

Virtual education & the challenges it presents

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Senior Project 12A

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February 17, 2021

Introduction

Virtual education refers to the development of training strategies with cyberspace as a teaching and learning environment. Accordingly, this project is focused on the concept just explained, specifically on the teaching and learning challenges faced by 11/12th grade students and teachers when using it in LTSM. It is known that online teaching arises in parallel with the development of information technologies, particularly with the development of the internet. It originated from the need to provide academic formation to those who did not have the ease of accessing face-to-face education. Furthermore, the concept of this teaching methodology can be defined as a learning process that takes place through the Internet and with the support of technological tools to transmit the necessary information so that students can learn. Also, it is an educational strategy that facilitates the management of information and that allows the application of new pedagogical methods focused on the development of meaningful learning, which is centered on the student and active participation.

It is extremely important to be informed about this topic because virtual education can adapt to diversity, overcoming temporal and personal barriers. These characteristics make it a suitable environment to motivate self-learning, which is very useful in labor circumstances since it facilitates the ability to adapt to the updates that happen every day. Also, researching about the subject in question can be very functional since it is currently a commonly used teaching modality around the world due to the health emergency that has been an ongoing issue since early 2020. Specifically in Colombia, the government established biosecurity measures to regulate the contagion of COVID-19 such as preventive isolation; which impedes individuals from leaving their homes for non-vital matters and also rejects massive crowds.

On account of this and the new cases registered, face-to-face education can't take place at this precise moment, making virtual education the most effective and immediate learning method.

The research that will be carried out and reflected in the following project will add valuable information about the learning and teaching challenges experienced in virtual education, as the researchers have a unique approach being students that are experiencing what online learning is like. They also have the possibility of conducting surveys with teachers who are confronting this new modality as well and thus the students will be able to present the situation from two different perspectives and contribute with solutions.

Question

What are the main teaching and learning challenges faced by 11th and 12th-grade students and teachers during virtual education?

Hypothesis

If the main challenges faced by students and teachers are those that make the learning and teaching processes more difficult, then the main problems that virtuality presents to this population are the lack of social interaction and ineffective teaching.

Objectives

General

To identify the challenges that teachers and 11/12th-grade students face with virtual education and to explore solutions.

Specific

To recognize the challenges that teachers and 11/12th-grade students perceive about virtual education.

To identify the academic and emotional problems that these challenges may cause in the future.

To develop ways to solve or alleviate these challenges.

To share the results of the research conducted with the LTSM community to improve the virtual education experience.

Justification

The project looks to find and understand the main challenges that students and teachers face with online education. What feelings are produced by these challenges (e.g., stress, anxiety, incorrect grading, frustration, etc.), and what actions can be implemented to render said challenges into something less problematic. The researchers look to gather information to have a better understanding and a better approach so that there is an improvement in certain areas of virtual education keeping in mind both teachers and students.

Online education is a fairly recent topic, which provides the members of the project different approaches and overall a broader field for research. The project also targets a population composed of teachers and students; this makes the information gathered unbiased and allows the research to contain different points of view. The project is deeply related to the COVID-19 outbreak; which has challenged education to take place in a virtual environment and this has brought certain difficulties to the academic population. In this order of ideas, the research done looks forward to identifying said problems, analyzing them, and looking for solutions to improve this experience.

Limitations

Time is the main limitation of the project because it requires researchers to be actively working on the document, gathering information, researching, etc. The current global crisis makes activities like data gathering slower and more tedious, also, social distancing forces the researchers to gather information through virtual methods (surveys, investigation, data comparison). Nonetheless, the objective is to not limit the investigation to be strictly virtual;

certain research processes may be done without virtuality (e.g., interviews). With all these factors in mind, researchers will have to adapt and overcome the challenges presented to produce a superior project.

Delimitations

The project will be delimited to specifically focus on 11th and 12th-grade teachers and students. What was stated above will make the study more manageable and acquire more accurate results and information. It was also decided to narrow the subject of the project, meaning that the focus of the research will not be all the challenges that 11th and 12th-grade students and teachers have to face with virtual education. The focus will be especially on the teaching and learning challenges these students and teachers experience. Since it would be unlikely to come up with accurate results if very general aspects are analyzed.

Theoretical framework

E-learning

Online learning (also considered e-learning) can be defined as a learning process that takes place through the Internet and with the support of technological tools to transmit the necessary information so that students can learn. According to Pete Chapin (2010), “not everyone fits into the traditional school model, and the online program provides another way for us to meet the diverse and often unique needs of our students.” This shows the importance of being informed of the subject, since online learning has the ability to adapt, making it a very useful alternative.

Furthermore, online learning is an educational strategy that facilitates the management of information and that allows the application of new pedagogical methods focused on the development of meaningful learning, which is centered on the student and

active participation. The history of E-learning is related to the beginnings of distance education; both arose due to the need to spread academic training to those who didn't have the facility to enter face-to-face education, but this is not a reason to think that they are the same thing. Modern distance learning is a way of teaching in which students do not have to physically attend the place of study 100% of the time. This means that distance education has a percentage of presence and another percentage of virtuality, while virtual education is completely online.

History and evolution of distance learning

Some sources trace distance learning as far back as the 1700s in the United States. Soon after this time, distance education was practiced through a method called correspondence education. According to Mike Erwin of the University of Advancing Technology, the process was simple and slow: students received instructions through the mail and responded with assignments and/or questions to the teacher. On the other hand, some other sources argue that the beginning of distance learning was in 1840, when an English educator, Isaac Pitman, would mail text on postcards to students, and students would mail their assignments back to him (The Evolution of Distance Learning, 2019).

Correspondence courses continued to catch people's attention, and the Museum of Distance Education timeline reveals that, in 1858, the University of London became the first college to provide distance learning degrees. After that, considerable significant advancements have contributed to the improvement of distance learning since the late 1800s. In 1873, an official correspondence education program denominated "Society to Encourage Home Studies", was created in Boston, Massachusetts by Anna Eliot Ticknor. Then, the University of Queensland in Australia established its Department of Correspondence Studies in 1911.

The difficulty with these methods was that they are one-way forms of communication. It could take many weeks for a response from the instructor and that complicated the students' understanding. But despite the drawbacks, correspondence courses went ahead, mainly thanks to the evolution in the postal service that allowed correspondents to continue studying long distances.

Over time, technological advances played a fundamental role in distance education. The emergence of radio allowed universities to begin spreading information and courses to students. In the mid-1900s, universities such as "Pennsylvania State College" and "University of Iowa" became the first universities to broadcast via radio networks and to use television as a learning tool. After the television, the next major invention to revolutionize distance education was the computer with internet capabilities. The University of Phoenix became the first institution to launch a fully online college institution that offered both bachelor's and master's degrees in 1989. Later, two entrepreneurs called Bernand Luskin and Glen Jones instituted Jones International University, which became the first accredited and fully web-based university in 1996.

Currently, a health emergency is being experienced throughout the world, forcing each country to make the best decisions to manage the situation properly. Specifically in Colombia, the government decided to establish some biosecurity measures such as the mandatory use of masks, the closure of many public establishments, preventive isolation, among others; this to regulate the spread of the disease.

Even though each country is at different points in its rates of infection by COVID-19, most of them have had to decree preventive isolation, which impedes individuals from leaving their homes for non-vital matters and also rejects massive crowds. As a consequence, some governments have had to stop considering virtual education as an option and make it a

necessity to limit contagions and to comply with the quarantine. When a government decides against requiring most academic institutions to impart knowledge 100% online, it is when it stops being distance learning to become virtual education.

Benefits and drawbacks

Virtual education offers different advantages that face-to-face education lacks and allows tutors to use different approaches and platforms so that teaching can be easier and more enjoyable for students. Mainly, teachers can have better control of students, manage their tasks effortlessly, and provide better feedback; this provides a better experience for both students and teachers and new possibilities for interactive teaching. Online education also removes the tedious task of using textbooks that are usually expensive and most students dislike.

The main advantage of virtual education is that it can be accessed almost everywhere by almost anyone (except for users that do not have any electronic devices or internet service). This proves extremely useful in the current global situation in which human contact should be avoided as much as possible to prevent the further spread of COVID-19. Online tutoring has provided educational services a way to continue with the learning process with students without hindering their progress. In this order of ideas, not only has virtuality provided ways to overcome the challenges that the pandemic has provided, but it also made students and teachers rethink what education means and what it is. In the past, most tutors and pupils had the concept that education was strictly face-to-face, with a notebook in hand taking notes about a theoretical lesson. However, virtuality has presented a set of challenges that have refined this previous concept and expanded it. This made lessons more interactive, where the pupil is required to be focused and to actively participate in the class. Some schools have implemented new educational platforms that make assigning tasks, giving

feedback, and answering questions easier; potentially giving more time to both students and teachers to develop other activities. Overall, virtuality has opened new ways to teach and to learn, has improved tasks that in the past were arduous to do, and has had a mostly positive impact on the willingness of students to learn.

However, virtuality also comes with several challenges that prevent it from being perfect. Mihaela Banek Zorican (2009), a member of the Croatian Department of Informational Sciences, and her student Antonija Lujanac (2009) found the following in their research:

The social interaction between students is greatly reduced because they must be focused and active in the virtual environment, this doesn't allow students to freely talk to their fellow partners. Also, because there are no breaks in which students share a virtual or non-virtual space the interaction between them is extremely low. In the short term, this may not seem like something that severely affects students, nevertheless, in the long run, this can affect the students' social life, capabilities to interact with other people, and their mental health.

Social interaction has always been something necessary for human beings, and the lack of it can severely affect and make an individual more likely to have health problems related to stress and heart and brain disease; according to Jane E. Brody (2017), "People who are chronically lacking in social contacts are more likely to experience elevated levels of stress and inflammation. These, in turn, can undermine the well-being of nearly every bodily system, including the brain". In this order of ideas, students have a bigger necessity to have these interactions because of the high levels of stress that they face compared to other populations.

Due to the mental health benefits that social interaction provides, it is essential so that the physical and mental health of pupils remains stable and at healthy levels. A study developed by the American Psychological Association (APA) in 2014 showed that teens often felt overwhelmed (31% of teens interviewed), depressed (30% of teens interviewed), or tired (36% of teens interviewed). Also, 54% of students affirm that stress has had an impact on their physical health and 52% stated that stress has had an impact on their mental health; while only 39% of adults believed that it had an impact on their physical health; 43% stated that stress has had an impact on their mental health; all the data suggest that teens are a population heavily afflicted by stress and mental disorders. The high level of stress reported by teens, the different mental disorders that they report, and the lack of social interaction caused by virtual education may further damage the health of teens. Nonetheless, this can be avoided by implementing an effective system in which students have the time and the opportunities to establish friendships and explore their social lives. The implementation of said systems can exponentially help teens to relieve their stress and to have better physical and mental health.

Improvement of virtuality

Since virtuality is such a new concept; especially in education, many areas need improvement. First, social interaction; E-learning lacks the spaces to permit social interaction between students. Most people think that this isn't important so it is frequently ignored, however, the absence of social contact can develop into stress which then develops other afflictions.

Second, certain students can't afford an electronic device or a good internet connection to connect to meetings or to develop assignments. This is something that happens frequently in public schools since most students that attend them don't have these resources.

This makes it impossible for these pupils to continue with their academic formation; not only affecting their learning experience but their future too.

Lastly, some teachers and students don't possess good knowledge or have the skills to correctly use electronic devices or virtual tools; this presents another set of challenges that prevents E-learning from being a smooth experience. This may also cause frustration and stress which proves detrimental for mental and physical health.

Virtuality and tradition

Virtual education is a powerful alternative to the usual teaching methods that involve teachers and students coexisting in a classroom. This method has proven useful for the last decade, however, due to the recent sanitary crisis, virtual education has become the ultimate replacement of the former method. E-learning allows students and teachers to work remotely, which proves especially useful in preventing the spread of the virus.

Nevertheless, various obstacles hinder the process of learning in a virtual environment. The amount of preparation required for synchronous online teaching is exponential compared to traditional classroom teaching, and online disruption can be attributed to a variety of variables (Etchells, M., Brannen, L., Et al., 2020). Tutors must spend more time planning their lessons and uploading their class plans to an online platform. Besides that, students may not be focused or may disrupt the class due to the amount of distractions present (e.g., phones, family members, pets, etc.). Furthermore, virtuality requires very specific things from teachers and students, like access to an electronic device, a good internet connection, experience with electronic devices and online classrooms, self-motivation, and academic honesty (Etchells, M., Brannen, L., Et al., 2020). Aside from that, E-learning lacks social interaction and the emotional process between students and teachers that plays an essential role in education (Barth, A., 2020). According to Dr. Aaron

Barth, the president of the Dialectic Organization; most students remember information that is presented to them through storytelling or the empirical method, based on experiences and stories. These things create empathy which makes remembering topics easier and more effective. Storytelling is a method that has been used since the Paleolithic Era by cavemen; it is extremely useful because the storyteller establishes a bond with the person who is on the receiving end of the story (Barth, A., 2020). Subsequently, the bond creates empathy that makes remembering specific details and topics easier because of the emotional nature of humans. Because of this, virtual education can be less effective because it lacks social interaction and bonding between teachers and students.

Despite some of the flaws of E-learning, it has been an extremely important tool that has helped to keep education going even in these difficult times. Without it, many pupils wouldn't have continued their scholarly process, further affecting their educational formation. Virtual learning has also taught teachers and students about adaptability and resilience; to keep on going through these dark times.

Virtuality has greatly benefited humans to adapt and overcome this pandemic, however, like everything else, virtuality also has important flaws, like the lack of social interaction and the dependability to a good internet connection or an electronic device. In this order of ideas, virtual education has played an important role lately, however, only time will tell if this alternative will render face-to-face education useless or will severely damage the mental health and academic processes of tutors and students.

Besides this, E-learning has benefited immensely from the COVID-19 outbreak. Since almost everyone is at home following the instructions stated by the Colombian government; "normal" education wouldn't work anymore. This made tutors and school directives think about innovative ways to keep on teaching so that the academic process of students would

remain untouched. The implementation of virtuality has surely brought negative effects, however, having the ability to teach or learn from the commodity of home while being protected from the virus has played a vital role in the adaptation of humanity to the current crisis.

Face to face education vs virtual education

Many aspects allow people to differentiate between virtual education and face-to-face education. For this reason, a comparative table was designed. It highlights the main differences between both pedagogical methods, which is shown below:

Figure 1

Comparison of two teaching environments.

Face-to-face education	Virtual education
Learning is synchronous. All teachers and students are present in the same place at the same time.	Learning doesn't have to be strictly synchronous, online instruction can be either synchronous or asynchronous.
A teacher/instructor is watching and monitoring each person's progress carefully.	Each person has to be their motivator, timekeeper, and disciplinarian.
Mentors are usually imparting knowledge, and then evaluate the understanding of that knowledge at a later time.	Instructors play the role of facilitators of learning, they help their students to understand concepts through online materials that are provided.
Since this type of learning method is face-to-face, participation and class attendance are easily performed by sight and then recorded.	Participation and class attendance are harder to measure in an online learning environment than in a face-to-face one. Because in online learning there is no precise method of knowing if students are attending their respective classes.

Note. Comparative chart between face-to-face and virtual education.

Apart from the information previously provided, Niema Moshiri, the lecturer of the Ted Talk named "The Era of Online Learning" recounts the experience of attending a class at the university in which the professor was not in the same room as him. Instead, there was a

giant screen on which the professor was projected during class. The speaker was unhappy with the method that was being executed, however, he was inspired to see what other professors did, how people tried to substitute it with technology, and how individuals try to learn from those things and apply them to education. Also, during the conference, it was mentioned that in 1984 Benjamin Bloom did an experiment where he tried to test different types of learning systems and saw that the traditional classroom setting was one of the least effective ways of spreading knowledge to students and he affirmed: "It makes no sense to expect all students to take the same amount of time to achieve the same objectives" (Bloom, 1984). The lecturer demonstrates his agreement with the previously mentioned phrase by saying: "If we have a bunch of different students in the same classroom coming from different backgrounds how can you expect two different students to learn the same material at the same pace" (Moshiri, 2017).

Later in the Ted Talk, Moshiri introduces a phrase with which he disagrees, which says that imparting knowledge in the classroom uniquely personalizes the learning process unlike Massive Open Online Course (MOOC). The lecturer argues that there is nothing unique about it since in classroom education students are being exposed to a wide amount of information but without going deeply into it. As a consequence of these thoughts, Moshiri proposes to use online education to change the situation and to get the professors involved with the learning breakdowns and not the general content.

While the talk "The Era of Online Learning" focuses more on the benefits of virtual education and how it should be implemented to improve the delivery of knowledge, the article "Comparing the Effectiveness of Classroom and Online Learning" provides a comparison in all aspects between both types of education. The author establishes that the results of this study:

Indicate that although student performance is independent of the mode of instruction, certain courses are more challenging to students who persist in the virtual environment than in the classroom. Furthermore, participation may be less intimidating and the quality and quantity of interaction may be increased in online classes. (Ya Ni, 2016, p. 15)

To conclude, it is clear that the study recognizes that both, online and classroom learning, have unique advantages and disadvantages that must be taken into consideration before defining the most effective.

Methodological Framework

Research question

The research question of the project is: “what are the main teaching and learning challenges faced by 11th and 12th-grade students and teachers with virtual education?”

The question is qualitative because the approach used seeks to understand the perspective of the population about the situations that surround them; the data gathered will be organized in categories instead of numbers. It looks to understand the opinions and concerns of the population, i.e. how they perceive their reality. Furthermore, it is possible to acknowledge that the question stated before is mainly focused on the perspectives of the population involved, regarding the challenges of virtual education. This gives the question a qualitative nature.

Context

The project will be developed through data recollection methods applied to teachers, 11th-grade students, and 12th-grade students because of the maturity of these populations. Choosing the samples from this population will be done randomly to facilitate the bias elimination process. The researchers will use tools like surveys, interviews, and observations.

Surveys will be done virtually. All interviews will be done through Zoom (virtually); observations will be done in LTSM and virtually. The process will take place during the second and third terms of school.

Liceo Taller San Miguel is a private school with approximately 650 students; it is primarily focused on arts, humanities, and the development of its students. Amidst the recent pandemic, the school has implemented virtual learning to continue with the academic process. The process of virtuality started back in March 2020 with the implementation of Zoom (a virtual meeting app) to teach classes. In August, the new academic year began with the implementation of Brightspace, an LMS platform (Learning Management System) that facilitated an effective process for both teachers and students. Two months later, in October, a hybrid process was started. In this educational model, students took virtual classes three times per week and went to school for in-person classes twice per week (this is the current model that LTSM is managing, nevertheless, it may change in the future). However, due to the rapid application of the virtual method (Zoom/Brightspace), certain problems arose (e.g., a great amount of homework, stress among students, rushed classes, to name a few.). This led the researchers to focus on virtuality to improve the virtual experience of LTSM teachers and students.

Population

The population of the study is students from 11th and 12th grade, (with ages ranging from 15-18 that were (or still are) part of the virtual process of LTSM) and High School teachers that teach classes to 11/12th grade. The researchers decided to focus on this population because it's the most reliable to get information from, due to their maturity and relevancy on the subject. Approximately 80 individuals are part of the population.

Sample

For the surveys, there is an approximate population of 80 students (11th & 12th). The surveys need a minimum of 50 individuals in the sample size to obtain reliable results. The sample taken has a confidence level of 99% and a margin of error of 10%. For the interviews, there is a population of 12 teachers, and the sample size will consist of 6 teachers.

Objectives

The first specific objective is “to recognize the challenges that teachers and 11/12th-grade students perceive about virtual education.” This seeks to list the challenges that the previously mentioned population notices about virtual education from their own experience and perspective. The data collection strategy that was chosen is denominated as a survey, which will be applied on teachers and 11/12th grade students since what is sought is to broadly identify their perceptions. The survey’s answers will be categorized to present the information in an organized fashion. The material gathered will be used to get a basic understanding of the population’s concerns and opinions; the data will also be used to create the questions for the interviews which is the second method.

The second specific objective is ”to identify the academic and emotional problems that these challenges may cause in the future”. It seeks to understand the consequences that can affect the student population while facing the challenges that virtual education presents. To develop this objective, interviews done through a questionnaire will be used with teachers to identify their complaints and recommendations about the virtual experience. In this population, the individuals that will be interviewed will be chosen randomly to eliminate bias. Also, a psychologist who can point out some of the afflictions that could be triggered after facing a difficult virtual experience will be interviewed (Lina Osorio). The interviews will give the researchers a more punctual understanding of the concerns of each interviewed

individual. With this data, the researchers will start to plan ways to improve virtuality and to start creating the visual material (4th method).

To achieve the third specific objective, “to develop ways to solve or alleviate the challenges of virtual education,” the researchers will use observational and analytical processes to think of ways to overcome and aid teachers and students with the challenges of the virtual experience. With these processes, the creation of visual material will be more effective; besides this, the data will provide the researchers a better understanding of the way virtual classes work and how students and teachers coexist within.

Furthermore, the surveys will be done to complete the first objective. The interviews will achieve the second objective and will help to complete the third one. By analyzing the results of the surveys and interviews, the researchers will identify the main concerns of the population; identifying them will make solving the challenges an easier task.

Ultimately, the fourth and last specific objective is “to share the results of the research conducted with the LTSM community to improve the virtual education experience”. It seeks to show the teachers and students of the school the information and conclusions that were collected to contribute to the improvement of the virtual experience of the whole population. The researchers will use the creation of visual material, like a presentation or infographics; they will contain tips and ways to improve virtuality. This material will let the community understand the main concerns and problems, as well as ways to improve their experience.

Data Collection & methods

The researchers will use a total of four methods. Firstly, they will use surveys targeting teachers and students (11th/12th graders); the information obtained by these surveys will allow the researchers to identify the challenges that the LTSM community faces.

Secondly, researchers will use observational and analytical capabilities to think of ways to

solve the problems that were expressed in the previous surveys. Then, they will use interviews targeting teachers and some students (chosen randomly from 11th and 12th grade) to understand their experience and opinions about the current state of virtuality and its relation to teaching. Finally, researchers will create visual material to share with the community their findings and recommendations to improve virtuality.

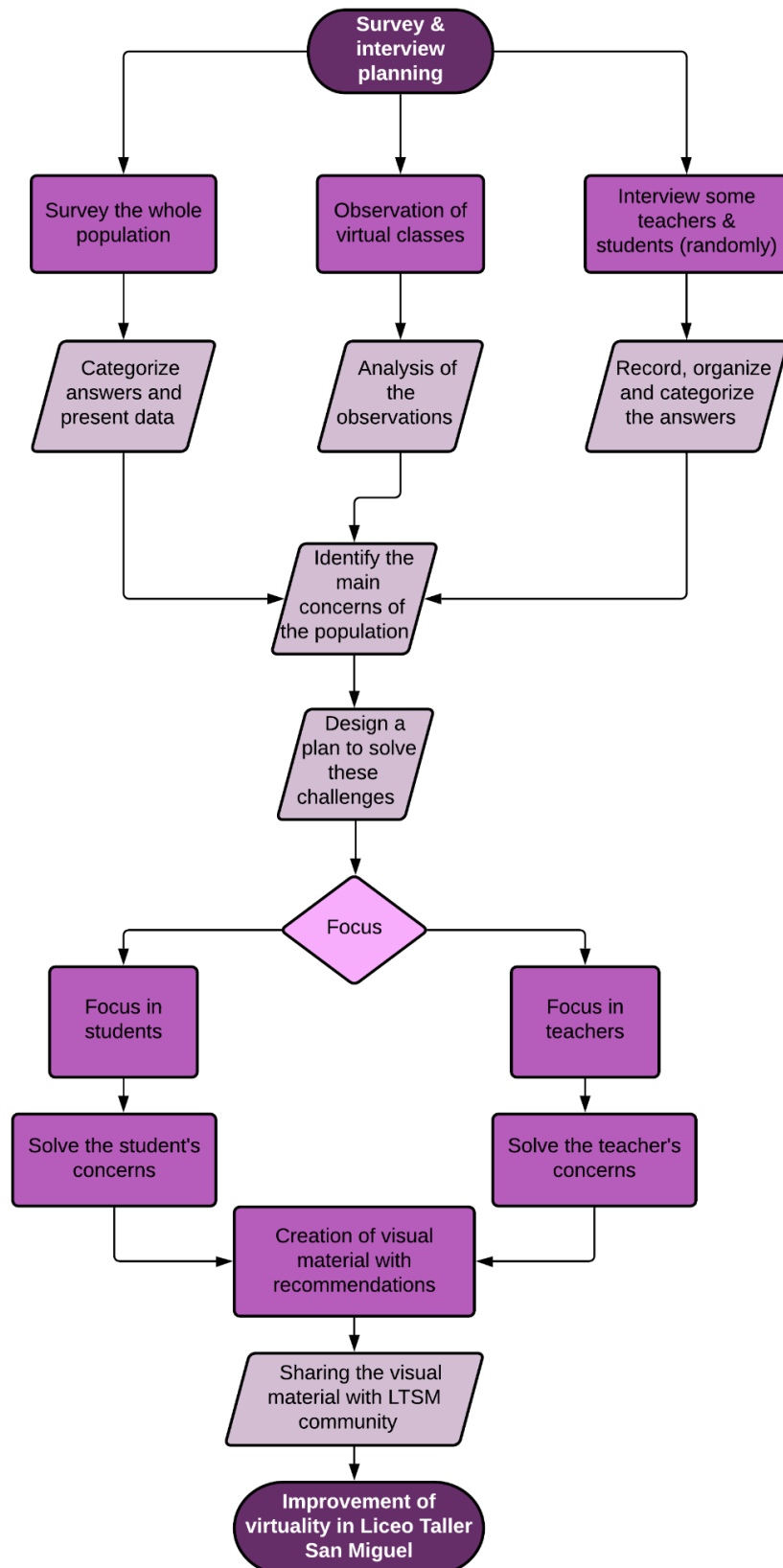
Data Analysis

The researchers will analyze the data of surveys, interviews, and observations through a qualitative approach (by categories instead of numbers). To accomplish this and to avoid leading questions or bias the researchers will have fixed and open questions to then categorize the answers i.e. the answers gathered will be classified depending on their contents (e.g., if a person answers positively that answer will go into the category of “positive answers”). After these answers have been classified at a basic level they will be analyzed and re-classified at a more specific level to show more punctual data.

Elimination of bias

In surveys, bias will be eliminated by ensuring the questions asked aren't leading or suggesting anything to the individual taking them. Besides this, surveys will be anonymous to obtain more reliable and honest answers.

The sample chosen for the interviews of teachers will be chosen randomly from the whole population; choosing them randomly will eliminate bias. The interview will avoid using leading questions.

Flowchart

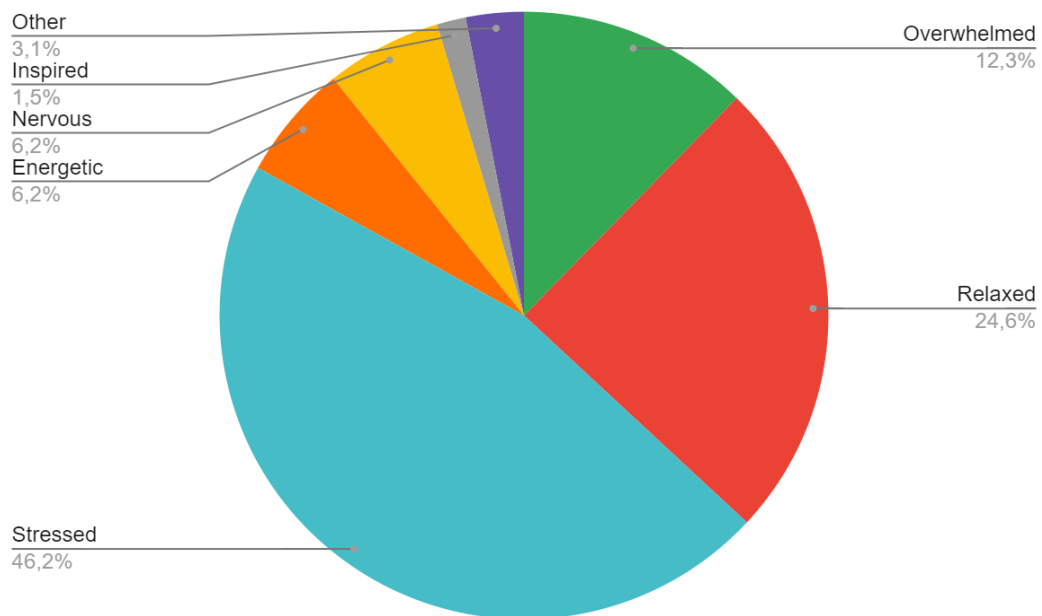
Results

Students survey

Data gathered from a population sample of 65 LTSM students from 11th and 12th grade. The surveys were made through Google Forms. There are a total of 65 answers, and all of them are anonymous. (Full survey found below in Annex 1).

Figure 2

Which of the following feelings best describes your virtual experience?



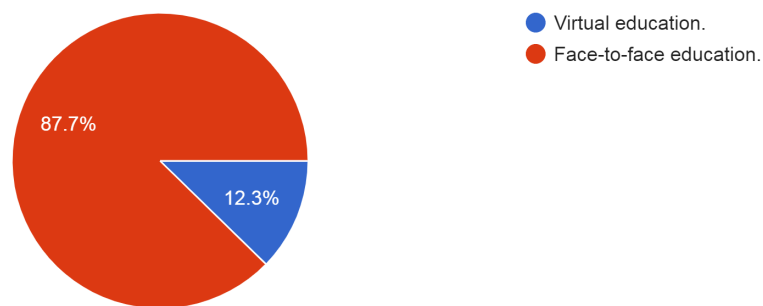
Note. Graphical representation of the data obtained in question 1 of the student survey.

Figure 2 shows that 46.2% (30 students) of the population surveyed feels stressed (blue slice). While 24.6% (16 students) of the population surveyed feels relaxed (red slice). And 12.3% (8 students) of the population surveyed feels overwhelmed (green slice). Then, the orange portion shows that 6.2% (4 students) of the population surveyed feels energetic. Followed by 6.2% (4 students) of the population surveyed that feel nervous (4 students).

While the gray slide represents that 1.5% (1 student) of the population surveyed feels inspired. Finally, the purple slide represents 3.1% (2 students) of the population surveyed who had a different opinion from the ones stated before.

Figure 3

Which of the following is your preferred educational method?

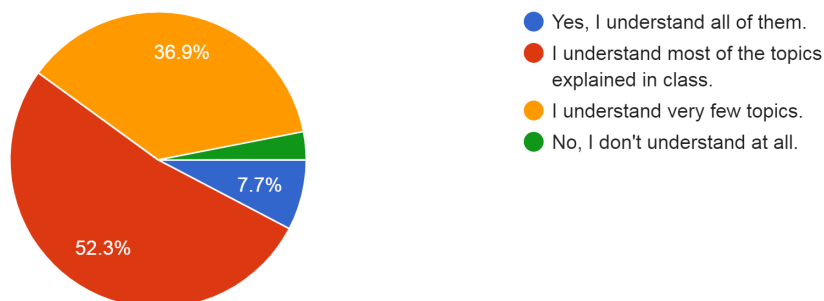


Note. Graphical representation of the data obtained in question 2 of the student survey.

It is observed in figure 3 that 87.7% (57 students) of the population surveyed prefers a face-to-face environment in education. While 12.3% (8 students) of the population surveyed prefers to learn through virtual education.

Figure 4

Do you understand the topics explained by teachers during the synchronic sessions?

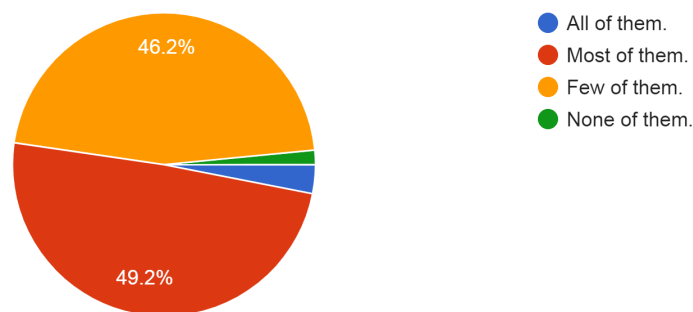


Note. Graphical representation of the data obtained in question 3 of the student survey.

In figure 4, 7.7% (5 students) of the population surveyed understands all of the topics explained during virtual classes. 52.3% (34 students) of the population surveyed understands most of the topics explained in virtuality. 36.9% (24 students) of the population surveyed understands very few topics explained. Finally, 3.1% (2 students) of the population surveyed doesn't understand any of the topics explained (percentage not visible in the graph).

Figure 5

How many teachers give feedback?

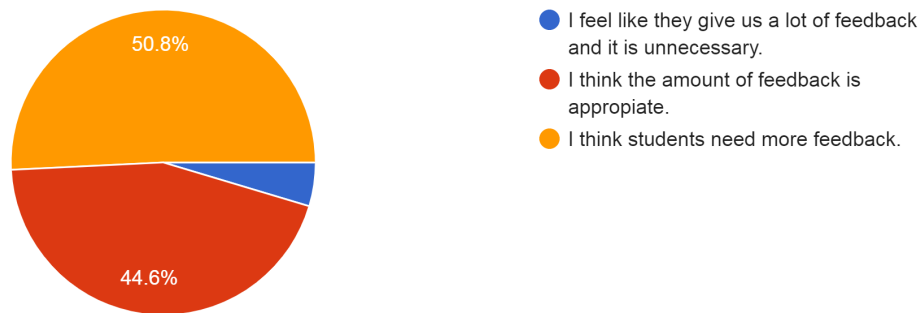


Note. Graphical representation of the data obtained in question 4 of the student survey.

Figure 5 shows that 3.1% (2 students) of the population surveyed believes that all teachers give feedback (percentage not visible in the graph). 49.2% (32 students) of the population surveyed thinks that most teachers give feedback. Then, 46.2% (30 students) of the population surveyed believes that few teachers give feedback. Lastly, 1.5% (1 student) of the population surveyed thinks that no teachers give feedback (percentage not visible in the graph).

Figure 6

What do you think about the amount of feedback given by teachers?

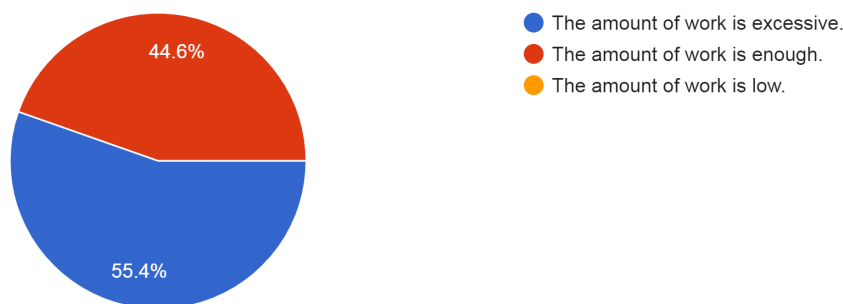


Note. Graphical representation of the data obtained in question 5 of the student survey.

It can be observed that in figure 6 4.6% (3 students) of the population surveyed feels like teachers give a lot of feedback and it is unnecessary. Subsequently, 44.6% (29 students) of the population surveyed thinks that the amount of feedback given is appropriate. Finally, 50.8% (33 students) of the population surveyed feels like they need more feedback from teachers.

Figure 7

How do you feel about the amount of homework given throughout your virtual experience?

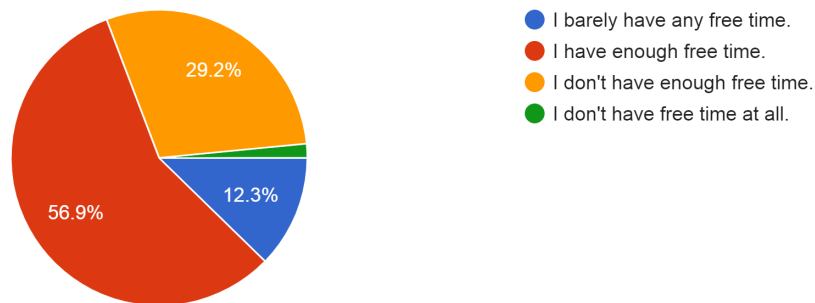


Note. Graphical representation of the data obtained in question 6 of the student survey.

In figure 7, 55.4% (36 students) of the population surveyed thinks the amount of work given is excessive. Next, 44.6% (29) of the population surveyed believes the amount of work is enough. Lastly, no one in the population surveyed believes that the workload is low.

Figure 8

How do you feel about your current amount of free time?



Note. Graphical representation of the data obtained in question 7 of the student survey.

In figure 8 it can be seen that the red-colored option represents 56.9% (37 people) of the total responses, being the most answered option. Followed by the orange-colored option, which represents 29.2% (19 people) of the total responses. Then it is the blue-colored option which represents 12.3% (8 people) of the responses. Finally, the least answered option was the green-colored one, since it represents 1.5% (1 person) of the total responses of the question.

Figure 9

What do you think about the amount of synchronic sessions?

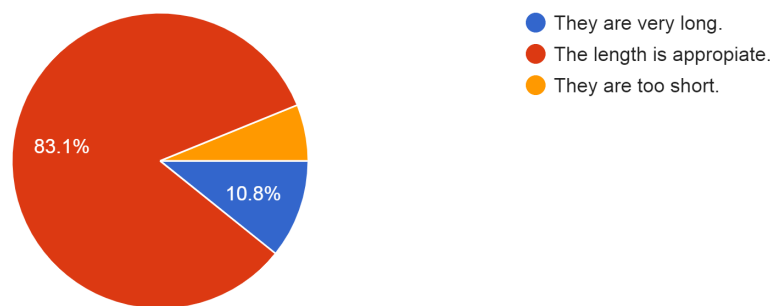


Note. Graphical representation of the data obtained in question 8 of the student survey.

Figure 9 shows that the least answered option was the orange-colored one, it represents 4.6% (3 people) of the total responses of the question. Followed by the blue-colored option, which represents 10.8% (7 people) of the total responses. Finally, the red-colored option represents 84.6% (55 people) of the total response blue-colored most answered option.

Figure 10

What are your feelings towards the duration of synchronic sessions? (45 min.)



Note. Graphical representation of the data obtained in question 9 of the student survey.

In figure 10 it can be seen that the red-colored option represents 83.1% (54 people) of the total responses, being the most answered option. Followed by the blue colored option, which represents 10.8% (7 people) of the total responses. Finally, the least answered option was the orange-colored one, since it represents 6.2% (4 people) of the total responses of the question.

Figure 11

Select the option that best describes your situation during synchronous sessions.

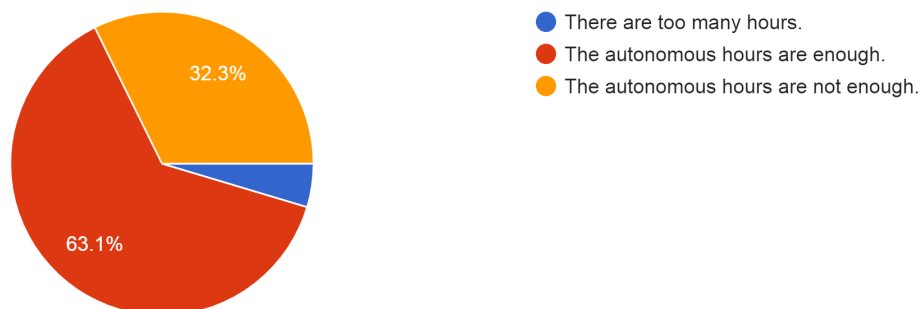


Note. Graphical representation of the data obtained in question 10 of the student survey.

In figure 11 it can be seen that the least answered option was the orange-colored one, which represents 6.2% (4 people) of the total responses of the question. Followed by the red-colored option, which represents 35.4% (23 people) of the total responses. Finally, the blue-colored option represents 58.5% (38 people) of the total responses, being the most answered option.

Figure 12

What do you think about the amount of autonomous work given?



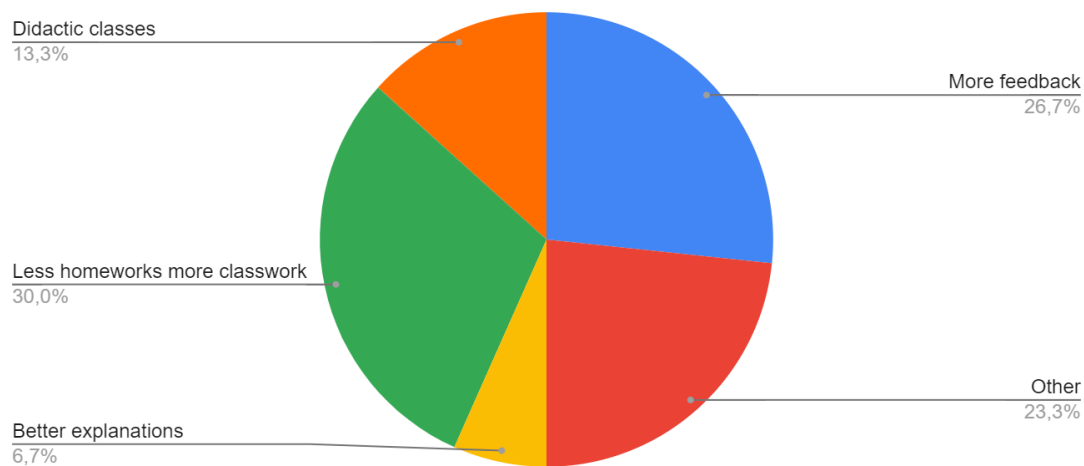
Note. Graphical representation of the data obtained in question 11 of the student survey.

In figure 12 it can be seen that the red-colored option represents 63.1% (41 people) of the total responses, being the most answered option. Followed by the orange-colored option, which represents 32.3% (21 people) of the total responses. Finally, the least answered option

was the blue-colored one, since it represents 4.6% (3 people) of the total responses of the question.

Figure 13

How would you improve virtual education?



Note. Graphical representation of the data obtained in question 11 of the student survey.

Figure 13 shows that 30% (9 students) of the population surveyed thinks that less homework and more classwork would improve virtual education. Followed by the 26.7% (8 students) of the population surveyed who think that more feedback would improve virtuality. Then, 13.3% (4 students) of the population surveyed believes that didactic classes would improve the virtual environment; and 6.7% (2 students) of the population surveyed think that virtuality would improve with better explanations. Finally, 23.3% (7 students) of the population surveyed consider that other options not listed before would improve virtual education.

Teacher's interviews

Data gathered from a population sample of 6 LTSM high-school teachers; this population was chosen randomly through a Random Roulette on the internet. The interviews were designed by the researchers of the project (Manuela Arenas & Juan José Daza); they were done virtually through Zoom. The whole population sample was interviewed. (Full interview transcription found below in Annex 2.)

Summarized interview transcription**- First question.**

Interviewers: briefly describe your overall experience in teaching in a virtual environment.

Ryan Cross: my experience has been challenging, it hasn't been easy, it is a big change. There are times when it can be frustrating just because digital platforms can be difficult, oftentimes things don't work the way you expect them to or think that they should. On the other hand, it's also been a really positive experience since, as with anything, sometimes you get comfortable doing things in a certain way, so you need kind of a strong and shocking experience to take you out of that. Occasionally it's nice to have a reason to leave the comfort zone, to do things in a different way, or to experiment with different methods. Overall I would say it's been a positive experience full of a lot of learning.

Daniel Echeverri: from an emotional perspective it is an unsatisfactory experience because students don't participate enough and often avoid turning their cams on. I believe that the attention span of students is affected by virtuality and the need for electronic devices. Sometimes I feel like I'm talking alone because of the absence of the students' presence. From a technological perspective, virtual teaching causes many challenges. Teachers need to

adapt to new tools and virtual platforms. I like technology and enjoy virtual environments, however, other teachers that don't feel this way may feel stressed about virtuality.

- **Second question.**

Interviewers: what do you think of Brightspace?

César Ramírez: when I was first introduced to the platform, it seemed really complex and I was a bit lost. However, I got used to the platform after using it for two months. It has some interesting tools that have allowed me to implement new things in my classes.

Lucía Flórez: It is a very complete platform with many interesting tools but it should continue to be explored and exploited. Since I feel that there are several things that are left aside because we do not know many of its aspects. For the teachers, it was very shocking. Because for some of us, technology is very complicated and having to learn how to use this new platform while we were already working in a virtual environment, it felt like there were many things at once.

- **Third question.**

Interviewers: what do you think of Zoom?

Hader Vargas: after analyzing and testing with other servers, we concluded that zoom offers many more advantages than other video calling platforms, for example, breakout rooms and the reactions. Zoom already had these types of innovations before, unlike other applications such as Microsoft's teams that recently were making similar updates.

Lina Osorio: using Zoom has been a really enjoyable experience, especially the premium version that the school acquired. I feel like it improves the connectivity in the platform, and it also provides new tools like the breakout rooms.

- **Fourth question.**

Interviewers: how is teaching virtually different from other teaching environments?

Lucía Flórez: in a face-to-face environment, you can accompany the process in a way that allows you to support the difficulties of the students and enhance their skills right at the moment. While in a virtual environment, you are not seeing what the student is doing, they are basically interpreting from their criteria instructions that are given and after that, the feedback is provided. In presenciality, the feedback is constant since the work is being done there, at the moment. Another big difference is that through virtuality, the students become more autonomous and in the face-to-face environment they become more dependent on the teacher.

Ryan Cross: as a teacher, for me, one of the most important things is the feedback that I receive from my students. I am talking about informal and almost involuntary feedback, which is a lot harder to get in a virtual environment because oftentimes you are not seeing people's faces and you cannot hear the low volume level comments they make, from where you can pick up on people's tones and attitudes. Through virtual environments, I sense that lack of feedback that I feel it's important to me and I miss having it, so that's a huge difference in my teaching experience. Another really big difference is that the amount of individual interaction that I can have with students is very limited since in a classroom it is so much easier to approach a person, ask how they are doing and talk to them. The whole social dynamic is easier at school.

- **Fifth question.**

Interviewers: do you feel that you have control over your students through virtuality?

Daniel Echeverri: no, I have less control than before because in virtuality students aren't as dependent on teachers as before; that's why autonomy is extremely important in virtual environments.

Lucía Flórez: I don't think so, in the face-to-face environment you have a way of controlling the groups because you are there and you see what they are doing. While in virtuality, this is not that easy since students turn off their cameras and they can go to sleep, move around the house, go to other places, among other things.

- **Sixth question.**

Interviewers: do you think that the fact that students do not turn on the camera affects the development of the class?

Ryan Cross: I think that it does. I am not saying that you can't give your full attention and have your camera turned off, it is possible. But also I feel that if the camera is on, people are going to act a little differently, definitely, they are going to be sitting in front of the screen, they are not going to be all-around their houses doing different things, they are going to be more focused.

César Ramírez: It affects the student-teacher connection. However, I understand why students avoid turning on their cameras; I think it's because they are self-conscious or shy about their appearance or their surroundings. Due to this, teaching in virtuality is a complex process, since you have in mind not only your feelings but the ones of your students.

- **Seventh question**

Interviewers: has your class planning process been affected by teaching virtually?

Ryan Cross: yes, we have to be planning more long term but at the same time, we also have to be flexible and we have to change and improvise new plans based on the feedback and on how we perceive that things are working. I think it just takes more time, a lot of trying to focus on planning, a lot of research, collecting resources to share with the students, and uploading them on the platform, all of those things take extra time.

Daniel Echeverri: no, even though it involves much more platforms and tools, I still enjoy planning classes in a virtual environment because of the opportunities virtuality provides. It also allows me to fully use audiovisual material to teach.

- Eighth question

Interviewers: do you think you have been able to handle the resources and tools that virtuality provides?

Ryan Cross: yes, but I know I could be better with more time, focus, discipline and also one of the key factors would be with more experience.

Hader Vargas: no. I think all the tools that are available that could be applied and exploited for the application of the learning, I have not yet explored them 100% so there is more to do.

- Ninth question

Interviewers: has your virtual experience been positive or negative so far?

César Ramírez: it has been positive because I have learned new things about teaching processes and methodologies. I actually think that I've had better results teaching virtually than face-to-face (pre-COVID-19). The emotional part is the only difficulty I have had with virtual environments so far.

Lucía Flórez: positive because many things have been learned. I believe that as long as there is learning in every process, it will always be a positive experience.

- Tenth question

Interviewers: do you think your students are really learning during your class?

Hader Vargas: in order to answer that question I think it would be necessary to look at student by student. However, I know that some students are learning, but others leave me

wondering. Virtuality is showing me more and more that the teaching process should be more focused on students' skills and what they like.

César Ramírez: yes, definitely. I've tested the knowledge of my students about theater class and they show a good learning process.

- Eleventh question

Interviewers: would you rather teach in a virtual or face-to-face environment? Why?

Lina Osorio: I would rather teach in a virtual environment, it provides so many tools and experiences that make teaching more efficient. Furthermore, virtuality allows a better time management compared to face-to-face education.

Lucía Flórez: face-to-face. I am a person who loves the face-to-face environment, both as a teacher and as a student.

- Twelveth question

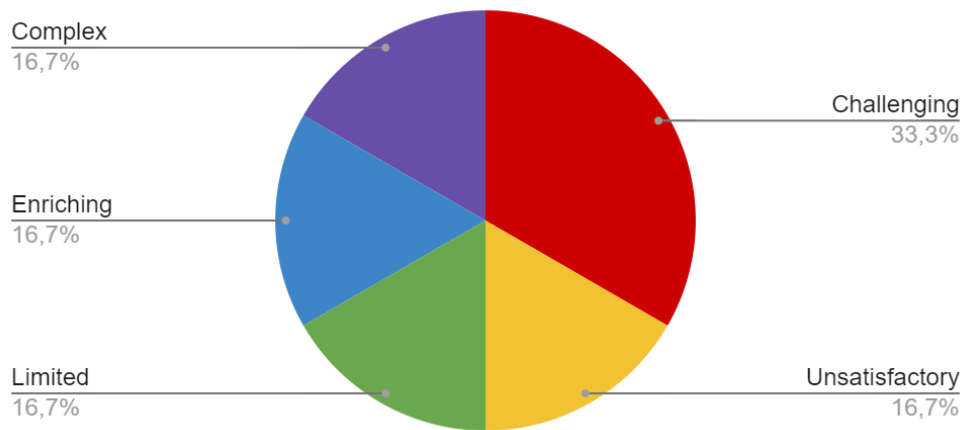
Interviewers: do you have any complaints or comments about virtuality that you didn't have the opportunity to share in the previous questions?

Hader Vargas: no, I think that you guys have approached every topic very well.

Lina Osorio: I think that virtuality has taught us that we must always adapt when things don't work the way we originally wanted to. It has also taught us about resilience and adaptability.

Teachers survey**Figure 14**

Briefly describe your overall experience in teaching in a virtual environment.

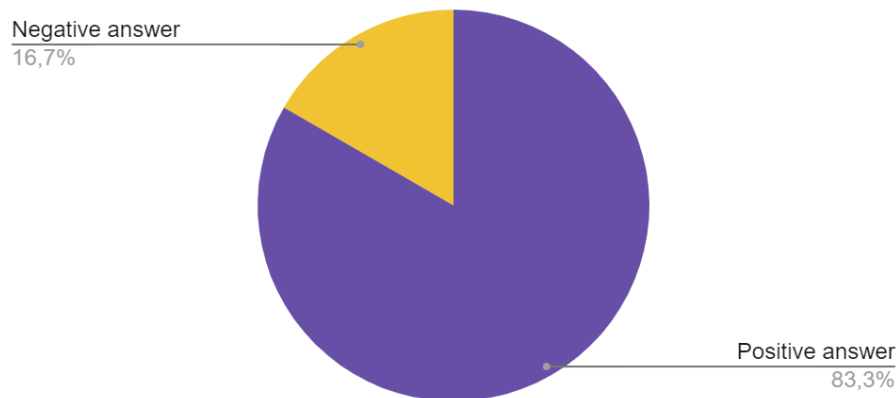


Note. Graphical representation of the data gathered in the first interview question.

In figure 14 33.3% (2 teachers) of the population interviewed thinks that the virtual experience has been challenging. And 16.7% (1 teacher) of the population interviewed thinks that virtuality has been an unsatisfactory experience. Then, 16.7% (1 teacher) of the population interviewed believes that virtual education has been a limiting experience. While 16.7% (1 teacher) of the population interviewed believes that virtuality has been an enriching experience. Lastly, 16.7% (1 teacher) of the population interviewed thinks that virtual education has been a complex experience.

Figure 15

What do you think of Brightspace?

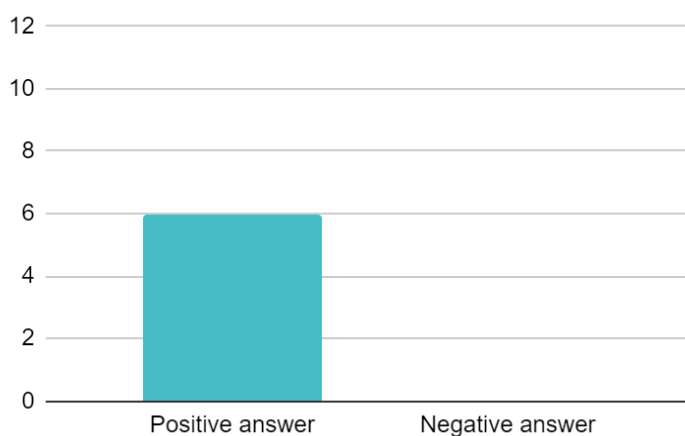


Note. Graphical representation of the data gathered in the second interview question.

Figure 15 shows that 83.3% (5 teachers) of the population interviewed thinks positively about Brightspace. And 16.7% (1 teacher) of the population interviewed has a negative opinion of Brightspace.

Figure 16

What do you think of Zoom?

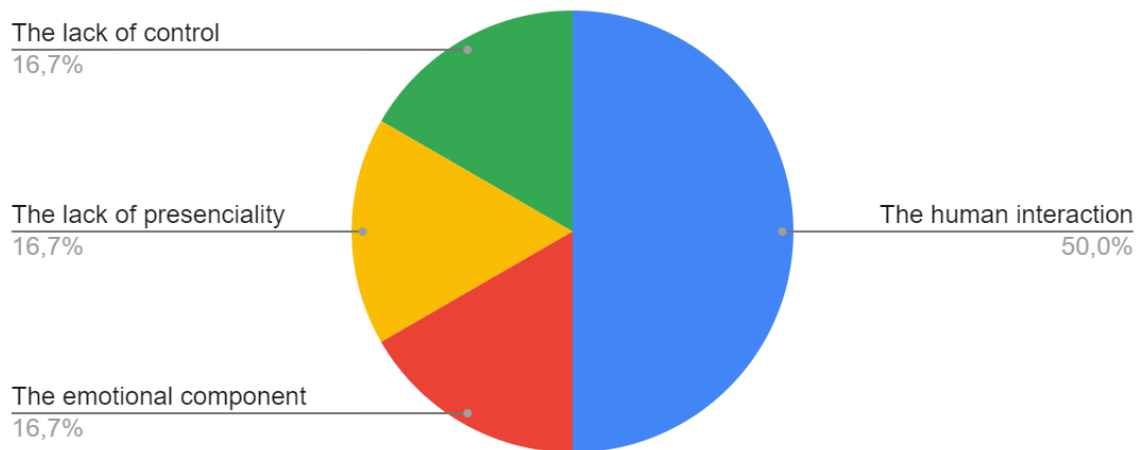


Note. Graphical representation of the data gathered in the third interview question.

In Figure 16, the totality of the population interviewed (6 teachers) has a positive opinion about Zoom, while no one interviewed had a negative opinion about the virtual platform.

Figure 17

How is teaching virtually different from other teaching environments?

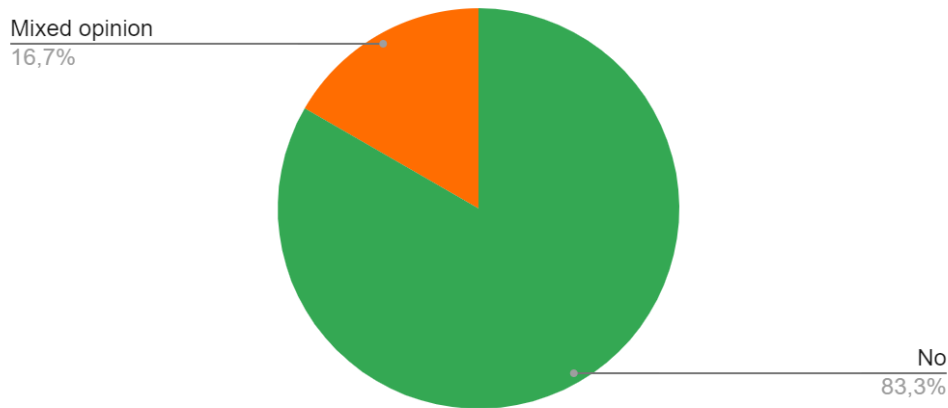


Note. Graphical representation of the data gathered in the fourth interview question.

Figure 17 shows that 50% (3 teachers) of the population interviewed finds human interaction to be the main difference between virtuality and other environments. Followed by 16.7% (1 teacher) of the population interviewed who believe that the emotional component is the main difference. Then, 16.7% (1 teacher) out of the total data states that the lack of presenciality is the main difference. Finally, 16.7% (1 teacher) of the population interviewed finds the lack of control to be the main difference between virtuality and other teaching environments.

Figure 18

Do you feel that you have control over your students through virtuality?

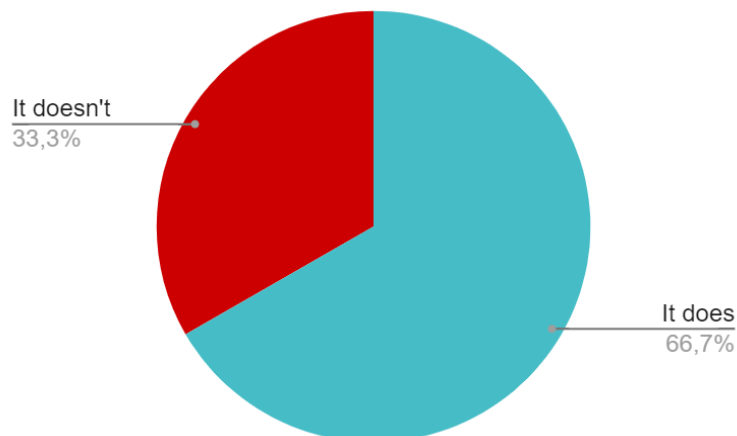


Note. Graphical representation of the data gathered in the fifth interview question.

In figure 18, 83.3% (5 teachers) of the population interviewed answered that they don't have control over their students in virtual environments. And 16.7% (1 teacher) of the population interviewed has a mixed opinion (neither positive nor negative).

Figure 19

Do you think that the fact that students do not turn on the camera affects the development of the class?

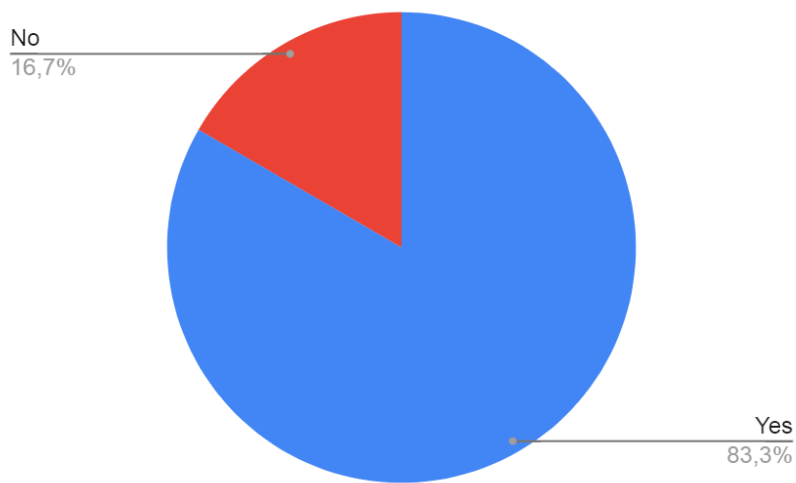


Note. Graphical representation of the data gathered in the sixth interview question.

Figure 19 shows that 66.7% (4 teachers) of the population interviewed feel like students having their cameras off affects the development of the class. While 33.3% (2 teachers) of the population interviewed feel like it does affect class development.

Figure 20

Has your class planning process been affected by teaching virtually?

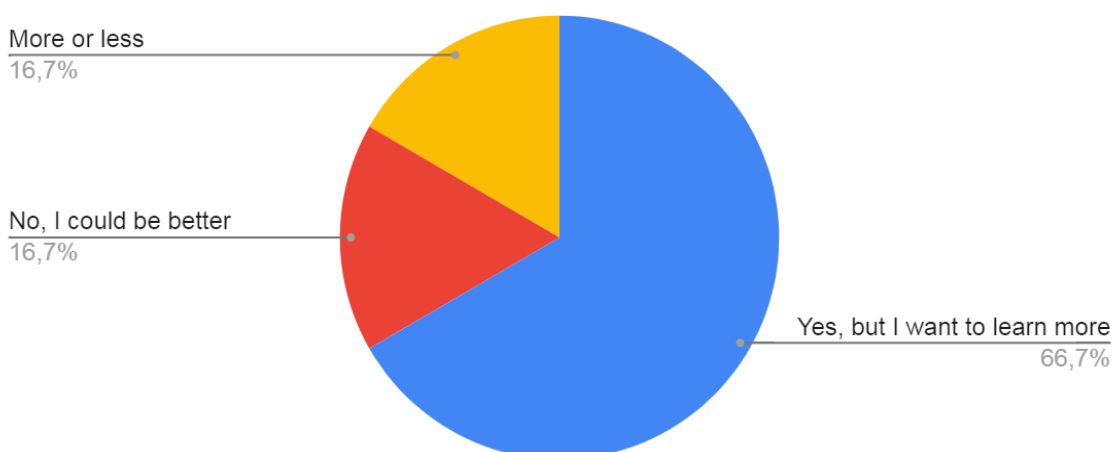


Note. Graphical representation of the data gathered in the seventh interview question.

Figure 20 shows that 83.3% (5 people) of the teacher population selected the blue-colored option, being the most answered option. While only 16.7% (1 person) answered the red-colored option, making it the least common response.

Figure 21

Do you think you have been able to handle the resources and tools that virtuality provides?

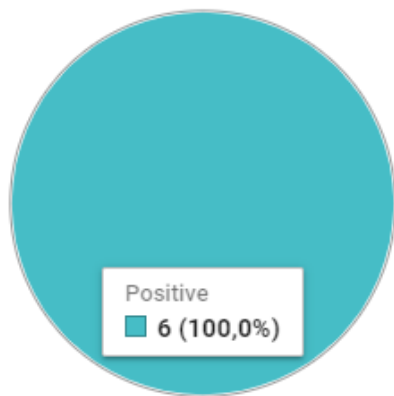


Note. Graphical representation of the data gathered in the eighth interview question.

In figure 21 it can be seen that the blue-colored option represents 66.7% (4 people) of the total responses, being the most answered choice. Followed by a tie between the orange-colored option and the red one, where each of them represents 16.7% (1 person) of the total responses.

Figure 22

Has your virtual experience been positive or negative so far?

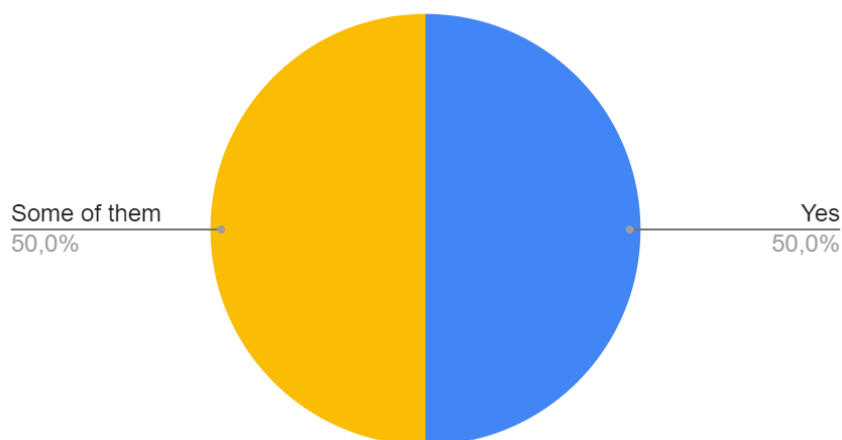


Note. Graphical representation of the data gathered in the ninth interview question.

Figure 22 shows that the blue-colored option represents 100% (6 people) of the total responses, being the most and only answered option.

Figure 23

Do you think your students are really learning during your class?

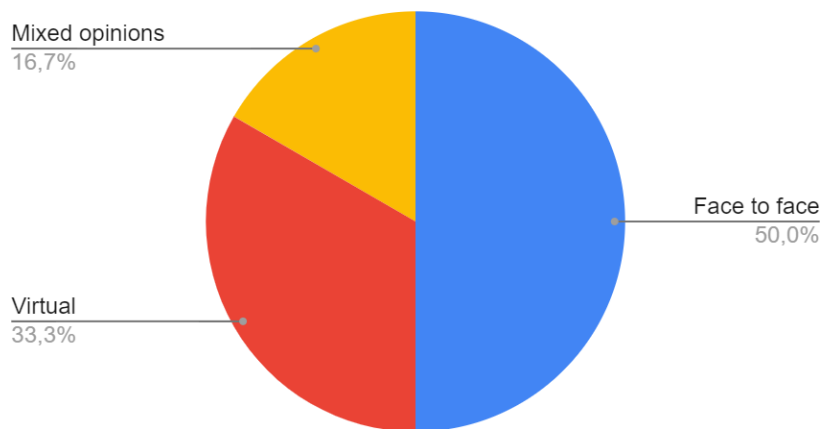


Note. Graphical representation of the data gathered in the tenth interview question.

In figure 23 it can be seen that each option shown represents 50% (3 people) of the total responses. Half of the population interviewed thinks that their students are learning during class, while the other half thinks that only some of them are learning.

Figure 24

Would you rather teach in a virtual or face-to-face environment?

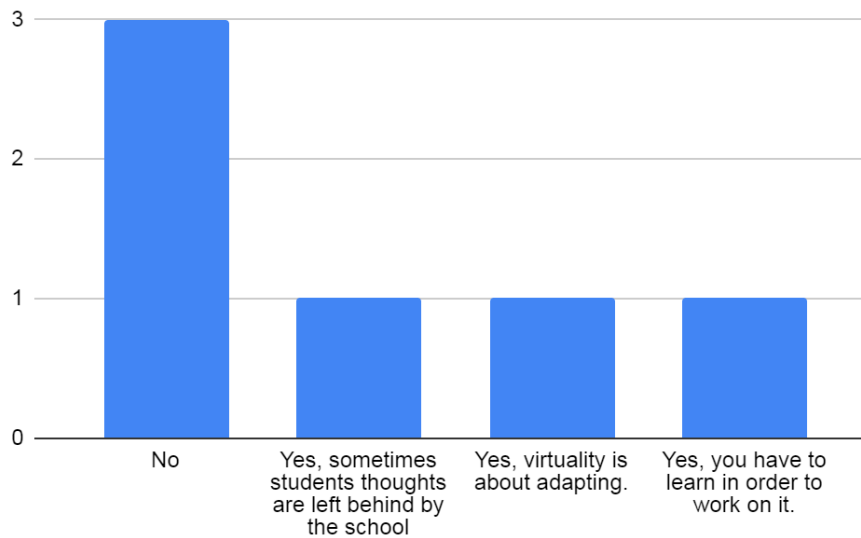


Note. Graphical representation of the data gathered in the eleventh interview question.

Figure 24 shows that 16.7% (1 person) of the teachers have a mixed opinion about these learning environments (yellow-colored portion), making it the least common response. Followed by the red-colored one, which represents 33.33% of the total answers. Finally, the blue-colored option was the most common answer, with 50% (3 people) of the teachers selecting it.

Figure 25

Do you have any complaints or comments about virtuality that you didn't have the opportunity to share in the previous questions?



Note. Graphical representation of the data gathered in the twelfth interview question.

In figure 25 it can be seen that the most common answer was “no” which represents 50% (3 people) of the total responses. While each of the other three options represents 16.7% (1 person).

Conclusions

A thorough analysis was performed in figures 2, 3, 6, 7, 11, and 13 to understand what the students' opinions of virtual education are. The analysis of this data shows that most students are feeling stressed, overwhelmed, and nervous while learning virtually (figure 2). Furthermore, almost all students would rather be in a face-to-face environment than in a virtual one (figure 3). A possible reason behind the previously presented information is the lack of feedback given to students (as evidenced in figure 6 and 13), the excessive workload given (such as homework or workshops) (seen in figure 7 and 13), the difficulty of concentrating during synchronous class sessions (shown in figure 11), and the need for more classwork, fewer assignments, dynamic classes, better explanations, and more feedback (as evidenced in figure 13). This leads to the conclusion that students are experiencing negative

feelings towards virtuality because of certain stressful behaviors or activities that they are forced to do, according to figure 2, 6, 7, and 13. Another conclusion that can be extracted from the data is that most students don't like or aren't used to the virtual model that emphasizes autonomy, assignments, and proactivity; mostly because they were used to the face-to-face model in which most assignments were done during class and the teacher was always there to help the students. The contrast between these environments may be another cause for the negative virtual experience of students, which can be evidenced through figures 3, 11, and 13.

Then, figures 4 and 5 were analyzed to find the level of comprehension of students during synchronous sessions, and the number of teachers who gave them feedback. Through this analysis, it was found that 52% of students understand most of the topics explained during class, while 37% of students understand very few topics explained according to figure 4. Also, almost half of the population stated that few teachers give feedback, while the other half of the sample stated that most teachers give it, according to figure 5. The previous data leads to the conclusion that almost a fourth of the population doesn't understand the topics explained in class, which could be explained by the small number of teachers that give feedback to their students; as evidenced in Figures 4 and 5.

Following this, by studying figures 8 & 12 the researchers found that the majority of the population feels like they have enough free time (figure 8) and autonomous work (figure 12). This allows the researchers to conclude that the amount of asynchronous sessions is directly proportional to the amount of free time, i.e. if students have a lot of asynchronous sessions they will have a lot of free time. Free time is a really important activity for students since it lets them perform their hobbies, do other activities, and relax. In conclusion, having

enough asynchronous sessions for students to develop their academic assignments will allow them more free time.

A careful analysis was performed in figures 9 and 10 to find how students feel about the number of synchronous sessions (figure 9) and the duration of them (figure 10). It was observed that in both figures the majority of students feel like the amount and the length of the sessions is appropriate, while only one-tenth of the population feels like the length and amount is excessive. This leads to the conclusion that the duration and quantity of the synchronous sessions established by Liceo Taller San Miguel are pertinent and adequate; as evidenced by the positive answers extracted from Figures 9 & 10.

By analyzing figure 14, researchers found that 5 out of 6 teachers expressed a negative emotion when asked about their virtual experience indirectly. However, when they were asked directly about their virtual experience all of them answered positively, as evidenced in figure 22. This leads to the conclusion that the teachers' opinions are incongruous, and their answers may vary when asked directly. According to this, the data in the mentioned figures shouldn't be considered reliable due to the discrepancies in the information gathered, which can be evidenced in Figures 14 & 22.

Through the analysis of figure 15, it was observed that 83% of teachers gave a positive answer when asked about their thoughts on Brightspace. And through figure 16 it was discovered that 100% of teachers gave a positive answer when asked about their thoughts on Zoom. This allows the researchers to conclude that almost all teachers like using these platforms and find the tools they provide relevant; as shown in Figures 15 & 16.

A thorough analysis performed in figure 17 showed that 3 out of 6 teachers think that human interaction is the main difference between teaching virtually and teaching in other environments; other answers given from the teachers were: the lack of control over students,

the lack of presenciality, and the emotional component. Figure 24 showed correlation to the previous data, so it was analyzed as well. Through the analysis, it was found that 3 out of 6 teachers would rather teach in a face-to-face environment, while 2 out of 6 would rather teach in a virtual environment, and 1 out of 6 had mixed opinions about the topic. The data found in figures 17 & 24 leads to the conclusion that human interaction is one of the main challenges that teachers face, which is why most of them stated their preference for a face-to-face environment in figure 24; because human interaction is always present in that environment.

By analyzing figure 18, researchers found that 83% of teachers feel like they don't have control over their students in a virtual environment, and 16% had mixed opinions about the topic. Furthermore, in figure 19 it was observed that 66% of teachers think that students having their cameras turned off affects the development of the class, while 33% think it doesn't affect it in any way. The analysis done leads to the conclusion that teachers believe that the visualization of students is directly related to the control of them; as evidenced by the data correlation in Figures 18 & 19.

Through the analysis of figure 21, it was observed that 4 out of 6 teachers think that they have been able to handle the virtual tools and resources provided to them, and want to learn more about them; while 2 out of 6 teachers had a different opinion about the topic. This allows the researchers to conclude that most teachers have the skills necessary to use virtual resources; also, their experience would improve by teaching them how to fully use the resources provided to them, as evidenced by figure 21.

Then, a thorough analysis was performed in figure 23. And it was found that 50% of the population thinks their students are really learning during their class, while the other half thinks only some of their students are learning. This leads to the conclusion that most students are learning during virtual classes; however, further analysis focused on students

should be done to get more reliable answers, because this data only comes from the teachers' perspective, hence it could be biased. The conclusion is evidenced by figure 23.

Ultimately, by taking into consideration the previous conclusions, the researchers extracted some final, global conclusions. First, students enjoy the assignments when they can be developed during class (in a similar fashion to workshops). Giving more class time for students to work on their assignments could potentially give them more free time, which could prove beneficial for their stress level and their academic performances; this conclusion was evidenced through Figures 8 and 13. Then, two thirds of the teacher population believe that the activation of cameras during class is important for the class and the control over students, as shown in figure 18 and 19. Forcing students to turn their cameras on might alleviate one of the main challenges that teachers face: human interaction; as evidenced in figure 17 & 24. However, this could make students anxious or nervous about classes because of the camera requirement; because of this, a balance between these two ideas should be found in order to design an efficient solution. Finally, figures 2 to 25 lead to the conclusion that even though virtual education has been a challenge and hasn't been easy, students and teachers have adapted to this environment. However, there still are certain details that could be improved to produce an effective and unique learning experience that focuses on students as much as teachers.

Recommendations

Future researchers who would like to continue with this project should keep in mind that when conducting interviews it is important to extract the most essential information it provides. As this data collection method mainly uses open-ended questions, it implies a lot of

details that are not really necessary; they make the transcription process longer and hinder the categorization system. For this reason it is recommended to use minimal open-ended questions.

A recommendation that could facilitate the information analysis process for future researchers is to make the questions that are directed towards teachers and students touch the same topics. This would provide the possibility of correlating the responses of both populations more precisely, which would yield more reliable results.

After collecting this information, the Liceo Taller San Miguel school directors should take into account that maintaining the Zoom and Brightspace platforms even when the pandemic is completely over is a wise decision. Due to the potential both of them have and all the tools they offer, Brightspace and Zoom have achieved great acceptance among the majority of teachers.

The school directors should keep in mind the upstanding work they are doing and maintain it. Since the results and conclusions showed that, according to the majority of the students, the amount and duration of autonomous work and synchronous hours are appropriate and sufficient.

A recommendation for the directors of Liceo Taller San Miguel is that they should open the possibility of providing more spaces for teachers so that they can take advantage of their potential and learn more about virtual tools. This is extremely important since most of the teachers expressed that they would like to improve and comprehend more about everything that teaching in a virtual space entails.

Teachers should consider providing time for classwork during synchronic sessions with their guidance rather than leaving it as homework. For example, they can assign a workshop that can be carried out during the 45 minutes of the class with the presence of the

teacher. In addition, it is important to emphasize that this is one of the most common ways in which students responded that they would improve virtual education.

Most of the teachers should take more into account the importance of feedback, of telling their students what they did wrong and well and explaining why they got their grade. This is crucial since the results and conclusions indicate that the lack of feedback hinders both the learning process of the students and their virtual experience. However, it is important to clarify that not all teachers are overlooking this; some do give feedback to their students.

Students should be aware that teachers also experience many difficult moments with virtual education, mainly due to the lack of interaction and control over the students. A good contribution to both challenges is for students to try to sensitize and turn on their cameras during synchronous hours. This would provide the closest thing to an interaction and could also make the teacher feel that they have an easier handling of the class.

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Annexes

Annex 1

Survey link (as evidence to visualize the answers).

<https://docs.google.com/forms/d/1D-Nyba7g5yOCqnsGbibChuhqzvUa302pVgvfRIagwrY/edit?usp=sharing>

Annex 2

Link and image of visual material (infographic) to be shared with the educational community Liceo Taller San Miguel.

https://www.canva.com/design/DAEd7uAI8Jw/ZeiR3y6MIA5i0prur9_J_g/view?utm_content=DAEd7uAI8Jw&utm_campaign=designshare&utm_medium=link&utm_source=publishsharelink

LET'S IMPROVE VIRTUAL EDUCATION AS A FAMILY



STUDENTS

Should be aware that teachers also experience many difficult moments with virtual education. A good contribution to both challenges is for students to try to sensitize and turn on their cameras during synchronous hours. This would provide the closest thing to an interaction and could also make the teacher feel that they have an easier handling of the class.

TEACHERS

Should consider assigning a workshop that can be carried out during the 45 minutes of the class with the presence of the teacher.

Most of them should take more into account the importance of feedback. This is crucial since the lack of feedback hinders both the learning process of the students and their virtual experience. However, it is important to clarify that not all teachers are overlooking this; some do give feedback to their students.

LTSM DIRECTORS

Should take into account that maintaining the Zoom and Brightspace platforms even when the pandemic is completely over is a wise decision. Due to the potential both of them have and all the tools they offer, Brightspace and Zoom have achieved great acceptance among the majority of teachers.

Should keep in mind the upstanding work they are doing and maintain it. Since the results and conclusions showed that, according to the majority of the students, the amount and duration of autonomous work and synchronous hours are appropriate and sufficient.

Should open the possibility of providing more spaces for teachers so that they can take advantage of their potential and learn more about virtual tools. This is extremely important since most of the teachers expressed that they would like to improve and comprehend more about everything that teaching in a virtual space entails.

All information provided in this infographic is based on research conducted at LTSM

Annex 3**Interview transcription****Ryan Patrick Cross. English teacher. February 18.**

Manuela Arenas: good afternoon, this is the first interview of our Senior Project about virtual education and we are with the teacher Ryan Patrick Cross.

Juan Daza: briefly describe your overall experience in teaching in a virtual environment.

Ryan Cross: my experience has been challenging, it hasn't been easy, it is a big change. There are times when it can be frustrating just because digital platforms can be difficult, oftentimes things don't work the way you expect them to or think that they should. On the other hand, it's also been a really positive experience since, as with anything, sometimes you get comfortable doing things in a certain way, so you need kind of a strong and shocking experience to take you out of that. Occasionally it's nice to have a reason to leave the comfort zone, to do things in a different way or to experiment with different methods. Overall I would say it's been a positive experience full of a lot of learning.

Juan Daza: what do you think of Brightspace?

Ryan Cross: the addition of that tool in school allowed teachers to really think about virtual spaces and to try to find a way to translate the traditional classroom into a virtual experience. The use of this platform has been challenging. Just like any tool, it has enormous potential and, personally, sometimes I feel like I am not using all of the potential that it has; which is kind of intimidating but it gives me the opportunity to experiment and explore different possibilities. Overall, I would say that my opinion of Brightspace is very positive, it is a good addition to the school and I think even if eventually the pandemic ends completely

and we go “back to normal” it's something that we should maintain since this tool is useful for the educational context in general.

Juan Daza: what do you think of Zoom?

Ryan Cross: I am really grateful for the existence of zoom, it is a platform that almost none of us knew about before the pandemic started and then it became the center of our lives. Zoom does its job, makes things possible with a good quality and has many interesting features like the breakout rooms and the possibility to record sessions.

Juan Daza: How is teaching virtually different from other teaching environments?

Ryan Cross: as a teacher, for me, one of the most important things is the feedback that I receive from my students. I am talking about informal and almost involuntary feedback, which is a lot harder to get in a virtual environment because oftentimes you are not seeing people's faces and you cannot hear the low volume level comments they make, from where you can pick up on people's tones and attitudes. Through virtual environments, I sense that lack of feedback that I feel it's important to me and I miss having it, so that's a huge difference in my teaching experience. Another really big difference is that the amount of individual interaction that I can have with students is very limited, since in a classroom it is so much easier to approach a person, ask how they are doing and talk to them. The whole social dynamic is easier at school.

Juan Daza: Do you feel that you have control over your students through virtuality?

Ryan Cross: personally, I feel like I don't have more or less control because in my normal classroom situation I don't have control over them. I mean, I have my own personal feelings about the word 'control', but I supposed, again, it kind of come back to the issue of visibility of things and even though the rules of the school and the rules of virtual education are that you should have your camera on, it doesn't mean that people will, so students are

able to control their image and their visibility a little more. So I guess that you can say that I have less control but it's a tricky concept. I guess if control is related to knowledge, then that's when we lose some of control, since we don't know what is happening on the other side of the screen, even with the cameras on, I cannot have full knowledge. So, without over analyzing everything, there is some loss of control over the virtual situation because of the unknown.

Juan Daza: Do you think that the fact that students do not turn on the camera affects the development of the class?

Ryan Cross: I think that it does. I am not saying that you can't give your full attention and have your camera turned off, it is totally possible. But also I feel that if the camera is on, people are going to act a little differently, definitely they are going to be sitting in front of the screen, they are not going to be all around their houses doing different things, they are going to be more focused.

Juan Daza: has your class planning process been affected by teaching virtually?

Ryan Cross: yes, we have to be planning more long term but at the same time, we also have to be flexible and we have to change and improvise new plans based on the feedback and on how we perceive that things are working. I think it just takes more time, a lot of trying to focus on planning, a lot of research, collecting resources to share with the students, and uploading them on the platform, all of those things take extra time.

Juan Daza: do you think you have been able to handle the resources and tools that virtuality provides?

Ryan Cross: yes, but I know I could be better with more time, focus, discipline and also one of the key factors would be with more experience.

Juan Daza: has your virtual experience been positive or negative so far?

Ryan Cross: I would definitely consider this experience positive in the totality of my life because it's a new experience, something that allows me to explore different avenues of myself and my profession, challenge some of the ideas I have had before and live life in a very different way.

Juan José Daza: do you think your students are really learning during your class?

Ryan Cross: yes, I hope so, because if not, then I don't know what I'm doing. I think that the learning is different and that's okay because a lot of our traditional ideas of what learning is, are just that: traditional, which means that in some way they are kind of old, not saying that old things are bad or that they don't work, but we need to be preparing ourselves for the world that we are going to live in.

Juan José Daza: would you rather teach in a virtual or face-to-face environment?

Why?

Ryan Cross: face to face environment, since I really enjoy it and, as I said before, I really miss the feedback and being able to perceive in my students if what I'm doing is working or not.

Juan José Daza: do you have any complaints or comments about virtuality that you didn't have the opportunity to share in the previous questions?

Ryan Cross: no, I don't think so, I think I have expressed myself very completely.

Daniel Echeverri. Philosophy teacher. February 19. (Translated to English from Spanish).

Juan Daza: good morning, this is the second interview of our Senior Project, we are interviewing Daniel Echeverri, the philosophy teacher of Middle and High School.

Juan Daza: briefly describe your overall experience in teaching in a virtual environment.

Daniel Echeverri: from an emotional perspective it is an unsatisfactory experience because students don't participate enough and often avoid turning their cams on. I believe that the attention span of students is affected by virtuality and the need for electronic devices. Sometimes I feel like I'm talking alone because of the absence of the students' presence. From a technological perspective, virtual teaching causes many challenges. Teachers need to adapt to new tools and virtual platforms. I like technology and enjoy virtual environments, however, other teachers that don't feel this way may feel stressed about virtuality.

Juan Daza: what do you think of Brightspace?

Daniel Echeverri: it is a fantastic platform that provides many useful tools for teaching. It is exciting to use in a virtual environment, and I think it should also be used for face-to-face classes in the future.

Juan Daza: what do you think of Zoom?

Daniel Echeverri: Zoom is an effective platform and fulfills its objective. It has been especially valuable in the virtual experience.

Juan Daza: How is teaching virtually different from other teaching environments?

Daniel Echeverri: the main difference is the emotional component. In face-to-face education I had contact with my students. I also had control over them because I could see what they were doing and if they were understanding the topics I explained. The interactions in virtuality are cold sometimes and they are not as human as in face-to-face teaching.

Juan Daza: do you feel that you have control over your students through virtuality?

Daniel Echeverri: no, i have less control than before because in virtuality students aren't as dependent on teachers as before; that's why autonomy is extremely important in virtual environments.

Juan Daza: do you think that the fact that students do not turn on the camera affects the development of the class?

Daniel Echeverri: of course, the interaction between teachers and students is minimal compared to face-to-face education. This is reflected later in the grades and in the understanding of the students.

Juan Daza: has your class planning process been affected by teaching virtually?

Daniel Echeverri: no, even though it involves much more platforms and tools, I still enjoy planning classes in a virtual environment because of the opportunities virtuality provides. It also allows me to fully use audiovisual material to teach.

Juan Daza: do you think you have been able to handle the resources and tools that virtuality provides?

Daniel Echeverri: I think I have made good use of the virtual resources but I would like to learn more about them because i'm really interested and excited about them. I also believe that these resources provide amazing opportunities when used correctly.

Juan Daza: has your virtual experience been positive or negative so far?

Daniel Echeverri: it has been positive. Although there are some challenges, I really like the versatility of virtuality and the fact that is less time consuming than face-to-face education. Virtuality has also allowed me to focus on the activities I like besides teaching and to develop new skills.

Juan Daza: do you think your students are really learning during your class?

Daniel Echeverri: yes, some of them are really learning. However, some students don't focus enough in my class and it is negatively reflected in their grades and their involvement in the class.

Juan Daza: would you rather teach in a virtual or face-to-face environment? Why?

Daniel Echeverri: I'd rather teach in a virtual environment.

Juan Daza: do you have any complaints or comments about virtuality that you didn't have the opportunity to share in the previous questions?

Daniel Echeverri: no, I don't have any more comments about it.

Juan Daza: alright, that's the end of the interview. Thank you for your time.

Hader Vargas. Math teacher. February 24th. (Translated to English from Spanish)

Manuela Arenas: good afternoon, this is the third interview of our senior project about virtual education and we are with the teacher Hader Vargas.

Juan Daza: briefly describe your overall experience in teaching in a virtual environment.

Hader Vargas: it has been a challenge, it hasn't been easy because teaching virtually requires preparation and we had to face it suddenly due to the unexpected situation that was the pandemic. At first it was difficult but with the implementation of the brightspace platform for virtual environments, for synchronous and asynchronous encounters, it became easier. What seems complex to me about the experience not only of teaching but also of student learning is the adaptation to this new change.

Juan Daza: what do you think of Brightspace?

Hader Vargas: it is very useful, it was a good acquisition that the school made to face virtual education.

Juan Daza: what do you think of Zoom?

Hader Vargas: after analyzing and testing with other servers, we concluded that zoom offers many more advantages than other video calling platforms, for example breakout rooms and the reactions. Zoom already had these types of innovations before, unlike other applications such as Microsoft's teams that recently were making similar updates.

Juan Daza: how is teaching virtually different from other teaching environments?

Hader Vargas: undeniably the biggest difference is the interaction. In a face to face environment you can know what is happening, also emotions, behaviors and certain facets can be noticed. Oftentimes, virtuality does not allow these kinds of things.

Juan Daza: do you feel that you have control over your students through virtuality?

Hader Vargas: absolutely not, since I don't know what happens in those virtual spaces. Virtuality involves many external factors that can be considered distracting that cannot be managed.

Juan Daza: do you think that the fact that students do not turn on the camera affects the development of the class?

Hader Vargas: no, I don't think so.

Juan Daza: has your class planning process been affected by teaching virtually?

Hader Vargas: oftentimes you plan something in a specific way but then during practice is different. There are some students that have their autonomy, they self-lead and know what to do without needing someone to be aware of what they are doing. The big challenge is with those students who are not so autonomous and who easily lose concentration.

Juan Daza: do you think you have been able to handle the resources and tools that virtuality provides?

Hader Vargas: no. I think all the tools that are available that could be applied and exploited for the application of the learning, I have not yet explored them 100% so there is more to do.

Juan Daza: has your virtual experience been positive or negative so far?

Hader Vargas: I think that despite everything it has been positive. From the experience I have had at school, for me something that speaks about the processes are the results.

Juan Daza: do you think your students are really learning during your class?

Hader Vargas: in order to answer that question I think it would be necessary to look at student by student. However, I know that some students are learning, but others leave me wondering. Virtuality is showing me more and more that the teaching process should be more focused on students' skills and what they like.

Juan Daza: would you rather teach in a virtual or face-to-face environment? Why?

Hader Vargas: definitely face-to-face because, from the social interaction, it involves emotion, which is very important since if a student is not emotionally linked, then it is very difficult for him/her to be interested in what he/she is trying to learn. In addition, I still do not feel qualified to teach in virtual environments, I would need more training to be able to do it.

Juan Daza: do you have any complaints or comments about virtuality that you didn't have the opportunity to share in the previous questions?

Hader Vargas: no, I think that you guys have approached every topic very well.

Juan Daza: okay, that was the last question, thank you for your time.

César Augusto Ramírez. Theater teacher. February 25. (Translated to English from Spanish).

Juan Daza: good afternoon, this is the fourth interview of our Senior Project. Today we are interviewing César Ramírez, the theater teacher of Middle and High School.

Manuela Arenas: briefly describe your overall experience in teaching in a virtual environment.

César Ramírez: I've had past experiences with virtuality (pre-COVID-19) from a learning perspective; while being in that environment I didn't feel like I was in a prison, but with the current pandemic I feel that way. I also think that the feelings of students are really important and I usually perceive them through the virtual meetings.

Manuela Arenas: what do you think of Brightspace?

César Ramírez: when I was first introduced to the platform, it seemed really complex and I was a bit lost. However, I got used to the platform after using it for two months. It has some interesting tools that have allowed me to implement new things in my classes.

Manuela Arenas: what do you think of Zoom?

César Ramírez: compared to other platforms that are similar to Zoom, I feel like it is the best because it has very useful options that help with the development of the class. Besides that, it is constantly being updated to the needs of the people who use the app.

Manuela Arenas: how is teaching virtually different than other teaching environments?

César Ramírez: the main difference between these environments is the connection between the teacher and the students. In virtuality that connection is totally lost and there is a lack of social interactions in this environment.

Manuela Arenas: do you feel that you have control over your students through virtuality?

César Ramírez: I think that controlling students shouldn't be a part of education; the students that really want to learn will be attentive and will go to class, the ones who are not interested in learning will skip class or be distracted during it. The important factors in learning are: willingness, motivation, and autonomy.

Manuela Arenas: do you think that the fact that students do not turn on the camera affects the development of the class?

César Ramírez: It definitely affects the student-teacher connection. However, I understand why students avoid turning on their cameras; i think it's because they are self-conscious or shy about their appearance or their surroundings. Due to this, teaching in virtuality is a complex process, since you have in mind not only your feelings, but the ones of your students.

Manuela Arenas: has your class planning process been affected by teaching virtually?

César Ramírez: I modified the planning a tiny bit because teaching theater in a face-to-face environment is not the same as teaching virtually. I went from a kinesthetic and emotional approach to something more basic in order to be understood in a virtual environment.

Manuela Arenas: do you think you have been able to handle the resources and tools that virtuality provides?

César Ramírez: since I've had previous virtual experiences I already had some knowledge about the tools present in virtuality. Nevertheless, I keep on learning about the resources that virtual platforms provide daily; so I think I've been able to handle the tools so far, but I can always improve.

Manuela Arenas: has your virtual experience been positive or negative so far?

César Ramírez: it has been positive because I have learned new things about teaching processes and methodologies. I actually think that I've had better results teaching virtually than face-to-face (pre-COVID-19). The emotional part is the only difficulty I have had with virtual environments so far.

Manuela Arenas: do you think your students are really learning during your class?

César Ramírez: yes, definitely. I've tested the knowledge of my students about theater class and they show a good learning process.

Manuela Arenas: would you rather teach in a virtual or face-to-face environment? Why?

César Ramírez: I find it impossible to choose between the two, because each teaching environment has different strengths and weaknesses. In face-to-face education there is an emotional side to things and there is a better connection between the teacher and the students. However, I feel like my students learn more and understand me better in a virtual environment. I've also really enjoyed Brightspace because of the unique tools it provides.

Manuela Arenas: do you have any complaints or comments about virtuality that you didn't have the opportunity to share in the previous questions?

César Ramírez: the only complaint I have is that sometimes the school doesn't focus as much on the students' thoughts. However, the school has already solved this issue by making surveys to the students to know their opinions and feelings.

Manuela Arenas: okay, this is the end of the interview. We are very thankful for your time and for your answers, have a good afternoon.

Lina Osorio. Psychologist and vocational guidance teacher. March 5. (Translated to English from Spanish).

Juan Daza: good afternoon, this is the sixth interview of our Senior Project. Today we will interview Lina Osorio, the Vocational orientation teacher of 12th grade.

Manuela Arenas: briefly describe your overall experience in teaching in a virtual environment.

Lina Osorio: it's been an experience that requires a lot of preparation, technological skills, and emotional intelligence. Overall it has been an enriching experience.

Manuela Arenas: what do you think of Brightspace?

Lina Osorio: personally, it has been a challenge because it is constantly being updated and because I'm always learning about the platform; it can be complicated sometimes because of the amount of tools it has. Nevertheless, it is an extremely good platform, but I wish I knew how to fully use it.

Manuela Arenas: what do you think of Zoom?

Lina Osorio: using Zoom has been a really enjoyable experience, especially the premium version that the school acquired. I feel like it improves the connectivity in the platform, and it also provides new tools like the breakout rooms.

Manuela Arenas: how is teaching virtually different than other teaching environments?

Lina Osorio: the main characteristic is that in virtuality there's a lack of synchronicity; because of this, I try to make the instructions for activities as clear and organized as possible since most of it will be done unsynchronously. Virtuality also forces teachers to be really attentive to the platforms used, as well as any inconveniences manifested by students.

Manuela Arenas: do you feel that you have control over your students through virtuality?

Lina Osorio: I think that there's not as much motivation as in a face-to-face environment, which leads to students doing other things while they are in class. So the real control is in the clarity of the instructions given, as well as the rigurosity in due dates for work.

Manuela Arenas: do you think that the fact that students do not turn on the camera affects the development of the class?

Lina Osorio: I don't think so. I like to give my students the freedom to decide if they want to turn on their cameras or not. I also don't think that cameras are that important, because some students may work really hard and have their cameras off. Besides that, the dynamic I use in my classes doesn't really need students to have their cams on.

Manuela Arenas: has your class planning process been affected by teaching virtually?

Lina Osorio: definitely. I've had to invest a lot more time in planning out my classes because of the virtual environment. Also, the feedback and grading processes are also more time consuming.

Manuela Arenas: do you think you have been able to handle the resources and tools that virtuality provides?

Lina Osorio: yes, virtuality has been an amazing learning opportunity. Personally, this experience has helped me understand technology more.

Manuela Arenas: has your virtual experience been positive or negative so far?

Lina Osorio: positive, I've liked it a lot. Nevertheless, it has also been a challenging experience but thanks to the help of the school, I've learned to use the tools that virtuality provides.

Manuela Arenas: do you think your students are really learning during your class?

Lina Osorio: yes, I'm extremely sure of it. Especially because my class is focused on emotions and self-discovery.

Manuela Arenas: would you rather teach in a virtual or face-to-face environment? Why?

Lina Osorio: I would rather teach in a virtual environment, it provides so many tools and experiences that make teaching more efficient. Furthermore, virtuality allows a better time management compared to face-to-face education.

Manuela Arenas: do you have any complaints or comments about virtuality that you didn't have the opportunity to share in the previous questions?

Lina Osorio: I think that virtuality has taught us that we must always adapt when things don't work the way we originally wanted to. It has also taught us about resilience and adaptability.

Manuela Arenas: that was the final question of the interview; thank you for your time and your answers, Lina.

Martha Lucía Flórez. Chemistry teacher. March 15. (Translated to English from Spanish)

Manuela Arenas: good afternoon, this is the sixth and last interview for our senior project and we are with the teacher Martha Lucía Flórez Ramírez.

Juan Daza: briefly describe your overall experience in teaching in a virtual environment.

Lucía Flórez: my experience teaching in this way has been complex, since I was not prepared for this. In my case, I had to learn many things in the middle of the process and I still feel like I can learn in many more aspects. Teaching virtually is an experience that

involves many things and we as teachers didn't have much learning time, everything was in the moment, thus contributing to the fact that the experience has been difficult.

Juan Daza: what do you think of Brightspace?

Lucía Flórez: It is a very complete platform with many interesting tools but it should continue to be explored and exploited. Since I feel that there are several things that are left aside because we do not know many of its aspects. For the teachers it was very shocking. Because for some us, technology is very complicated and having to learn how to use this new platform while we were already working in a virtual environment, it felt like there were many things at once.

Juan Daza: what do you think of Zoom?

Lucía Flórez: I think it was the tool that saved us all. Although there are many platforms with the same purpose, the school decided to implement zoom because of its interesting features.

Juan Daza: how is teaching virtually different from other teaching environments?

Lucía Flórez: in a face-to-face environment, you can accompany the process in a way that allows you to support the difficulties of the students and enhance their skills right in the moment. While in a virtual environment, you are not seeing what the student is doing, he/she is basically interpreting from his criteria instructions that are given and after that, the feedback is provided. In the presence, the feedback is constant since the work is being done there, at the moment. Another big difference is that through virtuality, the students become more autonomous and in the face-to-face environment they become more dependent on the teacher.

Juan Daza: do you feel that you have control over your students through virtuality?

Lucía Flórez: I don't think so, in the face-to-face environment you have a way of controlling the groups because you are there and you see what they are doing. While in virtuality, this is not that easy since students turn off their cameras and they can go to sleep, move around the house, go to other places, among other things.

Juan Daza: do you think that the fact that students do not turn on the camera affects the development of the class?

Lucía Flórez: yes, it is a horror. When the cameras are off, I don't know what is happening, if I am speaking to a person on the other side of the screen or if I am speaking to myself with a device. In addition, I feel that when they turn off the camera, they can be much more distracted by activities other than the class. Which makes the teaching and learning dynamics less effective.

Juan Daza: has your class planning process been affected by teaching virtually?

Lucía Flórez: the planning process became more difficult since, before virtuality, I used to prepare two 55-minute classes per week and now I have to plan a 45-minute class. This is very complicated due to the fact that the chemistry content is very extensive and it's not the easiest in the world. So it is quite a challenge to condense so much information in such a short time.

Juan Daza: do you think you have been able to handle the resources and tools that virtuality provides?

Lucía Flórez: until a certain point. I think that virtuality has not gone bad for me. I have tried to adapt to the situation and to join many aspects of my face-to-face class dynamic with a virtual one. In certain grades it has been easier but in general terms I believe that I have done the best I could with the tools that were given to me and the ones I have looked for in order to develop this process better.

Juan Daza: has your virtual experience been positive or negative so far?

Lucía Flórez: positive because many things have been learned. I believe that as long as there is learning in every process, it will always be a positive experience.

Juan Daza: do you think your students are really learning during your class?

Lucía Flórez: I believe that in some moments yes, but not always. This due to the fact that the virtual dynamic is very complex.

Juan Daza: would you rather teach in a virtual or face-to-face environment? Why?

Lucía Flórez: face-to-face. I am a person who loves the face-to-face environment, both as a teacher and as a student.

Juan Daza: do you have any complaints or comments about virtuality that you didn't have the opportunity to share in the previous questions?

Lucía Flórez: no, I have no complaints. I just want to say that what happens with virtuality is that you have to be able to learn it in order to work on it.