreased interaction in the remote learning environment:

"it's like we really don't interact that much, it's like the professor gets on, or teaches, and then that's it. Like I I personally don't interact too much." (P13)

> *"So what she does on Zoom is make breakout sessions, break out rooms, sorry. So it's randomly assigned, so you don't know what group you're going to be in, so you end up in a room, and say the group is five people. Four people will have their microphone off the camara off, and you now have to do a group assignment."* (P14)

Participant 24 also described very little interaction with peers during remote learning; she's part of a group chat, but doesn't talk in the chat, preferring to talk via text with one or two peers only. Interviewer asked participant 24 how this compares to peer interaction during in-person learning, asking how often she interacts with peers or asks questions. Participant said, *"I mean I can't really put a number on it. Just you know when I need help. But I know I talk to them way more in person than I do now."*

Remote Location

Loss of Supplies/Resources

Overall, participants reported some loss of recourses. Commonly, resources that they lost when learning became remote were the library as a quiet place where they could have focused study, and the lab where students had access to software they needed for their courses. At least one participant reported currently needing a printer and not having access to one. Participant 7, among others, cited the library. Participant 13 also said that *"definitely the library"* was a resource that she used as an undergrad (when learning was on campus*) "probably like once a week."* Participant 22 said that she used the library to print. When asked where she prints since the library closure due to the pandemic, she replied that she needed to get a printer (but currently uses apps as a replacement). Participant 11 also cited the library as a resource used prior to the pandemic:

> *"So most of the time when I used to do that I would go into the library and get my homework done but now that you can't go into the library anymore."* (P11)

Inadequate Internet Connection

Participants interviewed had access to in-home internet. There were some participants that reported losing connection periodically. A small number of participants had breaks in connectivity that resulted in missing at least some class time. We also discuss ways in which participants had to adjust to relying on their private internet connection.

Participant 8 moved back to her family's home when things became remote and had to adjust to the inconsistent internet. She had to up the data on her phone to use it as a mobile hotspot. She has since moved to an urban area with better internet, but reported that even here the internet connection drops once a day.

Participant 16 reported that in Spring semester 2020, he got kicked out of his internet about twice per class in that semester, and sometimes got kicked out of his internet at the beginning of Fall 2020 semester. He reported that now his internet is stable. Participant 10 lost Wi-Fi the day her finals were due. She also reported it being "rough" that sometimes due to professors' bad internet kicking them (the professor) out of class.

> *"Sometimes I would have poor connection so like sometimes if my professors tried to talk to me, I couldn't respond, or it would be choppy, or they couldn't hear me."* (P10)

Participant 3 connected to classes via his phone and reported that he lost service *"here or there"* but was able to connect to classes a majority of time. Participant 11 generally connects from her laptop, but sometimes has to log out of the Zoom meeting and join from her phone when the connection is bad.

Inadequate Technology (Device)

The switch to remote learning has exacerbated existing inequalities between students. Prior to Covid-19, students who could afford reliable internet, a good computer and printer had access to these devices. (In this context we define *good* as a reliable device that can run all software required by student's courses.) They likely had their one laptop, and either purchased a printer or used the ones available on campus. Students who could not afford a good computer and printer still had access to a computer on which they could run the necessary software for their classes and also a printer. But now, the latter category might be left simply without access to adequate technology. Two participants did not have computers that could handle the software necessary for their major: one used some savings to buy a new laptop. One uses a Chromebook and codes on repl.it (an online I.D.E). Participant 1 explained that some of his students have to share a family computer and so did not always have access to a computer when needed. A lot of students *"will use their phone to communicate because for whatever reason their computer uh is just too slow to be able to (inaudible) online connection."* Various participants don't have access to printers now. Another area in which we see exacerbation of inequalities is in the working environment, discussed in following sections.

Inadequate Working Environment

We have found in our investigation that generally, students interviewed have a harder time learning from an online classroom than an in-person one. It is pertinent to note that these students had mostly studied in physical classrooms in the past. That is, for most of them, they had little experience studying virtually. But this is nonetheless a cost of the switch to remote learning. We have also found that overall, participants gained benefits from the switch to remote learning. Participants were able to work and attend school, in some cases that wouldn't have been possible without the online learning option. No commute was another general benefit. There were notable exceptions. Not all participants struggled with remote learning. In fact, a participant that never was comfortable in the physical space of academia has benefitted. Nevertheless, prior to the pandemic, these students learned in the same physical space for lectures. That is, their learning environment for lectures was the same for all students. Their studying environment might have varied, but there were some options for students whose home environments didn't foster focus and productivity: university library, labs, possibly the public library. Since the switch to remote learning, participants have been generally confined to their home space. In fact, only one participant detailed studying in a place that was neither his home nor work (in academic labs). This means that students with their own room or a reserved space without distractions have an advantage over students that don't have this access. For example, participant 17 and 7 work from home, as do her family:

"Especially because my mom is right in front of me, and my brother is like a couple feet away from me. So he's in class on the other side and my mom is in front of me talking about work in the other area. So like I just get distracted with that." (P17)

"...our home wasn't really ready for three people to be working from home." (P7)

Participant 10 also had distractions by household members. She related that her parents didn't know when she was in class, so they would look to see what she was doing, or continue to call her, which she says was distracting. Her perspective was that her remote environment harmed more than helped her. Participants 13 and 9 were examples of participants whose home workspace had distractions that interrupted their work:

"when you're home and it's like your family's home, and it's, oh can you do this, or do this, or people are talking to you and you'e in the middle of class, it's pretty distracting...it's I guess every time I have a class, or I'm in classes, always someone coming in my room asking me about something, or some–like every time I have class, I guess I guess there's distraction pretty much, and I have classes twice a week, so." (P13)

"... I have a younger sister and sometimes she will play her music really loud, and I have 2 dogs at my house at my family's house so they will bust in the door. People are in and out the house and then my parents don't know or always realize that I'm in class sometimes and will come in my room talking to me and I'll be in zoom or sometimes taking an exam...they don't really realize um and of course when I tell them they stop but of course they will stop but it's kind of distracting you know because in college you can go to the library or you have your own room where you can just focus." (P9)

Distractions in Remote Workspace
While there was some overlap in the previous and current section, this section is dedicated to looking at elements of participants' remote workspace that presented challenges but without rising to the level of creating what author one interpretated as an inadequate working space. Mainly, these are the distractions inherent to a home workspace generally controlled by participants.

Participant 14 found it quite difficult to study while he only had his bedroom as a study space, as it was very difficult to work *"right next to (his) bed."* Participant 6 does his homework while on break, at work. He has access to a room at work where he can focus. However, he is sometimes interrupted by things that come up. Various other participants reported some distractions from household members. Various participants reported difficulty working from home. For example, participant 8 related that in October of 2020, she felt distressed, and realized it was because she was literally living in her workspace. She took measures to find a solution by dedicating three places in her home where she expressly worked and stopped working in her bedroom. Participant 5 reported it being a challenge to work at home because it's not a conducive environment to working: *"your home is your home; you don't do work here."*

To evaluate whether they have an adequate working environment, we must consider whether the student or faculty member is dealing with added challenges that can be managed, or barriers beyond this. For example, participants that cite the lack of obligation to be visibly present and interact still control this distraction. Does a student whose only study space is a desk next to their bed in their bedroom have an adequate working environment? Do participants whose workspace is "a few feet" away from a younger sibling studying his own classes and a parent working from home have access

to an adequate working environment? What is clear is that this is at the least, somewhat of a disadvantage from students who have a distraction-free space in which to study, especially if it is not their bedroom.

In evaluating the workspace of participants during Covid-19, we can divide the challenges and barriers created by the remote workspace (or rather, created by the lack of access to campus study and lecture spaces) into two categories: those that participant controls and those that participant does not control. There were various participants that cite challenges in the workspace belonging to the former category: they can look at their phone, they're at home so they have opportunity for distraction, they are not required to be physically or even sometimes visibly present nor interact, so they have the freedom to pay attention to other things while in class or instead of class. We are more concerned with the challenges and barriers in remote workspaces of the latter category, those that participants don't control. A significant number of participants do not have a space available that they can dedicate to work. Many participants were working from home alongside siblings and parents. All of the participants had access to internet, but several participants had some instability in their internet connection. Once again, this may not disqualify their working space at adequate, but it undoubtedly puts them at a disadvantage to students that don't have to deal with a drop or stoppage of internet connectivity.

5   Conclusion

We found that students and faculty were impacted by the pandemic directly, and also by the challenges presented by remote learning. The former was loss of life or health of persons close to participants, reported by some, and the fear and stress of living in a pandemic, more frequent and pronounced in the case of participants with high-risk family members. Remote learning presented participants with challenges and in some cases obstacles that had not been present in the in-person learning environment.

With respect to the remote learning environment, the sudden switch to remote learning had the most significant impact on participants whose home environment does not provide for a private workspace. For these participants, distractions from household members create a challenge that participants may not be able to control. As to environment distractions that participants do control, it seems that participants that faired best in remote learning were those that adapted to the remote situation by managing those distractions or finding new ways of learning. There was a clear trend to engage less in lectures. Participants overall find video lectures less engaging. Some participants struggle learning materials. Others changed their approach to academic learning to rely more on self-learning.

With respect to engagement, there was a clear trend toward less engagement both among peers and between students and their instructors. The exceptions were participants that had high participation in remote communication like Slack. That is, participants who were able to adapt to new technologies to replace in-person communication in order to create or maintain connection. The remote classroom seems to be a more difficult place for students to participate, because social interaction is less "natural" in an online classroom than in an in-person classroom. As a significant

number of participants that reported mental drain or stress or fear due to the pandemic, it's possible that this affected mental state, combined with a more "draining" learning experience and a more challenging communication channel contributed to lower student engagement.

Finally, we address the resourceful ways participants are adapting. Participants that can no longer see each other in person are connecting via Facetime or phone calls. Participants that used to rely on community-based learning on campus are using Reddit communities to read about the course topics they are covering for supplementary information. Now that students cannot have study groups in person, they have created group texts where they discuss courses, remind each other of upcoming deadlines, and help each other with coursework.

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