COVID-19 and technology use by teenagers: A case study

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Abstract
The impact of the COVID-19 pandemic on regular life across the world has changed teenagers’ use of technology. Through this case study, the author analyzed, reported, and reflected on personal experience of a shift in technology use during the COVID-19 pandemic. There are two parts of this case study. The first part highlights the new technology used in five inside-of-school activities, including classroom learning, group projects, dance tutorials, environmental club, and affinity group. The second part describes six outside-of-school actions that utilized technology, such as homework assignments, online test preparation, virtual workouts, listening to music, picking up hobbies, and interacting with peers. Based on the reflections on the author’s first-hand experiences, adjustments at the personal, school, and society level are discussed.

KEYWORDS
COVID-19, inside of school, online learning, outside of school, technology uses, teenagers

The outbreak of COVID-19 changed millions of K-12 students’ everyday life inside of school and outside of school across the world (Viner et al., 2020). Various technologies played a significant role after schools were shut down during the COVID-19 pandemic (Wang, Zhang, Zhao, Zhang, & Jiang, 2020). When the COVID-19 pandemic occurred in Boston, my school, Beaver Country Day School, fully shifted to online learning from early April to early June. As a result of these adjustments, multiple changes occurred at home of each student: bedrooms turned into school classrooms, living rooms turned into science laboratories, and backyards turned into workout gyms. This case study reports the individual-based personal experiences of technology use from a perspective of an ordinary high school student rather than the group-based or institution-based collective experiences during the COVID-19 pandemic. The first section of the paper highlights the use of newly introduced technology inside of school through classroom learning, group projects, modern dance tutorials, an environmental club, and an affinity group. The second section outlines technology use in various academic and non-academic activities outside of school, such as homework assignments, online testing preparation, virtual workouts, listening to music, picking up new hobbies, and interacting with peers.

1 TECHNOLOGY USE INSIDE OF SCHOOL

1.1 Classroom learning

As physical classrooms shifted to virtual experiences, interactions between students and teachers changed. During the COVID-19 pandemic, many schools across the world adapted some sort of online platform to host virtual classes. For example, my school adapted to using the video communication service: Google Meet. The basic feature of Google Meet is for virtual meetings that could be scheduled and held routinely with the standard functions of a video call. Two adjustments were made when using Google Meet: learning how to use the new technology and implementing the platform in classes.

1.1.1 Learning new technology

Several logistical items of the newly implemented platform lead to additional information that needed to be learned. Three items students needed to learn were: where to access meetings, how to use specific technological elements, and how to manage work on multiple online tabs.
The first item was for students to learn was where to access meetings. Before any virtual learning started, the following information was shared: a meet is created by inviting other people, using Google accounts and accessed through a shareable link. All virtual classes were on the single platform and accessible meeting links were found on online classroom pages. These online classroom pages were on the software program, Canvas. The program has a range of functions (e.g., classroom resources, individual grades, assignments, calendar reminders, media recording, and discussion tab). However, the most frequently used function was the classroom resources page where individual classroom Google Meet links were located.

The second item was for students to get oriented and familiar with the specific technological features of Google Meet. Initial features with coordinating icons were easy to spot on the screen during a meeting: the mute/unmute, hang up, and webcam control buttons. Following initial class meetings, both students and teachers utilized more of the tools on Google Meet that included, presenting a tab, switching arrangements of views, and chat box. Through class discussions on specific assignments or during a presentation, students would present their computer screens to either show or explain their work. Presenting a computer screen was used regularly for reviewing coursework and pointing out specific ideas or answers. Correspondingly, students in in-person classes would project their work on computers to a white board. On the other hand, a visual aspect of virtual classrooms was that the arrangement of views could be adjusted. An individual's webcam view could be pinned to make the focus of the screen or the exact opposite, a grid view of all the individuals at the same time. In the terms of bad internet connections or webcam malfunctions, the chat box was utilized for students to communicate their problems to teachers. As an additional component, teachers would occasionally change different methods of how students answered a question and direct them to the chat box to type their answer. The way I initially learned how to use the Google Meet features were through the icons, which was also useful when discovering the chat box.

The third item was for students to manage work on multiple tabs at once. A minor but important adjustment was that students had to get used to multitasking on different online tabs. During a routine virtual class with Google Meet, at least four online tabs were open simultaneously: the class Google meeting, Canvas dashboard, Canvas class assignments, and Google Docs pages. Each open tab had an individual purpose that played a key role in the effectiveness of a virtual class and replaced an element from in-person classrooms. The class meeting screen essentially replaced the physical classroom setting where students could ask teachers questions. In normal circumstances at school my computer would always have the Canvas dashboard and Canvas class assignments tabs open. However, I would need to switch tabs between two pages when doing classwork or asking a question, whereas before the pandemic a simple raise of a hand or a glance up at the white board would do. Notably, one of the leading changes was the way of taking notes on recently introduced topics. Note-taking already requires multi-tasking, but over a computer screen was a challenge added on top. Two note-taking strategies were to either write in a Google Doc and listen to the audio of a teacher talking simultaneously or have a Google Meet meeting tab open while write notes down in a notebook. At first glance the challenges presented seemed insignificant but needed creative thinking to conquer.

1.1.2 Implementation

Teachers implemented changes to their classes to suit new technologies and at-home students. Two developments to the change of classroom styles were teachers both shifted to lecture-based classes and focused on providing more homework. Each teacher has their own way of crafting virtual classes to fit the special social-distancing circumstances. Two examples of classes that utilized lecture-style classes were from physics and history classes.

For the physics class, a teacher would present their computer screen of a Google presentation with that day's content, featuring the daily agenda, example problems, answer explanations, and videos containing class notes. Students could see the Google presentation and hear what the teacher was saying. In almost every class going through the presentation and filling it out along the way with notes became a developed routine. A helpful document for students to review or use to catch up was a copy of the presentation with all the notes taken in class on the physics Canvas page. Therefore, if a student did not catch every detail or was unclear with anything covered during the class time, they could review it later. Another way a teacher taught lecture-style classes was guiding students to a classwork document, while talking about specific concepts to focus on.

For the history class, a specific assignment for a day would have a designated Google Doc with a worksheet or organizer on it. With the Google Document open, the teacher would talk through the lesson of that day and at the same time students would follow along on their own screens. Each individual student would have their own copy of the Google Document that the teacher could view and add comments to. The second development of virtual learning was the focus on assigning more work to do after school. Due to classes being shortened by 25 min, the usual amount of classwork was altered for students to do as their homework. Instead, most of the class time was spent with teachers providing an overview of an assignment or having a discussion among students. Two examples of classes assigning more homework were from Chinese and dance class. A regular in-person Chinese class involved multiple interactive activities between students and a teacher, along with a daily class routine. However, with shorter class times as a new element to deal with, the teacher created small tasks to do every day, adding to a student's homework load. For example, the Chinese class would usually practice writing Chinese characters for about 10 min every class. Now, students were required to write characters for the same amount of time outside of the school day. The second class to assign more homework was dance class. Most of the dance classwork load before COVID-19 was long-term projects lasting through a semester. In a regular class agenda, not many items were on the list because much of the time was used for students to choreograph and work projects. Most of the new homework load was decided by students evaluating their own progresses.
Flexible project timelines were arranged by the teacher, but no daily work was assigned. Students gained more independence with their own education. Instead of demonstrating progress in person, learning development was showcased over virtual meetings and online documents. From hearing and observing peers, many students missed face to face interactions. Although virtual classes cannot compare with class in in-person school days, the new ways teachers adapted allowed students to continue learning effectively.

1.2 | Group projects

Along with the virtual changes that occurred in classroom learning, group projects also took on major changes. Two specific classes that best demonstrated these changes were history and Chinese class.

1.2.1 | History

Over the spring semester, multiple group projects were assigned, forcing students and teachers to adjust accordingly. My US History: Age of Reforms class had a class size of eight students and one teacher. During the shift to virtual learning, the teacher utilized group assignments which presented a need for traditional group work to be adjusted. Two changes that stood out from an assigned group project included the group environment and setting up homework. The first change was the group environment among classmates working together. A group project was introduced 1 day by the teacher over a class Google Meet. The end goal of the assignment was to actively read and take notes on three passages addressing one essential question. Each group had their own individual Group Meet that both the teacher and members could access. During class time, the group I was assigned, joined a Google Meet and started to work on the given assignment. When mentioning a change of the group environment, the following two topics come to mind: communication and physical feeling in a group assignment. Communication when working alongside peers on Google Meet required new adjustments. After getting initial information and organizing out of the way, students would turn off their webcams and work independently on their divided portion of the project. Usually in-person group projects in the initial few moments can be awkward, but later groupmates would get more comfortable with one another. That was not the case for groupmates virtually working together where people would keep to themselves and their work. An early observation was that it was not necessarily that peers did not want to communicate with each other, rather there was an invisible barrier over computer screens causing less overall communication among peers. In addition to communication weakening between groupmates, there was a shift in the physical feeling of group projects. One of the most sizable differences between working independently and working collaboratively is the physical feeling built when working with others. Before schools closed, working in a group had a couple special aspects, including bouncing ideas, workshopping thoughts together, and receiving/giving feedback. However, those special aspects were gone after shifting to virtual group projects. Less accessibility to group mates and truly working together lead to multiple collaborative elements going away. To combat that problem of peers turning their webcams and microphones off, different ways were used so people could do so without speaking. Two simple strategies were typing in the chat function on Google Meet and commenting on Google Docs. The chat function was handy when a peer had a question or concern at the same time another person was talking. To avoid interrupting anyone, students typed their thoughts into the chat box to eventually get answered. Also, if people needed access to a link or even help to spell a word, the chat function could be used with no verbal communication. A second strategy was using the Google Docs comment feature when classmates were giving feedback to each other. Through peer editing, a student could go onto their peer’s essay through Google Docs and turn on suggesting mode. Therefore, classmates could make edits that would only come out as comments that could either be accepted or denied.

The second change was in setting up homework for group projects. When deciding on what to do for homework, the items that needed to be finished every day changed. Previously in history group projects, individual groups would decide an overall timeline of what needed to be accomplished what day. Also, during in-person school days, an advantage was everyone in a group could gather outside of class during school hours. That advantage was lost while classes shifted completely to online learning, however two alternative solutions were introduced in history class: work checklists and individual reflections. The teacher would include a t-chart in a Google Document with two sections. One section was work done in class and the second section was work done outside of class. In the beginning of every class, the teacher would require students to fill out the chart with what specific work was accomplished the previous day. Through a work chart, groups were held accountable and created a sense of responsibility. The second solution was individual reflections were assigned after a group assignment was completed. On the reflection two separate sections were present: individual work/effort and overall group effectiveness. Beforehand, reflections were utilized in history class for multiple assignments, but not as essential comparatively to virtual group projects. Through a normal classroom setting, teachers can tell which students are doing work and staying engaged. With students working in separate Google Meet meetings, teachers had difficulty trying to do the same job of observing each member’s productivity. However, with the help of students filling out forms to track personal and group progress teachers could keep up.

1.2.2 | Chinese

The second class that consistently utilized group projects was my Chinese class. Although group projects in all online classes have common changes, the Chinese class had two unique changes in how grades/feedback were given, and pre-planning needed in class.
The first change was a difference in getting feedback from a teacher. This change can be demonstrated with a specific partner project done over the course of the virtual learning. A conversation in Chinese was screen recorded and shared with the teacher. When getting back a grade for the project, Canvas (see Section 1.1 for additional details) was used. On the “Grades” Canvas page teachers could publish a comment on the assignment or multiple comments in each section of a rubric. The Chinese teacher used a combination of feedback options, filling out a rubric for the partner project and writing a comment on the whole project.

The second change was a need for pre-planning in class to finish group projects. An example of this change occurred in a class debate project. The Chinese class was divided into two groups of five students and each group was assigned a side of an argument. All the work and rehearsal for the debate was done in class. Prior to the live debate over Google Meet, groups already assigned talking points to each group member and prepared potential rebuttals. In regular debates, preparation is needed to succeed, but in online debates additional planned groundwork was especially needed. Prepared notes and arguments were written ahead of time on a shared Google Document, leading to students delivering an effective and smoothly running debate over computer screens. To conclude, communication is key in any group project in any class. Online platforms with special features helped contribute to effective and efficient communication among classmates. Even with the new circumstances and groupmates trying to collaborate virtually, adjustments were made to help every individual groupmate do their best.

1.3 | Dance tutorials

Another class that shifted to relying on technology was my Dance: Choreography Foundations class. In comparison to other classes, dance and performance arts classes were reliant on physical interactions and collaboration. Two topics that clearly illustrate these changes are initial changes and special projects.

1.3.1 | Initial changes

In a small class of four students, two online platform features were taken advantage of, the chat box on Google Meet and Studio, a side platform of Canvas.

The first online platform feature used was the chat box on Google Meet. In almost every class, Google Meet was used at some point and the chat box was available to use at any time. My dance class frequently and consistently used the chat feature every class. The main purpose of the feature was to serve as a tool when writing daily agenda or providing links to external online sources. At the start of a dance class, the teacher would insert a YouTube link of a Just Dance video through the chat box to do as an active warm-up. For any external links, anyone in the class could quickly access them and type one in the chat box. Another daily routine was a written agenda would be displayed somewhere during class. Having a written agenda kept students staying on task and having specific work to do. During an independent work session, students worked in their own individual Google Meet virtual dance studios. In each dance class both short and long-term assignments were given and having a list of items reminded students what needed to be done. When using the chat box feature, a virtual alternative to writing information on a physical whiteboard in a classroom. Writing on a whiteboard serves as the purpose of showing important information (e.g., agendas, links, etc.) which the chat box took the new role of.

The second online platform feature was the side platform of Canvas, Studio. The video program has the function to record both audio and media clips that could be shared with others via email. Before my school shut down, Studio was occasionally used to upload an assignment or watch a short tutorial video. However, in online dance classes, media recordings were frequently uploaded and shared with classmates and teachers. A special element in Studio is the timestamped commenting that anyone with access to a video could write. Students and teachers could then elaborate on their comments and discuss them in class on Google Meet. Contrary to in-person dance performances and assessments on Studio, the same functionalities and even more tools could be utilized.

1.3.2 | Special project

During the spring term, my dance class worked on a choreography collaboration between the students. The collaboration was related to being quarantined and lonely, hence the song choice: “Lonely World.” Each student created a one-minute section for the whole class to learn. Eventually, all the sections would be put and performed together.

The dance class used was Google Meet, which allowed for students to teach each other choreographed sections and work independently in virtual studios. When the time came to teach choreography virtually, a couple of challenges were presented. The initial challenge was to get the music and physical movement to line up over Google Meet. Timing and counting beats are a big part of teaching and learning a new dance, so having delayed movements made it hard to correct or fix mistakes. Moreover, while trying to teach a new dance, both a computer and phone were used to communicate through Google Meet and play music on. Keeping track of multiple devices at the same time made teaching in class harder.

A technical challenge when teaching a set of dance steps virtually was getting a good camera angle. Teaching out of a small bedroom and constantly adjusting a computer’s webcam was a timely struggle. Not only was an individual supposed to see themselves, but also make sure classmates could visually learn the choreography well. Overall, dance class had the largest change from in-person to virtual classes. Learning and teaching new dances were challenging to do on a computer. But out of the challenges presented, a whole new experience and way of learning that was introduced.
1.4 | Environmental Club

Throughout most of the school year, my school's environmental club met weekly both club in-person and virtually. Two parts of the virtual environmental club that utilized different technologies were during at-home projects and ordering materials.

1.4.1 | At-Home projects

The environmental club I participated in embraced a variety of at-home projects remotely. From baking bagels to planting pepper seeds, the members of the club completed multiple projects over Google Meet. In a 30-min period, club members walked through the steps of a specific project together. Club members talked and asked each other questions all while doing an interactive project. The technological use of Google Meet was the same to any other regular online class.

A new technology used during the time between club meetings was the messaging app, GroupMe. Similar to other messaging apps, GroupMe users could send texts a group of people through a computer or phone. One detail that was different was personal phone numbers did not need to be entered. Therefore, teachers and students could casually send reminders and messages without violating any school set boundaries. As a collective club, GroupMe was also used to send updates in the form of pictures and texts through the week. Especially during the aftermath of a project, club members would send pictures of finished projects to showcase their individual work. For example, after making bagels during a club block, club members sent pictures of the baked bagels they each made. Another way the club used GroupMe was for sending information that was important to know before the next club meeting. This strategy was used when making sourdough starters. A club leader sent along a list of necessary ingredients a week prior to the actual club meeting. When students were notified of the necessary materials, there was enough time to either buy or prepare anything missing. Doing interactive and easy to-do projects at home provided a convenient Segway for clubmates to bond through computer screens. Although students lived all over Massachusetts, somehow the same in-person processes and experiences occurred over computer screens.

1.4.2 | Ordering materials

Amazon Business, a side platform of Amazon, was a key resource for ordering materials for club projects. In environmental club, everyone agreed with the idea to grow some sort of plants altogether. Through that idea, the same pepper growing kit was ordered on Amazon Business. To use the online platform, students needed to create special Amazon accounts to purchase materials that then needed to be approved by an administrator. Three main steps in the process of ordering through Amazon Business are getting an email invitation, selecting product(s), and submitting an order. The first step was receiving an email invitation from a school administrator. In the email a set of instructions were detailed on how to access the school's Amazon account and order products from it. After, an account needed to be created for any new user, so administrators could identify who placed the pending order. The account was made with a school Gmail account and a password along with it. The second step was selecting a specific product to order. Another email from a teacher administrator was sent, containing a link to a pepper kit that club members were approved to get. With access to the overall school account granted, students could then select the kit to order. Finally, the same process as any regular Amazon order would follow through. Users needed to input a home delivery address, phone number, and full name. After all the information was filled out, the next page switched to a submission screen where school administrators could approve the order. Once an order was approved, the job was in the hands of Amazon to ship and deliver the materials. Since all six members of the environmental club were not physically together, interactive projects were heavily utilized, requiring the use of a new online platforms.

1.5 | Affinity group

As the shift to online school continued, my school’s organized affinity groups still took place. With five attending members and three teacher leaders, monthly meetings kept occurring. Along with other school related meetings, Google Meet was used for affinity groups. A difference from other academic classes was that the link to the Google Meet came through an email invitation. Two different technological elements were used in the duration of a meeting: chat box and Google Photos.

The first technological element was the chat box. In the chat box, one of the teachers or members would copy a link to send to everyone attending. The weblink would either feature an important article or video to generate a discussion among members. One of the purposes of having affinity groups was to create a community space for all the members to discuss current topics. At the beginning of meetings, members and teachers checked in and caught up with each other. In the middle of the meeting, different talking points were brought up along with external resources (e.g., articles, photos, and videos). In one of the affinity group meetings, a video of the PBS documentary on Asian Pacific American Heritage Month was shared through the chat box via a weblink. Through the end of the meeting, conversations wrapped up and goodbyes were said.

The second technological element utilized was Google Photos which a teacher introduced at a meeting. An online gallery containing photos of meals made during quarantine was showcased. To access the gallery, a sharable link to the specific Google Photos gallery was provided. The visual page was made up of a five by five grid of food photos that a viewer had the option to either like or comment on. Unique personal experiences and pictures were shared and discussed about in the affinity group. Through virtual interactions between
members, external online sources were used to further interesting conversations.

2 | TECHNOLOGY USE OUTSIDE OF SCHOOL

2.1 | Homework assignments

When online learning started, homework assignments changed. Three general differences between homework assigned virtually and in-person was submission options increases, use of external sources, and prep work for future classes.

The first difference was that submission options broadened and increased, which included media, videos, and audio recordings alternatives. Classes that specifically used new submission options were physics and Chinese class. In physics class, an already established homework routine was solving problem sets covering the topics of Newton’s laws, energy, and circuits through Google Docs. Prior to virtual learning, photos of a student’s work process and the steps taken to solve a problem were required. In the online classroom environment, the same routine was further instilled and necessary for teachers to follow along with a student’s conceptual thinking. Pictures of work done in a notebook, would be submitted with the answers on a homework assignment. A picture of work done in a notebook for each problem was first taken on a phone and then transferred to a computer. Getting the photos from the phone to computer was sent through an email attachment where the photos could then be downloaded. The last step would be to insert the photos to a Google Document with the given problem set and submit the completed assignment onto the external platform, Canvas. The second class, Chinese used audio recordings as a submission method for speaking assignments and evaluations. During in-person classes, the Chinese teacher had one-on-one conversations with students to evaluate their interpersonal speaking skills. The same assessments occurred through an audio recording that the teacher could listen to and give feedback on.

The second difference was the use of external sources occurred. Finished audio recordings were submitted as a completed assignment to Studio (see Section 1.3.1 for additional information). The commenting feature on Studio kept time stamps on where in time a comment was made by the teacher. Students could then listen back to their own recordings and take note of a given correction to fix. Two benefits of submitting a pre-recorded homework assignment instead of a real time conversation was less on the spot thinking was required and unlimited attempts were granted.

The third difference was prep work for future classes became a necessity. Before recording a speaking assignment, students planned what was going to be said in Chinese, so any awkward or noticeable mental pause could be eliminated. Sometimes it would take up to three to four attempts before getting a recording that a student felt confident in. Although the content students learned and the work teachers assigned did not change drastically, the submission options expanded to a variety of media types.

2.2 | Online testing preparation

An academic related outside of school activity was preparing for standardized testing (e.g., SAT, ACT, PSAT). While specifically focusing and studying for the SAT, multiple online sources were used. The three sources used the most for studying the SAT was CrackSAT, PrepScholar, and Khan Academy. The first source, CrackSAT has the individualized function for learning specific topics. For example, both math subject SAT tests and reviewing the answer explanations were on the website. Specifically, in the CrackSAT website, a result (correct or incorrect) would appear once a practice test was completed. If the answer choice were wrong, down below there would be a step-by-step explanation on how exactly the problem was supposed to be solved.

The second source was PrepScholar and it was especially used for downloading full-length practice test PDF files. The official College Board tests were available and free to download with an answer sheet on the PrepScholar website. Out of the three sources, the PrepScholar site was used less often because it was only occasionally needed.

The third source was Khan Academy, which had a variety of topics ranging from AP history to Molecular Biology to Trigonometry. A specific section and multiple pages were dedicated for studying for the SAT. Practice content and tools were in partnership with the official College Board organization. Contrary to the other sources, Khan Academy had personalized schedules and lessons to fit the individual needs of students. Specific functions that made the site personalized to the user was a designated schedule and task board setting. The schedule could help a student plan out when and how to practice before their official test day. The task board displayed specialized sub-topics from a test section that the user could use to study. On the physical task board page, there was a box of four tasks to complete every day in either the math, reading comprehension, or writing section. A final section was timed in a varying subject matter at the end of every practice session. Furthermore, a feature to track progress and grading each subtopic was at the corner of the main task board screen. The actual feature was a diagram of a semicircle with four arching sections. The number of sections filled in was equivalent to the skill level achieved. An example could be set for the topic of scientific reading, if three out of the four sections were filled, the student has almost mastered the topic. Although all three of the resources were present before the COVID-19 pandemic, the increase of free-time in many high school students’ lives lead to the discovery of useful test preparation material.

2.3 | Virtual workouts

Regular trips to the gym and sport facilities were moved to new virtual practices. For an abundance of teenagers, playing sports was an everyday activity. Isolation from teammates, coaches, and gyms changed regularly occurring routines to revert to using two online platforms: Zoom and YouTube. An initial difference between the two
programs were that Zoom served the purpose to hold team scheduled workouts, while YouTube was used to stream online exercises.

The first platform was zoom, which my club basketball team used to meet twice a week to do virtual workouts. A specific link to a Zoom training session was provided through an email from a trainer. The same link was continuously used for every session when joining the bi-weekly workout. Through the real-time workout, two ways the trainer communicated and demonstrated exercises were by using the webcam and typing in the chat box. With their computer’s webcam on, the trainer would introduce and demonstrate an exercise. My team would then do that specific movement for a certain increment of time, ranging from 30 s to 5 min. Through the first strategy of visual communication, all the virtual training sessions felt as though it was an in-person workout. On top of that, all the other participants would also have their web cameras on, so the trainer could give real-time pointers on how to do the exercise correctly. When a participant had a question, they could unmute their microphone to directly ask the trainer a question or try to mirror a peer.

The second platform, YouTube was used to stream online workouts. Users needed to find workouts to do and a body part to strengthen. Using the strategy of picking a specific body part to target made the search for a quality workout less challenging. To further explain, if one wanted to exercise their leg muscles, a simple search of “leg workout” supplied multiple workout options as a result. Two variables could be taken into consideration when choosing a workout video to use, the total amount of views and the total time. The view count is important because it reflects how many people streamed the workout and how popular it is. As for the time variable, an important factor to always consider is the total time spent. A long duration usually correlates with an exhausting and repetitive workout, while a shorter length workout usually is an intense and fast-burn workout. Once a good workout was found, users could continuously use it or take parts of the exercises to implement in their own daily workouts. Exercising is an important part of maintaining a healthy lifestyle and is especially essential when stuck in quarantine. Without access to regular gyms and trainers, working out turned to different technology platforms.

2.4 Listening to music

A daily activity used to unwind and relax was listening to music. With additional down time at home during the COVID-19 pandemic, three changes occurred for music listeners, an increased time spent, wider exploration, and special at-home playlists.

The first change was an increased time spent on listening to music. Although people listen to music regularly and routinely, the use of music streaming apps increased. Discovery of newly released songs and playlists broaden over days in quarantine. I went from pending around 1–2 hr a day listening to music to playing music alongside almost every activity done throughout an entire day. The music streaming app, Spotify could be used on multiple devices. To use the Spotify application, a user must create an account. Through the application, the user can create playlists with ranging musical genres as well as listen to podcasts. The activity of listening to music recently increased in the COVID-19 pandemic.

The second change was a wider exploration was accomplished by users. One of the best activities to do on Spotify is putting together playlists for different occasions and moods. The action of browsing through and adding songs goes along with having a satisfactory playlist. On the browse tab and search bar, a user can find their favorite music or artist, as well as leaf through top-rated songs. When trying to find new music, the browse tab is a helpful tool to discover unique songs that do not get over-played on the radio. Sub-tabs that were the foundation of the browse page included, top charts, genres/moods, and new releases. Depending on what type of playlist or mood a user picks, determines what type of music is focused on and looked through.

The third change was the addition of special at-home music playlists. A practical feature of Spotify is pre-made playlists. Users can publish public playlists for other music listeners to stream. Spotify also generates their own playlists based on either a genre, mood, or even decade. Using pre-made playlists cuts down the time users spend trying to find to songs. In addition, special-edition Spotify playlists came out to especially please at-home listeners. Two examples of unique at-home playlists were titled “Listening Together” and “Work from Home.” To add on, the browse section had a new “At-Home” category that featured celebrities’ personal cooking and cleaning playlists. With all the dramatic alterations people have experienced on a global spectrum due to the pandemic, newly customized playlists were just one simple change made.

2.5 Picking up new hobbies

One observation I made from my own actions and peers’ actions was how over quarantine new hobbies and activities were picked up. A contributing factor was the increased time spent at home and limitations imposed on in-person activities. Some peers found new video games to play, while others experimented with baking. Three new hobbies newly I obtained during the pandemic included, writing down daily quotes, starting new art projects, and catching up on online news.

The first hobby was writing down daily quotes, which was not an entirely new activity. Throughout months prior, I occasional glanced at a Google Document filled with quotes devoted for each day of 2020. A special aspect that I always looked forward to seeing was who the quote was said or written by. In the document, all the way from Michelle Obama to the current Dalai Lama were included.

The second hobby was starting new art projects. A daily activity I did to relax was to simply draw or sketch on a blank piece of paper. A technological element incorporated into the art projects was using Google to search for art inspiration. Ideas would rarely just immediately come to mind, most other times art pieces or sketches featured on Google were used as inspiration. Going into the Google images tab and typing in an art concept (e.g., geometrical patterns) was the main
search method used. Once numerous options popped up, the next action was to pick a single image or even multiple images to use as a reference.

The third hobby was catching up on online news. Through the pandemic and an increase in free-time, I paid more attention to news developments and politics. A newly developed habit was watching several news channels on TV at lunchtime. Also, reading NPR (National Public Radio) articles every morning became a daily activity. Alongside political news and updates on COVID-19, reading uncommon and somewhat weird topics was an amusing way to start the day. Using Google as the default browser and directly searching for a website or looking through bookmarked pages to find recent news. With access to an abundance of online news sources, technology users can easily read news from around the world. Information on the internet can be reliable or fake or even a mix of both. Even with these discrepancies it is critical for both adults and teenagers to stay informed. In the special case of the COVID-19 pandemic, using technology to keep discovering new activities to do was especially relevant.

### 2.6 Interacting with peers

Three main communication platforms were used to interact with peers was Google Meet, FaceTime, and Zoom.

The first platform utilized was Google Meet for outside of school meetings that were partially academic related. For example, holding an advisory board meeting 2 months after school ended or meeting with teachers after the so-called “school day” was over. The convenience of popping into the teacher’s classroom to ask a quick homework question or to just check-in about the upcoming weekend was missing during school hours. Through a shift in online learning the down time with teachers changed alongside it. Another academic related activity was talking with other students about projects or assignments. For example, when working on a project for Chinese class, my partner and I had to record a conversation in Chinese. On a regular school day meeting at office hours or even after lunch to record a quick 2-min conversation would be enough time to finish a quick partner assignment. Instead, communication between partners was through an initial text message trailed by a Google Meet. Through the virtual meeting, the project was successfully completed, and the teacher was emailed an attachment to the assignment.

The second platform utilized for outside of school activities was FaceTime. Regularly used by most iPhone holders, FaceTime was used more than before social distancing implications. During real-time video chats friends could talk about completely random topics. In one FaceTime, one of my friends and I decided to submit a video to be added into a whole grade video, which comprised of multiple short student videos. Through brainstorming several ideas, it eventually led to a five-second video.

The third platform used for talking with friends was Zoom. Since the majority of academic related functions were on Google Meet, Zoom was used for communicating with friends. At one instance, two of my friends suggested that we all watch the television show, “Kids Baking Championship” in a Zoom Meeting. Through an organized Zoom meeting, one of friends would present their screen streaming the show. An additional option was for users to choose only to present a single tab, window, or the whole desktop view. We reacted and watched the show together while simply talking about random topics. New technology-oriented experiences were an opportunity for peers to bond through a single online software. To conclude, the implication of social distancing caused friends to pull out old or find new platforms to virtually communicate with each other.

### 3 Conclusion

Looking back on the 4 months of online learning experiences at home, no extreme emotional, social, or stress-related challenges has been observed perhaps mainly because of the good support from my school, my family, and my friends. However, virtual academic and non-academic activities required technological, mental, and strategical adaptations due to the impacts of COVID-19 pandemic. Although various lessons can be learned from this case study, three takeaways might come to one’s mind, that is, minor adjustments can lead to strong outcomes, new features can be constantly discovered on a single technology, and technology can narrow the social distance among friends.

First, minor improvements in teaching and learning helped decrease the unpredictability in virtual classrooms (Bao, 2020). In the two sections of Classroom Learning and Group Projects, teachers designed small but thoughtful strategies that run classes smoothly and saved time. For example, my history teacher grouped students together for a project before class rather than during class to avoid any class time being wasted. Second, new technology features can still be surprisingly discovered even for various technologies that are familiar and easy-to-use. Research suggests that innovative use was found on technologies that were either regularly used or not designed specifically for the COVID-19 pandemic (Ting, Carin, Dzau, & Wong, 2020). For instance, in the section of Environmental Club, the software of Amazon Business is very easy to use but was not designed for the COVID-19 pandemic. But now students used it to order materials for at-home projects. Third, technology could bring even closer emotionally those who are socially distanced (Keesara, Jonas, & Schulman, 2020). For example, in the section of Interacting with Peers, my two friends and I live in different towns, but organized a Zoom gathering to watch a TV program called Kids Baking Championship. At that time, we laughed, talked, joked, and felt especially close. When people are apart physically, technology connects close friends or even a whole school psychologically.

Reflecting on a major schooling shift during the pandemic, adaptations with technology use could be improved at three levels, personal, school, and society. Personal adaptations could be implemented to keep better organization of virtual assignments and meetings. On the school level, certain adjustments could be made. For example, before the COVID-19 pandemic, each student’s class schedule varied each
day successfully with an enjoyable flow. During the COVID-19 pandemic, each student’s class schedule stayed the same every day repetitively with a fixed routine. Schools therefore should vary each student’s class schedules creatively to make each school day more exciting and refreshing instead of being repetitive within multiple months of home learning. As a society, students, parents, schools, and governments should make sure that students balance their screen time with their off-screen activities. People should be encouraged to share their creative off-screen activities to do at home.

CONFLICT OF INTEREST
The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT
Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

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