

The comparative effect of remote instruction on students and teachers

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SUMMARY

In March 2020, it was announced that the United States would undergo a lockdown. COVID-19 disrupted education systems globally, with schools transitioning from in-person learning to remote instruction. This change in the classroom setting greatly affected students and teachers alike. Students learning remotely were easily distracted due to their environment, and teachers lacked experience teaching a class virtually. Our research was designed to explore remote classroom instruction from both students' and teachers' perspectives in hopes of discovering the academic and social impact of remote learning. Being aware of the opinions of students and teachers can help to recognize flaws in remote learning, as well as identify possible improvements that can be made to current virtual systems implemented by schools. In this study, high school students and teachers responded to a survey consisting of Likert-type scale, multiple-choice, and open-ended questions regarding various aspects of remote instruction. After analyzing the data collected, we found that remote learning impacted high school students academically and socially. Students took longer to complete assignments, and both students and teachers felt that students do not learn as much in remote learning compared to in-person instruction. Additionally, students were not collaborative during group work. There was also difficulty in forming student-teacher bonds. However, most high school students demonstrated a comprehensive understanding of the topics, and an overall negative impact on students' grades was not detected. As for sleep, there were mixed responses as to whether students received more sleep during remote instruction.

INTRODUCTION

In March 2020, SARS-CoV-2 was declared a pandemic by the World Health Organization (1). The virus disrupted school education systems all over the world. Beginning in late February of 2020, governors across the nation were ordered to close schools, affecting at least 50.8 million students (2). Consequently, many schools transitioned to remote instruction, in which video conferencing platforms,

such as Zoom, were used to present synchronous lessons. However, real-time instruction in a remote environment posed its own drawbacks. In a study that surveyed students from James Madison University, the workload in a remote setting was reported to be more intense than in a face-to-face setting (3). This pattern was seen in another survey, in which researchers collected responses from over 10,000 high school students across the United States. Over half of the students agreed that their workload appeared to be excessive in a remote setting (4). Moreover, approximately half of the respondents reported a decrease in social engagement and a reduction in the strength of student-teacher bonds. On average, for the Fall 2020 semester, 47% of the surveyed students reported that the strength of their relationships with their peers decreased, feeling less connected in the virtual classroom (4). Besides classroom interactions, virtual learning also impacted students' sleep schedules. In the same study, 43% of students said their amount of sleep had decreased compared to before the pandemic when classes were in person. Researchers from Simon Fraser University also reported similar findings (5). They initially predicted that students would have gotten more sleep in a virtual classroom since they did not have to commute to the university to attend their classes (5). However, after a comparison between the data collected from 80 students enrolled in a summer course at the university and the previous samples of those students from previous summer semesters, the researchers found that students had less sleep despite attending virtual classes (5).

Teachers also faced challenges while teaching in a remote setting. In a study conducted by the Research and Development Corporation, which surveyed 1,082 teachers and 1,117 school leaders regarding the 2020-2021 school year, more than half of the teachers reported that they were falling behind the curriculum compared to their typical, pre-pandemic pace (6). Educators who taught in a fully remote setting said that there also appeared to be a problem with attendance, with a handful of students who did not attend class daily (6). Less than half of teachers reported being satisfied with the decision and system their schools implemented for remote instruction. In fact, over 50% of the teachers surveyed expressed feelings of burnout (7). Furthermore, in a remote setting, teachers also faced problems concerning grades. In a charter school in Tulsa, Oklahoma, a sixth-grade social studies teacher had 22 out of her 86 students nearly fail her

class in the first marking period (8). Some teachers also noted that students were failing more than ever in virtual learning (8). Similarly, in Fairfax County, Virginia, the percentage of English learners in middle school and high school who failed two or more classes increased to 35% from the previous year of 17% (8). This pattern of students failing a course could also be seen in higher education. In a study conducted by researchers at Fairfield University, 30% of students did not finish an online course in question, either failing the course, withdrawing, or not completing it (9). On the other hand, in in-person courses, none of the students failed to complete courses and more than half received a final grade in the A range (9).

Many previous studies have addressed the drawbacks of virtual education; however, few have examined the student vs. teacher perspectives on this topic. Therefore, we designed this research study to gather students' and teachers' opinions on aspects of remote learning, such as remote environment, students' workload, grades, comprehension of the material, classroom interactions, and sleep, in an attempt to improve the systems and instructions implemented by schools. We hypothesized that, from a students' perspective, remote learning would cause students to: 1) take longer to complete assignments as compared to face-to-face due to more distraction in a virtual setting, 2) have a harder time understanding class lessons, 3) earn lower grades as compared to pre-pandemic education, 4) feel less connected with teachers, 5) experience a lack of collaboration among peers, and 6) get less sleep. From a teachers' perspective, we hypothesized that: 1) students would be more distracted in a virtual classroom, 2) a remote setting would limit their teachings, 3) there would be a noticeable decrease in student grades, 4) it would be more difficult to bond with students, and 5) there would be a reduction in student collaboration.

Our study concluded that students were impacted both academically and socially by remote learning. The environment at home distracted students. They were taking longer to complete homework assignments, which correlated to a rise in procrastination. Students' responses as to whether their grades had improved during remote instruction were mixed— some agreed that grades improved while some disagreed. Most teachers reported that students' grades improved in a virtual classroom. All agreed that students learned less in remote learning. However, students reported that they understood the topics taught by teachers. In a virtual classroom, most teachers believed that there was collaboration among students, whereas the students disagreed, favoring the statement that there was no collaboration. Over half of students believed that they were not forming meaningful bonds with teachers; in contrast, teachers presumed students were connecting with them. There were also mixed responses from students regarding the amount of sleep they got as compared to before the shift to a remote setting.

Our research was designed to explore remote classroom instruction from both students' and teachers' perspectives

in hopes of discovering the academic and social impact of remote learning. From our findings mentioned previously, we found that students' and teachers' outlook on remote instruction were very dissimilar, despite being affected by the same situation. Being aware of the opinions of both students and teachers can improve education by helping to recognize flaws in remote learning and identifying possible improvements that school officials can make to current virtual systems implemented.

RESULTS

Students and teachers were surveyed to determine their opinions on various aspects of remote learning, including topics such as environment, workload, grades, comprehension, classroom interactions, and sleep. Both surveys included multiple-choice, Likert-type scale, and open-ended questions.

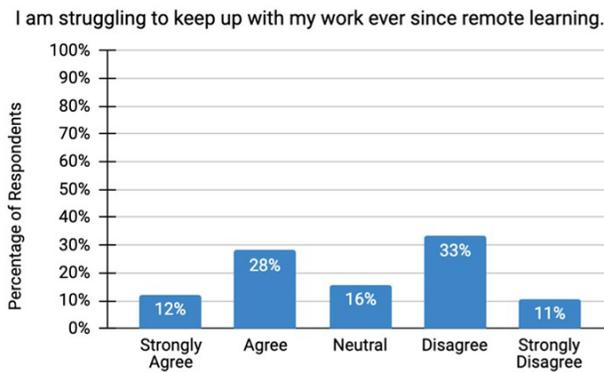
Homework and environment

There was a bimodal distribution for students who agreed and disagreed with having trouble managing their work (**Figure 1A**). Nevertheless, 62% of the students agreed that they were taking longer to complete homework assignments in a remote setting (**Figure 1B**). Two-thirds of the student respondents reported taking anywhere from three to six hours to complete their homework (**Figure 1C**). Seventy-eight percent of students noted that they were procrastinating on assignments more frequently compared to when they were in school (**Figure 1D**). The environment at home also impacted some students (**Figure 1E**). In an open-ended response question, 20 out of 33 respondents reported that the home environment was distracting as there was a greater availability of electronic devices where students could surf the internet while working (**Appendix A**). Other distractions mentioned included being in an environment with a loud background, helping younger siblings with their assignments, and being involved in familial activities (**Appendix A**).

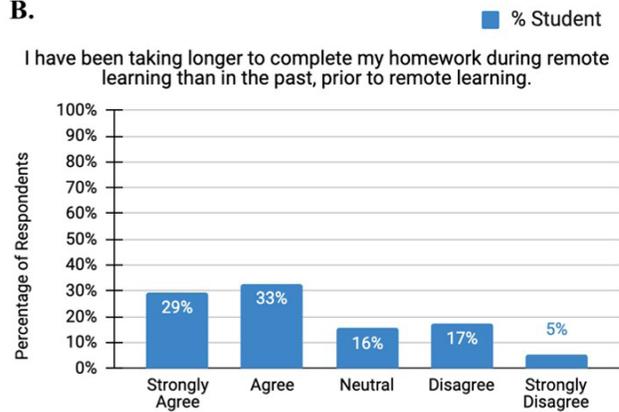
Workload

Students reported mixed perceptions regarding their teachers' flexibility and understanding of their school workload (**Figure 2A**). Although 21% of teacher respondents disagreed that their perspectives on student workload and technology changed due to remote learning, 79% of teacher respondents agreed that their views changed (**Figure 2B**). In a free-response question, teachers elaborated how their perspectives changed due to remote instruction. A handful responded that they consciously reduced student workload. One teacher reported that in a remote setting, they cut their students' workload in half. Similarly, another explained how he or she would spread the assignments out over several days so that there would not be many assignments for the students. Others responded that they limited the amount of work during the class period where information taught would be disseminated into smaller amounts (e.g., shorter videos).

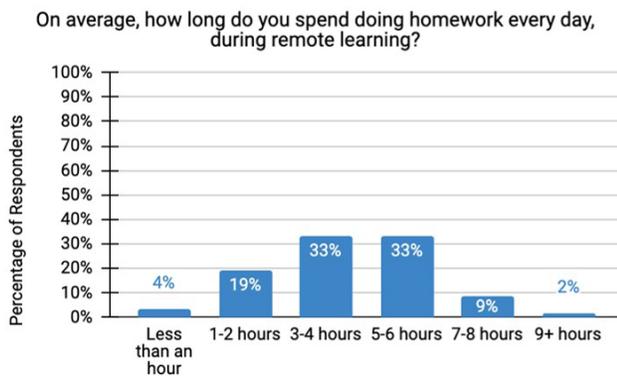
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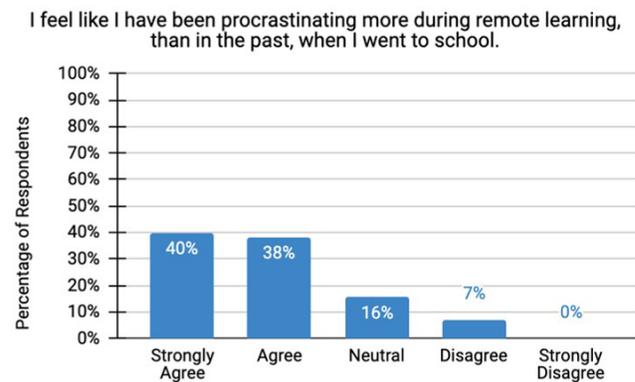
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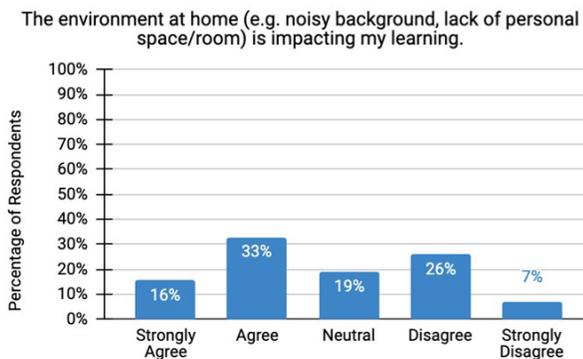


Figure 1. Students were surveyed about their homework and environment in remote instruction. A) Student's management of workload. There is a bimodal distribution, with 40% of students expressing difficulty to manage the workload and 44% of students able to accomplish their work in a timely manner without any difficulty. **B)** Comparison of the duration of homework during remote instruction to prior to remote instruction. Of the students surveyed, 62% collectively agreed that they spend more time on homework during remote instruction. **C)** Duration of homework during remote instruction. Two-thirds of students spent 3 to 6 hours on homework every night. **D)** Procrastination during remote instruction. 78% of students reported procrastinating more during the remote year. **E)** Impact of students' remote environment on their academic performance. Students respond on whether their at-home environment has been affecting their learning. Responses were mixed, with 49% of students claiming yes and 33% of students claiming no.

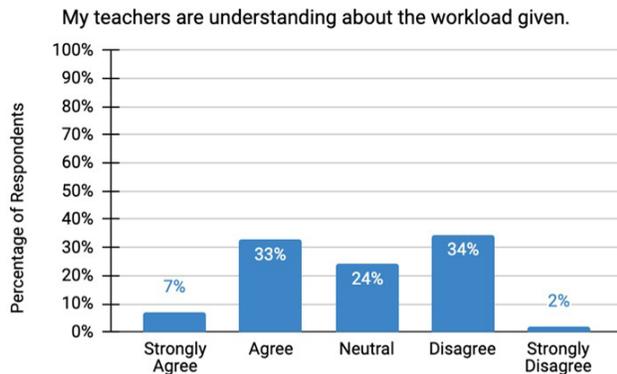
Although the class time for a period in remote learning was the length of a standard double period (75 minutes), a teacher reported that they could "not complete two lessons during that period"; one lesson could be accomplished successfully, but activity and engagement declined when doing two lessons. Furthermore, 47% of the students also agreed that they felt more calm and relaxed learning remotely, as opposed to an in-person environment (Figure 2C).

Comprehension and grades

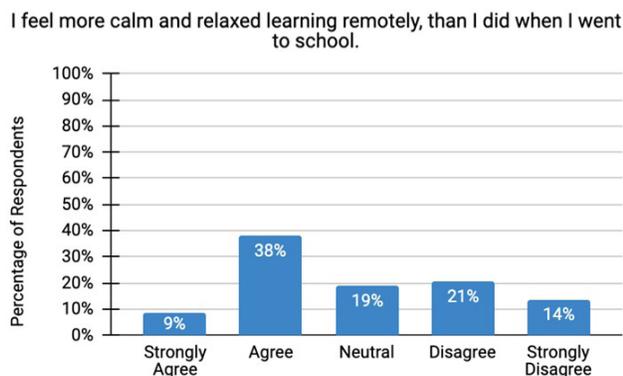
The responses among students as to whether their grades had improved during remote instruction were uniformly distributed (Figure 3A). In contrast, 58% of teachers surveyed

agreed that students' grades had improved during remote instruction. Both sides concurred that students learned less in remote learning than if they were in-person (Figure 3B). In a remote setting, teachers felt as though their teaching had been limited (Figure 3C). In an open-ended question, approximately 83% of the teacher respondents replied that it was harder to facilitate class discussions and that some activities could not be done remotely. Despite the limitations, 57% of students agreed that they understood the topics being taught by teachers in a remote classroom (Figure 3D). Nonetheless, in a question regarding both sides' views on if students were easily distracted and lost focus during remote learning, 78% of students felt that they were easily distracted

A.



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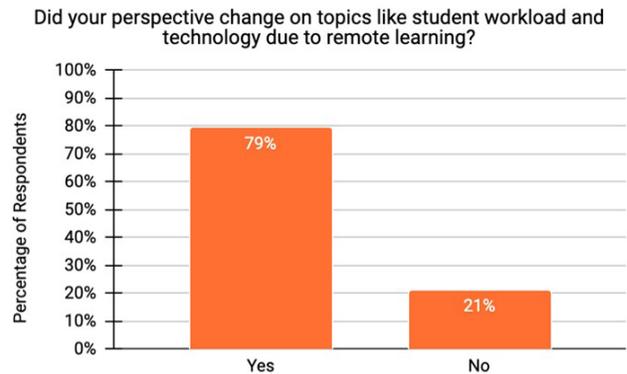


Figure 2. Students and teachers were surveyed about their respective perspectives on student workload. A) Students' perspective of teachers' leniency towards workload during remote learning. The graph displays students' responses on whether their teachers have been understanding about the workload given. There is a bimodal distribution, with collectively 40% of respondents agreeing and 36% disagreeing. **B)** Teachers' shift in perspective due to remote learning. Graph of teachers' responses regarding the change in their views on various topics, such as workload and technology. Of the teachers surveyed, 79% reported that their mindset had adjusted, as a result of the remote circumstances. **C)** Students' mental wellbeing during remote learning. Students' opinions on whether they feel more calm and relaxed during virtual learning, in comparison to in-person learning. Of the student respondents, 47% agreed while 36% disagreed.

in a home environment, but only 42% of teachers felt that students lost focus (**Figure 3E**).

Classroom interactions

Despite being in a remote setting, 83% of teachers surveyed presumed that they were bonding with their students, yet 64% of students disagreed and felt that they were not forming a connection with their teachers (**Figure 4A**). Regarding collaboration with their peers in remote learning, students' responses were skewed towards the idea that collaboration did not exist in a virtual classroom (**Figure 4B**). On the contrary, teachers' responses were slightly skewed towards the idea that there was collaboration among students (**Figure 4B**). Of the students surveyed, 58% of them voiced their displeasure with breakout rooms, which were frequently implemented in virtual classes by teachers (**Figure 4C**). In an open-ended question, numerous students reported that breakout rooms tended to be silent and awkward, and classmates usually were unresponsive. One student commented that they "find it frustrating when teachers constantly put us in breakout rooms and expect social interaction" (**Appendix B**). A student expressed their dislike of breakout rooms as "everyone is on mute and their camera is off" and "it is the worst feeling of having classwork to do, [since most of the time] no one in the

breakout room is trying to help" (**Appendix B**). Furthermore, another student shared that most of the time, the breakout rooms were silent and there were no replies; as a result, the students ended up doing all the work by themselves rather than together with their peers (**Appendix B**). In an open response directed to teachers, some reported how sometimes breakout rooms were silent and sometimes they were not, depending on the students (**Appendix B**). A teacher who disliked the lack of discussion in breakout rooms started using pre-assigned permanent breakout rooms, hoping to build up some familiarity (**Appendix B**). Surprisingly, another teacher reported that seniors, who tended to have their cameras on, discussed the prompts, creating a sense of collaboration, while freshmen when told to work together to complete an activity, ended up working on their own and rarely spoke to each other (**Appendix B**). Some teachers stated that they were "encouraging [students] to turn on their cameras (if possible) in breakout rooms" as it was something they wanted to happen on a regular basis (**Appendix B**).

Sleep

There was a near-equal distribution as to whether students

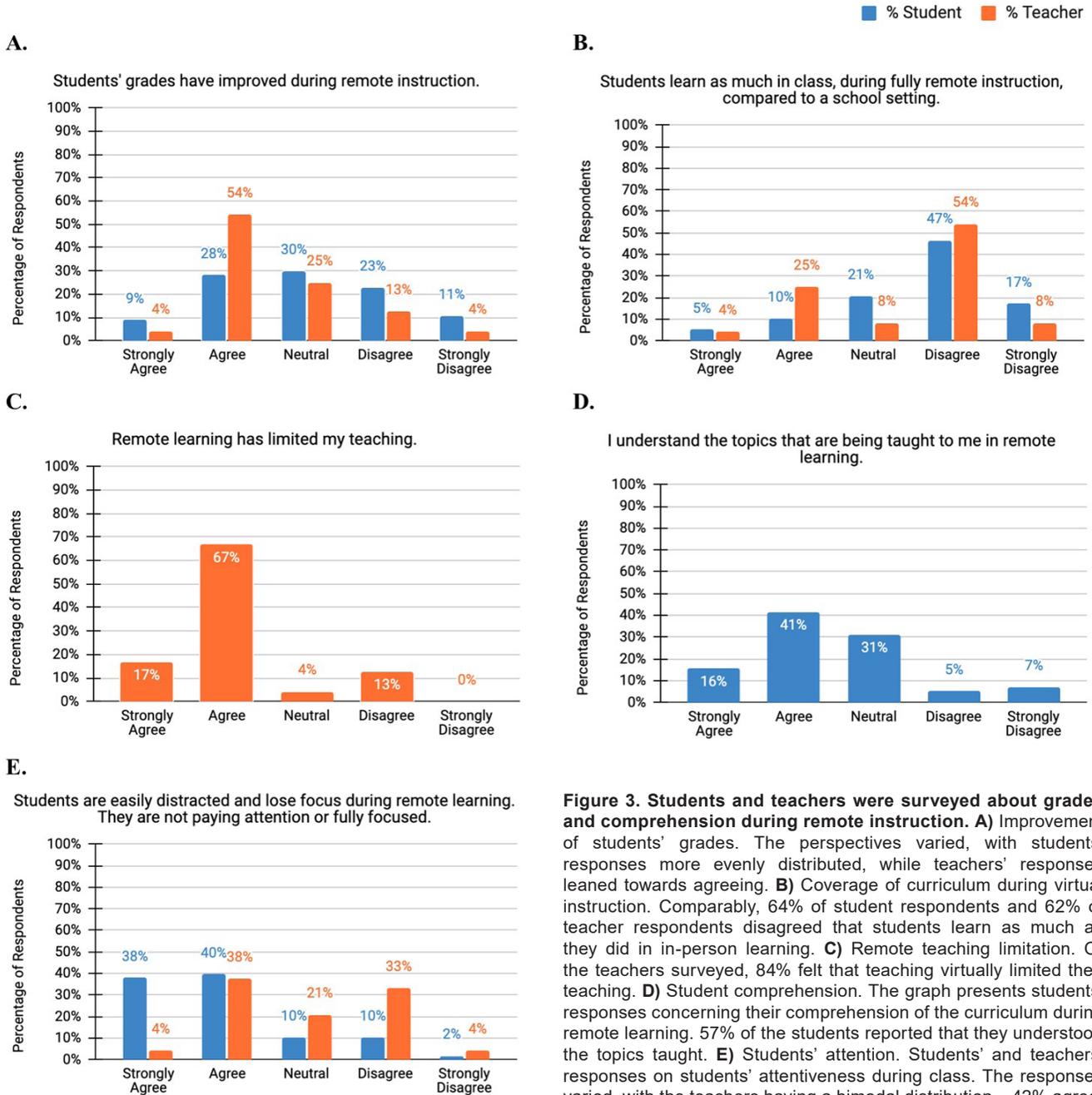


Figure 3. Students and teachers were surveyed about grades and comprehension during remote instruction. A) Improvement of students' grades. The perspectives varied, with students' responses more evenly distributed, while teachers' responses leaned towards agreeing. **B)** Coverage of curriculum during virtual instruction. Comparably, 64% of student respondents and 62% of teacher respondents disagreed that students learn as much as they did in in-person learning. **C)** Remote teaching limitation. Of the teachers surveyed, 84% felt that teaching virtually limited their teaching. **D)** Student comprehension. The graph presents students' responses concerning their comprehension of the curriculum during remote learning. 57% of the students reported that they understood the topics taught. **E)** Students' attention. Students' and teachers' responses on students' attentiveness during class. The responses varied, with the teachers having a bimodal distribution—42% agree, 37% disagree—while students heavily leaning towards agree—78%.

had gotten more hours of sleep during remote instruction (Figure 5A). The amount of time students slept varied, with the mean, median, and mode of the responses being seven hours (Figure 5B).

DISCUSSION

Workload

We hypothesized that remote learning negatively impacted students and teachers in various aspects, including workload, comprehension, grades, class interactions, and sleep. The

data collected regarding workload partially supported this hypothesis. While there were mixed responses to whether students had been struggling to keep up with their work (Figure 1A), the majority had been taking longer to complete assignments during remote learning (Figure 1B). The student respondents reported spending an average of 4 hours on homework every day during remote instruction (Figure 1C). This was, comparatively, significantly higher than the duration students spent on homework prior to the pandemic. After surveying over 50,000 students, a study conducted

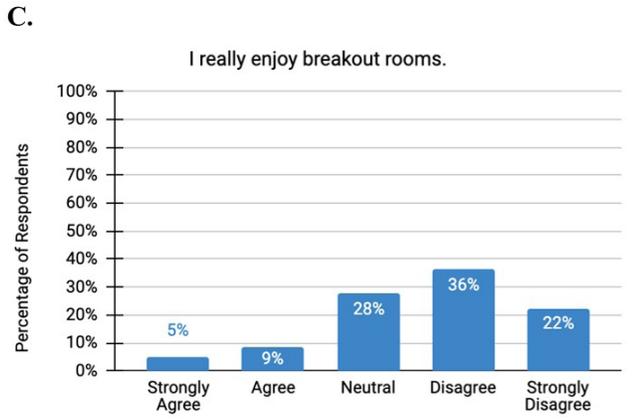
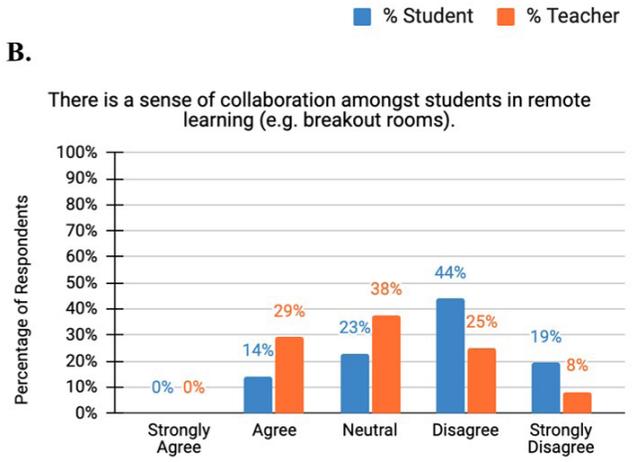
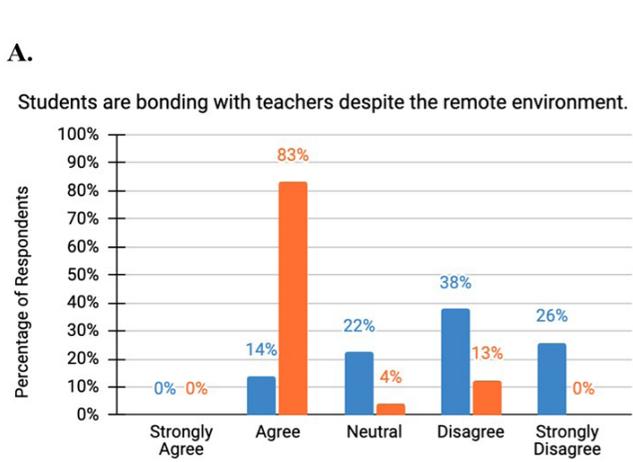


Figure 4. Students and teachers were surveyed about classroom interactions during remote instruction. A) Student-teacher relationship. Students' and teachers' perspectives on if there exist strong student-teacher bonds in remote learning. Responses differed, with teachers' responses skewed towards agree, while students' responses skewed towards disagree. **B)** Peer collaboration. The graph displays students and teachers' perspectives on peer collaboration in a virtual setting. Of the respondents, 63% of students and 33% of teachers sensed a lack of collaboration among students. **C)** Opinions on breakout rooms. The graph shows students' opinions on breakout rooms. Of the students surveyed, 58% of them expressed their dislike of breakout rooms.

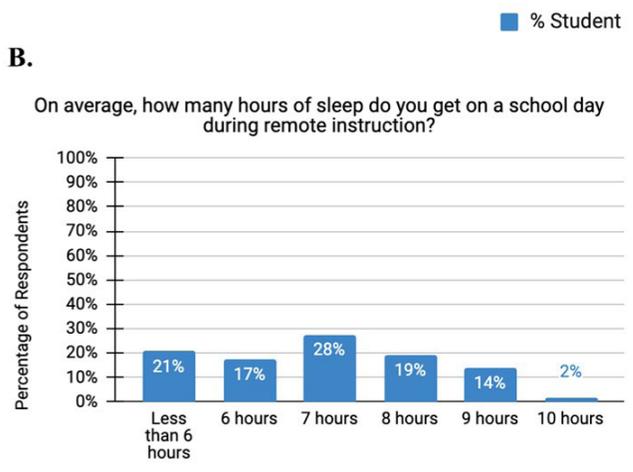
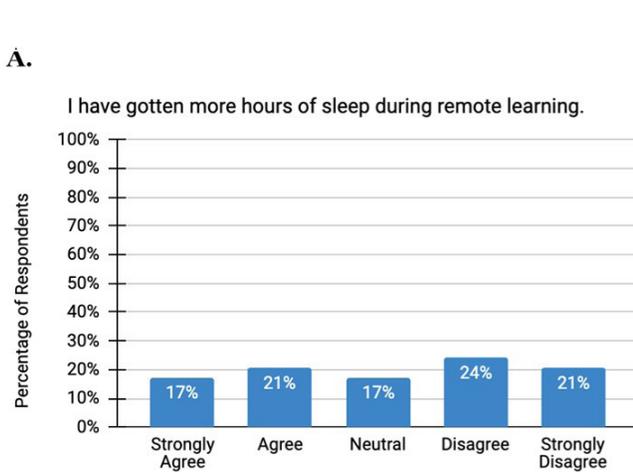


Figure 5. Students were surveyed about their sleep during remote instruction. A) Comparison of students' sleep during remote instruction to prior to remote instruction. The responses were evenly distributed. **B)** Duration of sleep during remote instruction. The graph displays hours of sleep students get each school night. The responses varied. The mean, median, and mode of the student responses were 7 hours.

from October 2018 to January 2020 found that high school students spent an average of 2.7 hours of homework per weeknight (4). The study reported in February 2021 that the average increased to 3 hours per weeknight (4). This disparity may be a direct result of the rise in procrastination among students (**Figure 1D**). The environment in which students worked in may have contributed to the rise of procrastination seen among most of the respondents. According to the data collected, approximately half of the students reported that the environment at home was impacting their learning (**Figure 1E**), and over 75% agreed that they were easily distracted and lost focus during remote learning (**Figure 3E**). In a remote setting, as opposed to in school, students were exposed to many distractions, including electronic devices and loud background noises. In a study that examined the impact of Internet use on procrastination, although the sample was 1,577 German Internet users, it was found that surfing the internet while also performing other activities, was positively correlated with procrastination (10). Although the subjects were different, this indicates that in a virtual setting, students, who now have greater access to the Internet, may be more likely to procrastinate. This procrastination may have been why students took longer to complete assignments. Furthermore, researchers have also discussed that regarding self-regulation failure, one of the most crucial forms of self-regulation was managing one's attention (11). Yet in virtual classrooms, students encountered difficulties in maintaining their attention and failed to self-regulate, as over 75% of students agreed that they were easily distracted and lost focus remotely (**Figure 3E**). As a prime consequence of self-regulation failure, procrastination could have resulted in the piling of workload, making it more time-consuming to complete the assignments. This finding highlights a major consequence of not having face-to-face classes. In in-person classes, teachers were more aware of their students' attentiveness to the lesson. However, in virtual classes, most students had their cameras off, causing many teachers to be unable to gauge whether their students were focused on the lesson.

Comprehension and grades

While most students admitted to not being fully engaged in the lesson, roughly half reported a comprehensive understanding of the topics being taught during remote learning (**Figure 3D**). This finding differed from the initial hypothesis that remote learning negatively affects students' comprehension. Despite that, both students and teachers agreed that students did not learn as much in remote instruction as they would have in a school setting (**Figure 3B**). In another study, 56% of the teachers reported that they have covered half to less than half of the curriculum that they would have typically taught already, alluding that remote learning greatly impacted the amount of the curriculum covered (6). Additionally, over 80% of teacher respondents agreed that remote learning had limited their teaching, with

83% surveyed stating that some class activities cannot be done in a remote setting. However, most teacher respondents agreed that there was no negative impact on students' grades during remote instruction. Fifty-six percent of teachers surveyed found that their remote students' grades were higher than their students from previous years. From student respondents, there was a mixed response regarding whether their grades had improved during remote instruction. This may indicate a difference between a student's self-evaluation of comprehension and their calculated grades. Sometimes, grades fail to provide reliable information about a student's understanding, becoming misleading information instead. For example, grading a student's work could be subjective. In a previous study, 142 high-school English teachers were asked to grade the same English paper; the grade the student received varied from 50 to 98% (12). Inconsistent and varied grades were also found when teachers were asked to grade a geometry paper of a solution to a problem (13). Furthermore, another study attempted to explore the relationship between written feedback and grades and found that the comments failed to help improve the students' performance as the grade would eclipse the feedback (14). Instead, grades fostered anxiety, fear of failure, and decreased enjoyment among students (14). These studies indicate that to students, the teachers' calculated grades are not an ideal standard of their comprehension. On the contrary, the fear and anxiety of getting a failing grade and disappointing adult figures could result in academic dishonesty among students, which was also reported in a study highlighting the rise of cheating in universities remotely (15). When in a physical classroom, teachers can supervise students during tests to prevent them from accessing resources like content sharing websites, question banks, or receiving help from a friend, making it more difficult for students to cheat. Another possible reason for the rise in students' grades or maintenance of the same grade in our study was the lack of open-ended questions and an abundance of multiple-choice questions. A study conducted on college students showed that the subjects performed best on multiple-choice questions and performed the worst on open-ended questions (16). Furthermore, a post-test survey showed that 97% of the students who took the assessment preferred multiple-choice questions because there was a greater accuracy when guessing (16).

Classroom interactions

The results of our survey partially supported our initial hypothesis. We expected that remote learning would negatively change the dynamic of a student-teacher relationship. Seventy-one percent of teachers found it harder to connect with students, and 63% of teachers found it harder to facilitate class discussions. Nonetheless, 83% of teacher respondents believed that students were still able to bond with teachers despite the remote environment (**Figure 4A**). On the other hand, only 14% of the student respondents believed that they were able to bond with their teachers during virtual

classes. While both populations were in the same situation, they had different perspectives on classroom interactions between students and teachers. This is similar to the results of another study where 42% of student respondents reported a decrease in engagement, and 50% claimed that the bond and relationship with their teachers had decreased (4). Additionally, the dynamic of collaborations between students was also impacted negatively (**Figure 4B**). 63% of students surveyed reported that there was a lack of collaboration among students in remote learning. Many students and teachers mentioned that there was rarely communication in breakout rooms, resulting in students working independently rather than collaboratively. In relation to the previous paragraph about workload, a study presented that cooperative collaboration or group work tended to reduce procrastination (17). It was also discovered by other researchers that students preferred to work independently, as group work usually promoted less effort among individuals when compared to performing something independently (18). In connection to our study, the lack of collaborative group work could have possibly led to a rise of procrastination as individuals tended to work alone, so the classwork would turn into an extra homework assignment. However, 29% of teachers surveyed believed that there was a sense of collaboration during remote instruction, compared to the 14% of students who believed this to be the case. Through virtual classes, teachers may have had a difficult time observing students' classroom interactions with other students, supporting that a consequence of remote instruction was teachers' decreased awareness of classroom activities. Our findings on the lack of social interactions among students during the pandemic also posed the question of whether this would affect their communication and collaboration with their peers in the upcoming years during their college and/or professional career since this occurred during teenagers' vital stage of maturity and development. In addition, an open-ended response from a teacher also brought up the possibility of age dependency in communication. From the teacher's observation, they had noticed that their senior students were more communicative in breakout rooms by turning on their cameras, discussing the prompt, and screen sharing. On the contrary, they had noticed that their freshman students tended to be less verbally communicative (as they would communicate through the chat) and complete activities independently. A possibility for this disparity between grades in terms of communication may be that seniors were more familiar with the school, the environment, and other students, compared to incoming freshmen; therefore, seniors were more comfortable to speak with others and collaborate during breakout rooms.

Sleep

Sleep was another significant aspect of students' day that had been impacted by remote learning. It was initially hypothesized that students had gotten less sleep because of remote learning. The data collected was mixed, with 38%

of student respondents stating that they had gotten more hours of sleep, and 45% of student respondents stating that they had gotten less (**Figure 5A**). It is recommended that teenagers between the ages of 13 and 18 should sleep for eight to ten hours a night (19). However, the average amount of sleep the students surveyed normally received on a school night during remote instruction was seven hours (**Figure 5B**). Despite being in a remote setting, two-thirds of the student respondents reported having less than 8 hours of sleep on a school day during remote instruction, which closely compared to the CDC's statistics that 7 out of 10 students do not get enough sleep (20). Alternatively, another medical institution stated that teenagers need 9 to 9 ½ hours of sleep per night (21). While it is debatable that teenagers need more sleep than school-age children, the Chief of Pediatrics at John Hopkins argues that supplemental sleep is necessary to support the physical growth and maturity that occurs at that age range. This means that approximately 85% of our student participants received less sleep than the recommendation from Johns Hopkins. This is very concerning as studies have shown that sleep deprivation negatively affects students' emotional regulation, learning, and overall health. The lack of rapid eye movement (REM) sleep could inhibit the ability to remember, concentrate, and solve problems (22). Students deprived of sleep may also face difficulties in school, such as poor academic performance, disciplinary problems, sleepiness in class, and poor grades (23). Additionally, they were at higher risk of developing mental illnesses, such as anxiety, depression, attention deficit hyperactivity disorder (ADHD), substance use, and suicide ideation. Sleep is a major proponent in a student's physical, emotional, and mental health. With the deprivation of sleep during remote learning, it can affect a student's well-being negatively.

Future directions and limitations

For future studies, we would like to see how students and teachers will adapt to in-person learning after a long period of remote learning. Furthermore, if teachers will adopt some of the learning and skills, e.g., technology, they have acquired in remote learning, and apply it to virtual classrooms also poses an interesting area to investigate. Students and teachers from other schools may have had different experiences with remote learning, bringing up the idea of whether the ranking of the school, academic rigor, and other factors could play a role in the severity of the impact of remote learning. The participants of this study were from Brooklyn Technical High School, a specialized high school located in New York City with a rigorous curriculum and academic competitiveness; therefore, the results of this study may vary from school to school. Additionally, these results may vary as the sample size was relatively small compared to the school population. 58 students and 24 teachers participated in this study, which accounts for approximately 1% of the school population.

In conclusion, remote learning appeared to impact students both academically and socially. It was determined

that students were taking longer to complete class assignments during remote instruction, perhaps due to the rise of procrastination that may have been encouraged by the environment at home. Students also had a mixed view regarding whether their grades had improved during remote instruction—some agreed that grades improved while others disagreed. On the other hand, most teachers reported that they did see a rise in student grades during virtual classrooms. Nonetheless, both sides agreed that students learned less in remote learning. Although the environment at home may have been distracting students, most reported that they understood the topics taught to them. Furthermore, in a virtual classroom, most students felt that there was no sense of collaboration among peers and that they were not forming bonds with their teachers. Yet, most of the teachers believed that there existed collaboration among students and presumed that students were connecting with them. In addition, even though remote learning allowed students to not commute to school and attend after-school clubs, there were mixed responses from students regarding if they got less or more sleep when compared to before the shift to a remote setting—some perhaps spent the spare time on other activities. With our findings, flaws within the integrated virtual classroom system can be recognized and worked on to improve the remote learning experiences of students and teachers.

MATERIALS AND METHODS

The participants of this research study were students and teachers from Brooklyn Technical High School, a specialized public high school located in New York City. The survey was issued on the school's daily announcements and was promoted on social media and by faculty members throughout the months of January 2021 and March 2021. After collecting responses for over two months, a total of 58 students and 24 teachers participated in this study. The student respondents consisted of 2 freshmen, 48 sophomores, 2 juniors, and 6 seniors. Of the teacher respondents, the teachers varied from teaching high school freshmen to seniors.

Two surveys, one for students and one for teachers, were designed to conduct this study. The surveys were used to identify students' and teachers' opinions, as well as any differences in perception towards remote learning. The questions for the student survey were developed to investigate the subjects most relevant to students shifting to a remote learning model. The questions for the teacher survey were primarily in correspondence to the questions in the student survey to gain a teacher's point of view on the same topics.

Questions on the survey were in a Likert-type scale, multiple-choice, or open-ended format and pertained to various aspects of remote learning, such as homework, grades, comprehension, and classroom interactions. The approximate time it took students and teachers to complete the survey ranged from 5 to 7 minutes. The student survey consisted of 38 questions, 13 of which related to workload and environment, 4 of which related to comprehension and

grades, 14 of which related to classroom interactions, 2 of which related to sleep, and 4 of which were questions for a specific grade (**Appendix C**). There were 10 multiple-choice questions, 24 Likert-type scale questions, and 4 free-response questions included in the student survey. The teacher survey consisted of 23 questions, 3 of which related to workload, 2 of which related to comprehension and grades, and 17 of which related to classroom interactions (**Appendix D**). There were 10 multiple-choice questions, 8 Likert-type questions, and 5 free-response questions included in the teacher survey. All the questions for both surveys were not mandated, so some surveys submitted were incomplete. The survey was sent out to 170 students, with a response rate of 34% for the student survey. Out of the 58 survey responses received from students, the completion rate was around 83% and 10 were partial responses, skipping at most two questions. The survey was sent out to 100 teachers with a response rate of 24%. For the responses collected from teachers, there was a completion rate of 63% with 9 out of 24 responses being incomplete, not answering at most three questions.

The responses to questions that were targeted to a particular cohort were reported in a bar graph. The responses to questions that were asked to both students and teachers were combined into a single bar graph to compare the results side-by-side. In the charts, every point in the Likert-type scale corresponded with the percentage of responses from teachers and/or students who selected it.

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REFERENCES

1. "Coronavirus Disease (COVID-19) - Events as They Happen." *World Health Organization*, World Health Organization, www.who.int/emergencies/diseases/novel-coronavirus-2019/events-as-they-happen.
2. Decker, Stacey, *et al.* "The Coronavirus Spring: The Historic Closing of U.S. Schools (A Timeline)." *Education Week*, Education Week, 8 Feb. 2021, www.edweek.org/leadership/the-coronavirus-spring-the-historic-closing-of-u-s-schools-a-timeline/2020/07.
3. Stern, Barbara Slater. "A Comparison of Online and Face-to-Face Instruction in an Undergraduate Foundations of American Education Course." *Contemporary Issues in Technology and Teacher Education*, vol. 4, no. 2, 2004, pp. 196–213.
4. Riedel, Kari. "Kids Under Pressure." *Challenge Success*, 14 May 2021, www.challengesuccess.org/resources/kids-under-pressure-a-look-at-student-well-being-and-engagement-during-the-pandemic/.
5. Smit, Andrea N., *et al.* "Impact of Covid-19 Social-Distancing on Sleep Timing and Duration during a

- University Semester.” PLOS ONE, vol. 16, no. 4, 2021, doi:10.1371/journal.pone.0250793.
6. Schwartz, Sarah. “Survey: Teachers and Students Are Struggling With Online Learning.” *Education Week*, Education Week, 1 Dec. 2020, www.edweek.org/teaching-learning/survey-teachers-and-students-are-struggling-with-online-learning/2020/11.
 7. Diliberti, Melissa, and Julia Kaufman. “Will This School Year Be Another Casualty of the Pandemic? Key Findings from the American Educator Panels Fall 2020 COVID-19 Surveys.” 2020, doi:10.7249/rra168-4.
 8. Belsha, Kalyn. “The Empty Gradebook: As Students Struggle with Remote Learning, Teachers Grapple with Fs.” Chalkbeat, Chalkbeat, 7 Dec. 2020, www.chalkbeat.org/2020/12/7/22160183/students-struggle-with-remote-learning-teachers-grapple-with-failing-grades.
 9. Sapp, David & Simon, James (2005). “Comparing grades in online and face-to-face writing courses: Interpersonal accountability and institutional commitment.” *Computers and Composition*, 22(4), 471-489.
 10. Reinecke, L., *et al.* (2016). Permanently online and permanently procrastinating? The mediating role of Internet use for the effects of trait procrastination on psychological health and well-being. *New Media & Society*, 20(3), 862–880. doi:10.1177/1461444816675437
 11. Baumeister, R. F., & Heatherton, T. F. (1996). Self-Regulation Failure: An Overview. *Psychological Inquiry*, 7(1), 1–15. doi:10.1207/s15327965pli0701_1
 12. Starch, D., and Elliott, E.C. (1912) Reliability of the Grading of High School Work in English. *School Review*, 20, 442-457. doi: 10.1086/435971
 13. Starch D, Elliott EC. Reliability of grading work in mathematics. *School Rev.* 1913;21:254–259
 14. Pulfrey, C., Buchs, C., & Butera, F. (2011). Why grades engender performance-avoidance goals: The mediating role of autonomous motivation. *Journal of Educational Psychology*, 103(3), 683–700. doi: 10.1037/a0023911
 15. Newton, Derek. “Another Problem with Shifting Education Online: Cheating.” *The Hechinger Report*, 8 Apr. 2021, hechingerreport.org/another-problem-with-shifting-education-online-cheating/.
 16. Cheng, Hsiao-fang. “A Comparison of Multiple-Choice and Open-Ended Response Formats for the Assessment of Listening Proficiency in English.” *Foreign Language Annals*, vol. 37, no. 4, 31 Dec. 2004, pp. 544–553., doi:10.1111/j.1944-9720.2004.tb02421.x.
 17. Karau S. J., Williams K. D. (1993). Social loafing: a meta-analytic review and theoretical integration. *J. Pers. Soc. Psychol.* 65 681–706. 10.1037/0022-3514.65.4.681
 18. Klingsieck, K. B., *et al.* (2013). Why Students Procrastinate: A Qualitative Approach. *Journal of College Student Development*, 54(4), 397–412. doi:10.1353/csd.2013.0060
 19. Paruthi, Shalini, *et al.* “Consensus Statement of the American Academy of Sleep Medicine on the Recommended Amount of Sleep for Healthy Children: Methodology and Discussion.” *Journal of Clinical Sleep Medicine*, vol. 12, no. 11, 15 Nov. 2016, pp. 1549–1561., doi:10.5664/jcsm.6288.
 20. “Sleep and Health.” Centers for Disease Control and Prevention, Centers for Disease Control and Prevention, 29 May 2019, www.cdc.gov/healthyschools/sleep.htm#:~:text=About%20%20out%20of%2010,enough%20sleep%20on%20school%20nights.
 21. “Teenagers and Sleep: How Much Sleep Is Enough?” *Johns Hopkins Medicine*, www.hopkinsmedicine.org/health/wellness-and-prevention/teenagers-and-sleep-how-much-sleep-is-enough.
 22. Shine, Rise and. “Effects of Sleep Deprivation in Teens: Children’s National.” *Rise and Shine by Children’s National*, Rise and Shine https://riseandshine.childrensnational.org/Wp-Content/Uploads/2017/11/childrens_riseandshine_logo.Jpg, 19 July 2019, riseandshine.childrensnational.org/effects-of-sleep-deprivation-in-teens/.
 23. Carpenter, Siri. “Sleep Deprivation May Be Undermining Teen Health.” *Monitor on Psychology*, American Psychological Association, Oct. 2001, www.apa.org/monitor/oct01/sleepteen.

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APPENDIX A: OPEN-ENDED RESPONSES PERTAINING TO DISTRACTIONS IN STUDENTS' REMOTE ENVIRONMENT

Question: What are some examples of distractions?

Summary: The majority of the student respondents listed electronic devices and family as distractions that contribute to their procrastination.

1. My phone
2. Pets.
3. my brother is playing games on his phone, very tempting... plus all the pots and pans in the background.
4. chores, siblings also remote learning
5. Some examples of distractions include my phone or other websites that are non-educational like Youtube/movie websites.
6. Phone
7. My brother barging into my room, my parents screaming in the background, my door being slightly open (which irritates me a lot)
8. family stuff, extracurriculars, no environment to study provided.
9. I need to help my brother with his work.
10. I mean I procrastinate either way. But my manga, texting, tiktok. My screentime on those are definitely higher.
11. Pets
12. Loud noises from my siblings and having to be more involved in familial activities
13. Online
14. loud siblings, loud pets, trinkets and toys laying around, etc...
15. Television, phone, computer, brothers
16. My family members (parents and sibling), my phone, and video games.
17. family (can be noisy), social media, phone is within arm's reach
18. family
19. Having to use a computer constantly, which messes up my eyes, my back hurts from being glued to the screen for hours a day without much of a break, technology, noise, having to eat while in class due to no break periods.
20. I'm always on devices so I am always facing the decision to either do my homework or to watch netflix or play video games.
21. Noise, siblings, etc
22. Phone, news, Youtube
23. Some examples of distractions are my phone and the internet being easily accessible during remote learning.
24. 1. My computer's availability; it's in front of me the whole day. 2. I fidget around since I'm stuck on the same chair for about 6 hours.
25. Electronic devices, such as my phone and computer.
26. Phone, family members, outside noise, etc.
27. Computer, phone, family, baby, tv, video games, social media.
28. Internet and social media
29. my family members downstairs
30. phone, the ability to just stop what I'm doing and go the internet to browse whatever.
31. Younger cousins not understanding work, Aunt and Grandma not understanding English.
32. My phone and games

APPENDIX B: STUDENTS' AND TEACHERS' OPEN-ENDED RESPONSES PERTAINING TO BREAKOUT ROOMS

Student's Responses	Teachers' Responses
<p>Question: To elaborate on your previous answers regarding breakout rooms, what is your opinion on them and how is your experience with collaborating with your peers in them?</p>	<p>Question: What is an issue or experience you have encountered with breakout rooms, specifically with discussions? What improvements do you wish to see made?</p>
<p>Summary: Overall, the majority of the student respondents found breakout rooms to be awkward and silent. Therefore, breakout rooms lack a sense of collaboration, and many work independently rather than their intended usage of peers working cooperatively. However, there were a few responses that noted their positive experiences in breakout rooms.</p>	<p>Summary: Many teachers reported mixed experiences with breakout rooms. While there were times when collaboration and conversation were present in the breakout room, generally, most breakout rooms were silent and students worked independently. Teachers wish that there was more collaboration within breakout rooms.</p>
<ol style="list-style-type: none"> 1. I rarely talk in breakout rooms, I don't have the urge to communicate. I only use the chat. 2. I chose neutral because it really depends on the class. In Capstone we do long term projects with specific groups/breakout rooms, so we actually get to know and collaborate with classmates more than once, which makes me enjoy breakout rooms and feel a sense of collaboration. However, in other classes we barely spend any time with a single group, so breakout rooms feel too temporary to get to know anyone or feel genuine collaboration. 3. It's kind hard to do anything as a group if everyone has the option of shutting themselves out with an off camera or mic 4. There's really no sense of collaboration between me and my peers in breakout rooms, just complete silence or a few people talking. Unless we have group work, we wouldn't be talking to each other. 5. Most of the time, breakout rooms are silent and no one turns on their microphone to speak even when I say "hello" or ask them a question. As a result, I end up doing the work by myself, rather than together with my peers. 6. I like collaborating in breakout rooms most of the time. However, I feel disconnected from others in my breakout room. Also, they are not always there in front of their device, so they don't participate. 7. No one ever talks in breakout rooms and it's difficult for everyone to be focused and bond over zoom, especially with our cameras off. 8. Breakout rooms: I feel neutral because it depends on the activity we are assigned to do in break out rooms. Personally, I think when teachers send us to breakout rooms for asking each other for help/collaboration that does not work. This is because there are group chats where we can ask for help and more times than none there is no real collaboration going on. However, whenever there's a discussion question assigned/math problem to solve, 	<ol style="list-style-type: none"> 1. Kids generally DON'T talk to each other. They work/struggle alone. 2. I'd love to see active collaboration with each other in breakout rooms, with students helping each other. 3. Some rooms are great. Some rooms have nothing going on. Depends on the mix of students 4. I know the students speak to each other even if I am not there to witness it but I wish they would talk to each other more. 5. It varies, there have been times where a shared screen is on and students are actively discussing the task. 6. I frequently see students preferring to work independently than with others in breakout rooms. I have seen students sharing their screens with each other and working hard but I also have seen, rarely, but I have seen it, where a student left the class from the breakout room. He never told me that he had wifi issues so I just assume he decided to leave. I would like to see students being held more accountable for their in-class work but I don't know how to do that beyond forcing them to put their cameras on like some teachers do. I just don't feel comfortable doing that and I won't. 7. Students who participate become leaders in their breakout groups. This is expected, but I'm relieved it happens during remote learning as well as in-class. I have no specific anecdotes, but I notice this when I pop into the rooms. If there is no leader in the group, even if I designate one, kids are silent. 8. Total silence. 9. So this is very age dependent; my seniors typically have their cameras on and are discussing the prompt, many times even screen sharing which I encourage them to do. The freshmen rarely speak to each other, will likely just put things in the chat, and when I tell them to work together to complete an activity they usually do it on their own and just talk about the

<p>better conversations happen. Sense of collaboration: In virtual it feels very do it yourself, even in group projects. Yes, there may be occasional student zooms for work, I think better collaboration happened in person.</p> <ol style="list-style-type: none"> 9. No connectivity, no relationships 10. Breakout rooms are mainly very awkward because sometimes some people won't respond. Other times, we never get to know each other, it's just getting our work done. Sometimes we don't even talk, just when we have questions. 11. There's those times where the breakout rooms are full of active people who participate and talk, and there's those times where you're the only one talking and it feels like no one cares about the assignment given. Usually it's 1-3 people talking and 2 just remain silent. 12. Some breakout rooms are really interactive and fun while others are just empty and no one says anything. 13. Breakout rooms: I do not like the idea of breakout rooms when everyone is on mute with their cameras off. It is the worst feeling of having classwork to do, and no one in the breakout room is trying to help. Collaboration: It seems as though every person is in it for themselves. There is no sense of classwork any longer. 14. no one speaks in breakout rooms so there's no sense of collaboration 15. Often, breakout rooms are silent and there isn't much of a way to break the ice. Personally, I find it frustrating when teachers constantly put us in breakout rooms and expect social interaction. In reality, there is rarely communication in breakout rooms unless it is via the chat. 16. People rarely talk in my breakout rooms, so it hard to get to know my classmates. 17. Breakout rooms are normally quiet and I feel very uncomfortable. Also a lot of us don't like talking to people we've never met or seen so the collaboration is difficult. 18. Breakout rooms tend to be quiet even though teachers urge us to talk. Most of us just get distracted and do whatever. Here and there the smart kids talk and discuss and when they do it is helpful. But like not a lot of people take the initiative and don't care for it much either. 19. A lot of the times in breakout rooms, it's usually me who initiates the conversation. I'm not a very talkative person so when the people on the other side are unwilling to talk much, I feel drained immediately. Sometimes breakout rooms are engaging but it's pretty rare. During remote learning, even if there is group work, you don't see the person directly and sometimes people don't talk or don't have mics so people just feel very far away compared to live classes where you see the people face to face. 20. I found it more comfortable talking among just 	<p>answer at the end which is not what I want them to do. Pretty much every time they go into a breakout room that is what happens even though I say multiple times they need to discuss the activity while they do it.</p> <ol style="list-style-type: none"> 10. I have some groups that work well together and others don't. I was going to switch the groups up but the well working have bonded and did not want to take that support system away from them. Open to suggestions on how to get the other groups to function. 11. Crickets. 12. Not all students participate equally and the teacher can not see all groups at once. It is difficult to control what's going on in each room. 13. Sometimes breakout rooms are silent. At times that is because they are communicating via chat, or they just stop because I'm there, but sometimes groups really do not talk much. I would also like to see Google Meets (which I use) upgraded so students can select rooms or move among rooms as they can with Zoom -- so I could tell students to go to various rooms depending on which project or activity they are working on without having to assign them. 14. The discussion happening in breakout rooms is not to my liking. I have tried different things (mandating a screensharer) I have also recently gone to using pre-assigned permanent breakout rooms, I am hoping that over time that will improve conversation by building up some familiarity, we will see. 15. Students will have discussions once a prompt is provided but they rarely talk without a prompt. Encouraging them to turn on their cameras (if possible) in breakout rooms is something I'd like to see happen on a regular basis. 16. The biggest issue is groups that decide to do the work themselves and not discuss their ideas / work as a group. 17. sometimes students work silently together 18. I wish cameras and microphones were mandated by the principal. 19. *For some of these questions, I would rather give a detailed answer, as I believe there are benefits and disadvantages to remote learning. This is the situation we are in and I am trying to make the most of it.
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<p>two other people in breakout rooms.</p> <ol style="list-style-type: none">21. I'm not getting to know my peers, even when I work with them22. Breakout rooms are hard to work in because the cameras are not on and it feels more anonymous than talking face to face in class23. Breakout rooms feel awkward since we don't know each other and sometimes they muted themselves/ not speak.24. In breakout rooms it's quite awkward because no lines to talk even after one person makes the initiative to. Making friends have also been harder since you don't actually see anyone so collaboration becomes more difficult as well.25. In breakout rooms, it's often quiet and because we are not really in school, we can't really discuss about other things as well such as other classes or work in general or the teacher might pop in.26. Breakout rooms are really good when peers turn on their cameras and talk and engage with you, but sometimes students don't do that and work independently instead; hence leaving you without collaboration.27. I enjoy breakout rooms because they allow me to get what I say across, but it mostly feels like talking to blank space.28. Breakout rooms are generally awkward and quiet. My classmates usually don't talk and work on the groupwork silently. Although everyone is working on the same document, it doesn't feel like groupwork since no one is actively sharing with each other.29. Breakout rooms are great only if everyone is collaborating. Many times/3 out of 5 times, people are inactive and aren't responsive. When we are in school, you can see them physically and actually get work done, while in breakout rooms it's a 50/50 chance. Also, most of the times breakout rooms are randomized, and it feels sort of like a blind date going into a room with someone.. It feels like you're holding onto loose threads to keep the conversation somewhat going. It's also really hard to get anything done.30. breakout rooms are often really quiet and speaking up feels awkward. even when we're supposed to be working together, most of the time we end up doing the whole thing independently or break it up in the beginning and don't talk to each other the rest of the time.31. Very few talk in breakout rooms32. Breakout rooms are the reason why I made new friends and we got to go through projects and even helping each other in different classes.33. Get to interact more with peers, but it isn't the same as in person.34. Many students in breakout rooms do not speak/share their work or ideas. Some students appear to have just left their computer on without actually being there.	
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35. Breakout rooms are usually very awkward and no talks so I don't talk. In addition, teachers are not there and many don't check on how we are doing making
36. I don't feel like my teachers know me. I made no new friends this year. Most of the time, I am the only person talking in the breakout rooms.
37. Breakout rooms are not the best when people remain quiet or aren't paying attention.
38. It really depends, I feel like if you have a breakout room with people who want to talk and participate it can be really fun, but it can easily be extremely awkward if people don't contribute. As far as collaboration, I find it nearly impossible to get work done in a fair way because many people, just don't respond.
39. Breakout rooms are group discussions except you can't force others to talk. Way too often the kids will walk away from their computers and not talk. Leaving you alone not being able to practice the activity given. It also feels embarrassing to try and force the other person to talk. As if you are speaking to an empty room or brick wall. Calling for help from the teacher feels intimidating as you have to wait and see if they saw your "call for help"
40. I really like talking to people. I talk to random people on omegle, random people on discord, etc. I've talked for hours with people I've only met once and will never meet again. I've made friends and still sometimes talk to people from Ukraine, UK, France, and Australia. Breakout rooms are places where I can talk to people behind a screen but still learn so much from them.
41. Usually it's a few people from a group actually doing the work so nothing is really different compared to in-school.
42. At least one person or maybe all of the people in breakout rooms don't respond when spoken to. This makes it hard to work together on most things or ask for help.
43. No one speaks in breakout rooms. No one knows what anyone looks like. There's barely any collaboration.
44. I think it's pretty awkward.
45. I don't particularly look forward to breakout rooms. I have felt that my classmates are more inclined to collaborate since everyone is experiencing the challenges of remote learning and the only way we can overcome them is by working together.
46. Breakout rooms make me really nervous. Even when I don't have to turn on my camera, it's as if I'm experiencing the first day of school, every class. In most of my classes, the breakout groups always change and it always feels awkward. I understand a lot of people are like me and don't feel comfortable talking. Most of the time, it's as if I'm talking to myself. If the groups are the same, we often remain muted

<p>and do the work by ourselves. I think a lot of it has to do with the fact that we don't see each other. We don't feel as connected.</p> <p>47. For the previous two statements, I feel the same way if it was in person as if it was remote.</p> <p>48. I think it is much difficult to feel a sense of collaboration due to the physical barriers of online learning. It is much different and not everyone has their cameras on or microphones on all the time which can make it difficult sometimes.</p> <p>49. People in breakout room barely talk and it makes it very awkward.</p>	
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APPENDIX C: STUDENT SURVEY QUESTIONNAIRE

MCQ: Multiple-Choice Question

LSQ: Likert-type Scale Question

OEQ: Open-Ended Question

Student Survey Questionnaire			
Format	Question (38)	Answer Choices	Completion Rate
MCQ	What grade are you in for the 2020-2021 school year?	[1] Freshman [2] Sophomore [3] Junior [4] Senior	100%
Workload & Environment (13)			
LSQ	I have been taking longer to complete my homework during remote learning than in the past, prior to remote learning.	[1] Strongly Agree [2] Agree [3] Neutral [4] Disagree [5] Strongly Disagree	100%
MCQ	On average, how long do you spend doing homework every day?	[1] Less than an hour [2] 1-2 hours [3] 3-4 hours [4] 5-6 hours [5] 7-8 hours [6] 9+ hours	98.3%
LSQ	I feel like I have been procrastinating more during remote learning, than in the past, when I went to school.	[1] Strongly Agree [2] Agree [3] Neutral [4] Disagree [5] Strongly Disagree	100%
LSQ	I feel like I am procrastinating because there are too many distractions in my house. (Please respond to this statement ONLY if you picked agree or strongly agree with the previous statement.)	[1] Strongly Agree [2] Agree [3] Neutral [4] Disagree [5] Strongly Disagree	100%
OEQ	What are some examples of distractions? (Answer this question only if you picked agree or strongly agree with the previous statement.)		93.9%
LSQ	The environment at home (e.g. noisy background, lack of personal space/room) is impacting my learning.	[1] Strongly Agree [2] Agree [3] Neutral [4] Disagree [5] Strongly Disagree	100%
LSQ	I am easily distracted and lose focus during remote learning, due to my phone and other devices.	[1] Strongly Agree [2] Agree [3] Neutral [4] Disagree [5] Strongly Disagree	100%

OEQ	What are some responsibilities you have, other than schoolwork?	<input type="checkbox"/> Babysitting younger siblings <input type="checkbox"/> Chores <input type="checkbox"/> Helping out at my family's business <input type="checkbox"/> Extracurriculars <input type="checkbox"/> Jobs <input type="checkbox"/> N/A (None of these apply to me) <input type="checkbox"/> Other: _____	100%
MCQ	On a weekly basis, how long do you spend on those outside-of-school responsibilities?	[1] 0 hours (I picked N/A for the previous question.) [2] 1-5 hours [3] 6-10 hours [4] 11-15 hours [5] 16-20 hours [6] 21+ hours	98.3%
LSQ	My responsibilities have impacted me negatively. (e.g. a decline in grade, failing to complete homework assignments, etc.)	[1] Strongly Agree [2] Agree [3] Neutral [4] Disagree [5] Strongly Disagree	100%
LSQ	I am struggling to keep up with my work ever since remote learning.	[1] Strongly Agree [2] Agree [3] Neutral [4] Disagree [5] Strongly Disagree	98.3%
LSQ	My teachers are understanding about the workload given.	[1] Strongly Agree [2] Agree [3] Neutral [4] Disagree [5] Strongly Disagree	100%
LSQ	I feel more calm and relaxed learning remotely, than I did when I went to school.	[1] Strongly Agree [2] Agree [3] Neutral [4] Disagree [5] Strongly Disagree	100%
Comprehension & Grades (4)			
LSQ	My grades have improved during remote instruction.	[1] Strongly Agree [2] Agree [3] Neutral [4] Disagree [5] Strongly Disagree	100%
LSQ	I understand the topics that are being taught to me in remote learning.	[1] Strongly Agree [2] Agree [3] Neutral [4] Disagree [5] Strongly Disagree	100%
LSQ	I learn better at home than I do in school.	[1] Strongly Agree [2] Agree [3] Neutral [4] Disagree [5] Strongly Disagree	100%

LSQ	I learn as much in class, during fully remote instruction, as I did in a school setting.	[1] Strongly Agree [2] Agree [3] Neutral [4] Disagree [5] Strongly Disagree	100%
Classroom Interactions (14)			
MCQ	How frequently do you turn on your camera for your classes?	[1] Never [2] Rarely [3] Sometimes [4] Most of the time [5] Always	100%
MCQ	Do you turn on your microphone?	[1] Yes [2] No [3] Sometimes	100%
MCQ	For those who turn on their microphone and/or camera, do you like turning it on?	[1] Yes [2] No	96.5%
MCQ	For those who chose no for the previous question, has this been making remote learning less enjoyable?	[1] Yes [2] No	100%
MCQ	How often do you participate in class in a remote setting?	[1] Often [2] Sometimes [3] Once in a while [4] Never, unless the teacher calls on me.	98.3%
LSQ	I feel intimidated to participate in class.	[1] Strongly Agree [2] Agree [3] Neutral [4] Disagree [5] Strongly Disagree	100%
MCQ	Do you think you participate more in school or remotely?	[1] School [2] Remote Learning [3] No Change	98.3%
OEQ	If you participated more in school or in remote learning, why?		97.1%
LSQ	I feel as if I am still able to bond with my teachers in remote learning.	[1] Strongly Agree [2] Agree [3] Neutral [4] Disagree [5] Strongly Disagree	100%
LSQ	I am making new friends during remote instruction.	[1] Strongly Agree [2] Agree [3] Neutral [4] Disagree [5] Strongly Disagree	100%
LSQ	I really enjoy breakout rooms.	[1] Strongly Agree [2] Agree [3] Neutral [4] Disagree	100%

LSQ	SENIOR: Remote learning has made my final year at high school less enjoyable.	[1] Strongly Agree [2] Agree [3] Neutral [4] Disagree [5] Strongly Disagree	100%
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APPENDIX D: TEACHER SURVEY QUESTIONNAIRE

MCQ: Multiple-Choice Question

LSQ: Likert-type Scale Question

OEQ: Open-Ended Question

Teacher Survey Questionnaire			
Format	Question (23)	Answer Choices	Completion Rate
OEQ	What grade do you teach for the 2020-2021 school year? Check all that applies.	<input type="checkbox"/> Freshman <input type="checkbox"/> Sophomore <input type="checkbox"/> Junior <input type="checkbox"/> Senior	100%
Workload (3)			
MCQ	On average, how long does it take for you to complete school-related responsibilities in a day? For example, creating lesson plans, grading assignments, etc.	[1] Less than an hour [2] 1-2 hours [3] 3-4 hours [4] 5+ hours	100%
MCQ	On average, how long do you think students spend doing homework every day?	[1] Less than an hour [2] 1-2 hours [3] 3-4 hours [4] 5-6 hours [5] 7-8 hours [6] 9+ hours	100%
MCQ	On a weekly basis, how long do you think students spend on outside-of-school responsibilities like babysitting younger siblings, helping out at a family business, extracurriculars, etc.?	[1] 0 hours [2] 1-5 hours [3] 6-10 hours [4] 11-15 hours [5] 16-20 hours [6] 21+ hours	100%
Comprehension & Grades (2)			
LSQ	My current remote students' grades are higher than my students from previous years.	[1] Strongly Agree [2] Agree [3] Neutral [4] Disagree [5] Strongly Disagree	100%
LSQ	I think that my students learn as much in class, during fully remote instruction, as I did in the past, in a school setting.	[1] Strongly Agree [2] Agree [3] Neutral [4] Disagree [5] Strongly Disagree	100%
Classroom Interactions (17)			
LSQ	Remote learning has limited my teaching.	[1] Strongly Agree [2] Agree [3] Neutral [4] Disagree [5] Strongly Disagree	100%

OEQ	If you choose agree or strongly agree to the previous question, what factors of remote learning limited your teaching abilities? Select all that applies. (Feel free to add factors that are not listed.)	<input type="checkbox"/> Some class activities cannot be done remotely <input type="checkbox"/> Harder to connect with students <input type="checkbox"/> New to all the technology <input type="checkbox"/> Harder to facilitate class discussion <input type="checkbox"/> Other: _____	100%
MCQ	Do you feel like remote learning has impacted your students' learning negatively or positively?	<input type="checkbox"/> [1] Negatively <input type="checkbox"/> [2] Unsure <input type="checkbox"/> [3] Positively	100%
MCQ	Do you make it mandatory for students to turn on their cameras?	<input type="checkbox"/> [1] Yes <input type="checkbox"/> [2] No	100%
MCQ	Do you make it mandatory for students to turn on their microphones?	<input type="checkbox"/> [1] Yes <input type="checkbox"/> [2] No	100%
OEQ	For the previous two questions, why did you choose that choice?		91.7%
MCQ	On average, how many students participate in your class? This excludes students that you call on.	<input type="checkbox"/> [1] 2-4 students; it's usually the same few people <input type="checkbox"/> [2] 5-10 students <input type="checkbox"/> [3] 11-20 students <input type="checkbox"/> [4] 21- 30 students	100%
LSQ	My students are fully focused and pay attention in their classes.	<input type="checkbox"/> [1] Strongly Agree <input type="checkbox"/> [2] Agree <input type="checkbox"/> [3] Neutral <input type="checkbox"/> [4] Disagree <input type="checkbox"/> [5] Strongly Disagree	100%
LSQ	I cannot determine if my students are engaged.	<input type="checkbox"/> [1] Strongly Agree <input type="checkbox"/> [2] Agree <input type="checkbox"/> [3] Neutral <input type="checkbox"/> [4] Disagree <input type="checkbox"/> [5] Strongly Disagree	95.8%
LSQ	I believe that I am bonding with my students, despite the remote environment.	<input type="checkbox"/> [1] Strongly Agree <input type="checkbox"/> [2] Agree <input type="checkbox"/> [3] Neutral <input type="checkbox"/> [4] Disagree <input type="checkbox"/> [5] Strongly Disagree	100%
LSQ	Remote learning positively impacted my teaching.	<input type="checkbox"/> [1] Strongly Agree <input type="checkbox"/> [2] Agree <input type="checkbox"/> [3] Neutral <input type="checkbox"/> [4] Disagree <input type="checkbox"/> [5] Strongly Disagree	100%
LSQ	I am having difficulty initiating class discussions.	<input type="checkbox"/> [1] Strongly Agree <input type="checkbox"/> [2] Agree <input type="checkbox"/> [3] Neutral <input type="checkbox"/> [4] Disagree <input type="checkbox"/> [5] Strongly Disagree	100%
MCQ	Did your perspective change on topics like student workload and technology due to	<input type="checkbox"/> [1] Yes <input type="checkbox"/> [2] No	100%

	remote learning?		
OEQ	What were some of the things you learned from remote learning?		70.8%
OEQ	If you answer yes to the previous question, what was it and could you elaborate on it?		50%
LSQ	I feel a sense of collaboration and discussion among the students in breakout rooms.	[1] Strongly Agree [2] Agree [3] Neutral [4] Disagree [5] Strongly Disagree	100%
OEQ	If possible, could you please describe an experience or issue you encountered with breakout rooms specifically with discussions? What improvements do you wish to see made?		75%