Artículos científicos

La videoconferencia como herramienta digital para el trabajo colaborativo en la educación superior

Videoconferencing as a digital tool for collaborative work in higher education

A videoconferência como ferramenta digital para trabalho colaborativo no ensino superior

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Resumen

A través de este trabajo quiero ahondar en la evolución de las herramientas de videoconferencia, sus características, el uso pedagógico, su etiqueta, ventajas y desventajas. En especial quiero destacar las herramientas de Microsoft Skype, zoom, Google Meet y Cisco Webex. Describir la experiencia de su uso a nivel licenciatura, para clases de tecnología del área económico-administrativa de una Universidad Pública del Estado de Jalisco. En sus características revisar la opción para grabación de la sesión, establecer un fondo virtual, la compartición de pantalla y el salón de charla, la programación de sesiones. Así como recomendar herramientas para la grabación de tutoriales y cambio de avatar y fondo. El uso sugerido fue de una hora de retroalimentación y dialogo de preguntas generadoras (teoría) y otra hora de ejercicios colaborativos en OneDrive y otros servicios de internet, donde los alumnos demuestren sus competencias después de haber visto videotutoriales propios y de YouTube. La recomendación de entrar con la videocámara prendida y el micrófono apagado. Las dificultades técnicas y como disminuirlas. Recomendaciones para evitar el *zoombombing*, Experiencia sobre la duración de la sesión y el espaciado en las mismas.

Abstract

Through this paper I want to delve into the evolution of videoconferencing tools, their characteristics, pedagogical use, their etiquette, advantages and disadvantages. I especially want to highlight the Microsoft Skype, zoom, Google Meet and Cisco Webex tools. Describe the experience of its use at the undergraduate level, for technology classes in the economic-administrative area of a Public University of the State of Jalisco. In its features, review the option to record the session, establish a virtual background, screen sharing and the chat room, and schedule sessions. As well as recommending tools for recording tutorials and changing the avatar and background. The suggested use was one hour of feedback and dialogue of generating questions (theory) and another hour of collaborative exercises in OneDrive and other internet services, where students demonstrate their skills after having seen their own video tutorials and YouTube. The recommendation to enter with the camcorder on and the microphone off. Technical difficulties and how to reduce them. Recommendations to avoid *zoombombing*, Experience on the duration of the session and the spacing in them.

Resumo

Com este trabalho, pretendo aprofundar a evolução das ferramentas de videoconferência, suas características, uso pedagógico, seu rótulo, vantagens e desvantagens. Quero destacar especialmente as ferramentas Microsoft Skype, Zoom, Google Meet e Cisco Webex. Descrever a experiência de sua utilização na graduação, para aulas de tecnologia na área econômico-administrativa de uma Universidade Pública do Estado de Jalisco. Em suas características, reveja a opção de gravar a sessão, estabelecer um fundo virtual, compartilhamento de tela e sala de chat e agendar sessões. Além de recomendar ferramentas para gravação de tutoriais e alteração de avatar e plano de fundo. O uso sugerido foi uma hora de feedback e diálogo de geração de perguntas (teóricas) e outra hora de exercícios

colaborativos no OneDrive e outros serviços de internet, onde os alunos demonstram suas habilidades após terem visto seus próprios vídeos tutoriais e YouTube. A recomendação para entrar com a câmera de vídeo ligada e o microfone desligado. Dificuldades técnicas e como reduzi-las. Recomendações para evitar zoombombing, Experiência na duração da sessão e no espaçamento entre elas.

Palavras-chave: Cisco Webex, educação pública, ensino assistido por computador, ensino superior, Google Meet, Microsoft Skype, teleconferência de tecnologia da informação, vídeo educacional, Zoom.

Introduction

Amaya Amaya (2010) Difference between conference calls, data conferences and video conferences. The first for simultaneous text conversations of collaboration programs (groupware) or multiple conference calls, the second for editing group documents (similar to what can be done with Google Docs or Microsoft OneDrive) and the third, in which , you can see your interlocutors on video screens are video teleconferences or video conferences.

In researching the literature, I have found that initially videoconferencing has been used for distance education, postgraduate education, on specialized and expensive hardware and software, and then they have diversified into more and more fields of knowledge, levels and types of knowledge. teachings. At present, in these times of pandemic, it would be considered a basic competence of the teacher.

To talk about the possibilities of videoconferencing, I consider it useful to quote Cabero Almenara & Romero Tena (2010) where he mentions the advantages, types and educational strategies: greater technical ease, the cost that is going down, from using specialized hardware for video, to use of free software to perform them, along with the increase in courses that use them. In types: they speak of point-to-point (proprietary) or multipoint conference. Large formats with high quality, videoconferencing over the Integrated Services Digital Network and IP-type computer videoconferencing (internet). Regarding educational strategies we have exposure, tutoring and feedback.

Videoconferences are not the only digital tool for distance education, we also have online course platforms, but videoconferences allow better feedback and better simulate face-to-face classes, as well as Castillo Holgado & Fernandez Iglesias (2014) He talks about its advantages and uses:

- One or multiple locations

- Share what the camera sees. The speaker and his audience

- Share the screen

- Remote access with some applications (take control of the other person with their permission)

- Share a white board to collaborate (feature that Google Meet has)

- Record the sessions to share later (and save them at the moment as in zoom, Skype and Webex or that the link is shared once processed as Google Meet does)

- Files can be distributed (normally I include links to documents stored in the cloud for viewing and / or downloading in the chat room)

- Availability of a chat or text conversation forum (very useful if the student misses the microphone).

On the educational use of videoconferencing they mention

"Contrary to what people believe, when using it the teacher must adopt a series of precautions both in the preparation of the sessions (make contact with the equipment and programs that will be used ...) and in their development (take care of the time intervention, use different teaching strategies ...) and at the end of the activities that will develop later." (Barroso Osuna & Cabrero Almenara, 2014) (p. 402).

Regarding the types, he distinguishes 3: web-based videoconferences, those that use an extension or plugin to function, those based on desktop software that occupy an application. (And they don't mention mobile apps yet.)

Regarding the limitations of videoconferencing, the cited author also mentions the pros and cons of it, where I will now mention the disadvantages that it indicates:

1. The cost of equipment and lines used

2. The lack of experience of teachers in its use

3. Need for a minimum knowledge of students and teachers in its use (and a sufficient income to be able to acquire them)

4. Psychological and didactic preparation to interact with both face-to-face and remote students (remote students may feel "forgotten" so every so often it is convenient to interact with them)

5. The technical quality of the image and sound

6. A good didactic preparation to achieve participation and the student does not get bored (usually generating questions and collaborative files are used to encourage participation, here the flipped classroom methodology is of great help).

The cited author also explains that among the educational applications of videoconferencing are: distance education consults experts, multi-center projects, personal and community activities. In the preparation, development and extension phases: talks about the preparations of the team, programs, materials, planning of the session. During the event: have a variety of activities, moderate the time, encourage participation and summarize at the end. Conclude with the indications of the tasks and subsequent review.

The same Barroso Osuna & Cabrero Almenara (2014) mentions the criteria for evaluating a conference: the functioning of the teams, the strategies used, the coordination of the personnel, the presentation of the exhibitor, the materials and the time.

Lopez Curiel (2014) lists a series of Videoconferencing tools: FlashGoogle Meeting (which stopped working in 2018), Google Talk (which was replaced in 2013 by Hangouts, and in 2017 it was divided into Google Meet and Google Chat). The Zoom App was founded in 2011. Cisco Webex has been around since 1995 and Microsoft Skype was created since 2003.

Hernández Adell (2016) shows us his experience with videoconferencing in the teaching of the subject of World Economic History and Spain in a Virtual University. He describes his 3 materials: Manual of the subject, E-learning, and presentations of the subject in PowerPoint. The duration of these is 10 sessions of 2 hours. 2 sessions per week for 5 weeks. One session per topic. The videoconference calendar is programmed from the beginning and its objective is to simulate the face-to-face experience. It is recorded for later use. He uses it for group tutoring, presentations, seminar, practical exercises and his discussion. And the tool used is Blackboard Collaborate, which has a video, chat, participant window and a whiteboard where the presentation screen is presented. In addition, use the socrative application for mobile devices and encourage interactivity through surveys, questionnaires, activities. And the purpose of the author of this article is to document his experience using videoconferencing at the undergraduate level for computer science classes in this period of the COVI-19 pandemic.

Among the risks for conducting videoconferences, we have zoombombing and for Recommendations against it, there is an article by Ling et al. (2020) (p. 1) that summarizes:

"Online meeting tools like Zoom and Google Meet have become the center of our professional, educational and personal lives. This has opened up new opportunities for large-scale harassment. In particular, a phenomenon known as zoombombing has emerged, in which bullies join the virtual meeting with the aim of interrupting and harassing the participants. "

Regarding their findings, the same authors indicate:

"The vast majority of attack calls are not made by attackers stumbling on meeting invitations or brute force attacks on meeting web addresses, but by members who have legitimate access to meetings, particularly high school students. and university. This has important security implications, because it makes common protections against zoombombing, such as password protections, infective. We also found instructions from members to enter the class under the names of legitimate participants to avoid detection, making countermeasures such as a waiting room and banning of participants less effective. Based on these observations, we intuit that the only effective defense against zoombombing is to create unique links for each participant. " Ling et al. (2020) (p. 1).

Additionally, it is very useful that if screen sharing is not designed, the default setting to disable it is used so that only the host can share and only he can start sharing when another is sharing. Appoint a deputy Host. (the above based on the Zoom options) and Google Meet also has organizer controls and disable screen sharing in allow everyone (optional disable sending chat messages).

Evolution of video conferencing and collaboration

If in 2009, with the H1N1 pandemic, videoconferencing tools were not as developed and especially smartphones had not been democratized to use them, it is therefore very useful to know the evolution of videoconferencing programs and services.

According to their website, Cisco Webex was created in 1995 by Subrah Iyar, Zhu Min in Milpitas, CA, USA. allows up to 100 participants, HD video, no time limit, shared screen and personal room in the free version.

Microsoft Skype, was designed in 2003 by the Danish Janus Friis and the Swedish Niklas Zennström (also creators of Kazaa) and developed in its technical solution by the Estonians Priit Kasesalu, Ahti Heinla and Jaan Tallinn, since in fact Skype was born in Tallin, Estonia. On May 10, 2011, it was bought by Microsoft.

In 2012 Windows Live Messenger was added. And in March 2014 the support for those accounts ended. In December 2013, Facebook was offering video calls via Skype. This same year it allowed group video calls (previously only two people). In the summer of 2014, the use of group video calls and desktop sharing (up to 10 people) stopped being premium. Before April 5, 2019, the limit was 25 people in free video calls, from that date it allows up to 50. In 2019, blur the background with Artificial Intelligence. (So does Zoom).

Zoom, was founded in 2012 by Eric Yuan, in San José, USA. the free version has limits of up to 100 people and 40 minutes.

According to Garcia, (2020) (párr. 1).

> "Currently, WhatsApp and Instagram video calls have the most limited number of simultaneous users, allowing only four. In comparison, FaceTime allows up to 32 people at the same time and Hangouts up to 10 people in its free version and 25 in the business version (Google Meet from G suite). Snapchat accepts up to 15 people, Facebook Messenger 50 people (although only six of them can broadcast) and Duo allows video calls of up to 12 participants."

Facebook Messenger, Since January 2015 allows videoconferences from the desktop version. And since April 28 on mobile devices such as Cell Phones.

Evolution of Facebook Messenger: since August 2011 (as a mobile application)

- Calls: January 2013 in Canada and the United States.
- Video calls: April 27, 2015 (in some countries, including Mexico)
- Group calls up to 50: April 20, 2016
- Group video calls: until 50, December 19, 2016.
- Animated reactions "effects", screenshots and filters. June 2017

First were the dedicated videoconferencing systems, then the computer-mediated, nowadays, smartphones allow you to communicate as long as you have data or a Wi-Fi connection. We will announce below the evolution of the conferences on WhatsApp.

WhatsApp. Its chat feature appears in 2009. In August 20013 the voice messages. It was bought by Facebook in 2014:

• Voice calls - since February 2015

• WhatsApp Web - since August 2015

• Groups (up to 256 members) - since February 2016

• Share documents (.pdf, .docx, etc.) - since March 2016

• Video calls - since October 2016

• Group video calls (up to 4) - from July 2018

• Until 8. April 20, 2020.

By Brown (2020) Google Hangouts started in 2013 includes Google plus Messenger videoconferencing and initially allows up to 10 conventional users, before the COVID 19 pandemic it allowed 25 business users and due to the confinement until September 30, 2020, the free version borrows features from Google Meet that allows up to 250 people and live video streaming for up to 100,000 people within a domain.

Google Duo, High Quality (HD) Video Conferencing Web and Mobile App, August 2016. As of April 2017, allows voice calls. In December 2016, he was the replacement for Hangouts. Although then Google Chat came out. March 2018: voice and video messages of up to 30 seconds.

In May 2019 it joins the competition with up to 8 simultaneous users in 720p. FaceTime, WhatsApp, Skype and Facebook Messenger,

In G suite for education the Google Classroom program allows the use of Google Meet. Which has web and Android and iOS versions. Since March 1917 it emerged as the business version of Google Hangouts. Presented for up to 30 users and according to their license: up to 100 members per call for G Suite Basic users, up to 150 for G Suite Business users, and up to 250 with G Suite Enterprise users.

Microsoft Teams. The current version in 2017 replaces Skype for Business (2015-2019), before Microsoft Lync (2010-2013), before Office Communicator 2007, before Live Communication Server 2003 and 2005 which started as Exchange 2000 conferencing. It has allowed white board, screen sharing, video conferencing and surveys.

Microsoft Teams is a unified communication and collaboration platform that combines a chat room, video meetings, file storage (including file collaboration), and application integration. The service integrates with the Office productivity suite by subscription and features extensions that can be integrated with non-company products.

Microsoft presents the educational version of Teams (2017) on June 28 of that year it launches the educational version of Microsoft Teams, which only requires a subscription to Office 365.

Objective

Document the experience of the use of videoconferencing in the field of information technology, first semester, in a Public University of the state of Jalisco. Where it began 100% face-to-face and as of March 21, 2020, it was changed to 100% online, due to the COVID-19 pandemic. The subject is supported by a course designed in Moodle with digital resources, as well as video tutorials made with Loom. The video conferencing tool used by Google Meet. And the collaboration tool was screen sharing, chat, and Microsoft Onedrive

The problems to be reviewed will be: does videoconferencing allow the automatic transfer of a face-to-face class to a virtual one at a Distance? What difficulties does the use of videoconferencing present in undergraduate students? of face-to-face classes?

Method

A descriptive research is used for this work, reviewing the different elements that make videoconferencing possible and the results obtained from the use of different collaboration tools such as videoconferences by Zoom, Google Meet (and others), Online course by Moodle, collaboration by Microsoft Onedrive. In addition to recording video tutorials with the Loom tool. Under a constructivist paradigm. The course begins with a diagnostic questionnaire answered with a Microsoft forms where questions about your computer, programs and internet connection and your online study habits were asked. The questions are available at this link https://forms.office.com/Pages/ResponsePage.aspx?id=DQSIkWdsW0yxEjajBLZtrQAAA AAAAAAAAEb50wzcKdUQkszWVRMVExaS1VZTEhEQ1NKVkE4uWFg1OC4 each school year.

For the subject of information technologies at the undergraduate level for the economic and administrative area, in its first semester. Prior to the 2020 Pandemic, a hybrid approach has been designed for 2 face-to-face hours and two hours of online work with the online course platform using the Moodle free software tool, the course has already been worked on by the academy, it includes resources in PDF and external links, work guides and work files, as well as a weekly schedule for the delivery of activities. Work was done on replacing face-to-face classes with Videoconferences. Every year there are two cycles: A from January to May and B from September to early December. Cycle A began in person and at the end of March abruptly changed to 100% online due to the COVID-19 pandemic.

In addition to videoconferences, as time was reduced and the didactic material was not designed to be taught 100% online and was updated on the fly in the 2020A semester, to allow students to "learn by doing" and at the same time as motivation of points extras requested the support of recording video tutorials on how to perform the practices, for the support of their classmates. Recommending the Loom tool.

It started at the beginning with the zoom video conferencing tool: its recording tools are simple, you can record to a file directly at the end of the session, you can easily schedule sessions and share screen. The main limitations were 2. The free version of zoom only allows 45 minutes of exposure, which leaves the rest of the time for self-managed work. And the virtual background feature occupies a recent computer, above average and even more recent than the computer that the teacher used, in the particular case the teacher's computer with Mac OS with the vast majority of students using Windows, making demonstrations difficult. computer science. A limitation that did not affect us was the capacity of 100 people simultaneously, since the groups were of 25 students. If that number is exceeded, it is better to use webinar or webinar tools or tools like Facebook Live, which allow thousands of simultaneous users and comments. Later, it was possible to update to a recent computer and to be able to put virtual backgrounds of a specific photo, for example a photo of school, being from home or even a predefined background video. In older computers such as an Intel i5 of 5th generation and lower, a green background must be available to have a virtual background, a situation that with the Snap Camera program and the same equipment, it is not necessary.

It continued with the Google Meet tool, where it generates a different address each time it is scheduled (to reduce the risk of zoombombing or massive and abusive interruption by third parties outside the meeting), if a class is created with Google Classroom, it is possible to have a fixed address, where once the session times have been programmed there is no room for confusion. A group was tested with sessions scheduled with different links and it led to confusion of the correct link. There was a bad experience of sharing an address of the videoconference through the social network Twitter instead of the Moodle online course and several users entered outside the institution and when the teacher accepted them, they kidnapped "in control of the screen, playing music on YouTube and video with indecent sounds, and how trying to block them individually was not fast enough and we left the session and scheduled another, agreeing from the Moodle notices, in the online course. Some time later, I realized that, using the Google Chrome Browser, we have the organizer controls to allow if the students can share the screen (which in this course by default was not necessary),

even if they could write in the chat , which if it was left open. Since it was left as the equivalent of the blackboard and the notices were noted in the chat.

For the recording there are several subjects, it is left programmed that it is going to be recorded, and a message is sent by mail when it has already been processed and saved, the name of the file cannot be chosen beforehand and it has to be renamed if it is handled several subjects. It is very important that the teacher is the last to leave the meeting, otherwise the other participants can be recorded until they hang up, if they have no image or voice, a black box is recorded for the time they are in the videoconference at the final. And for that reason it was necessary to edit and cut it when publishing the link, to share the recording for the specific topic of the presentations. Another detail of the G suite solution for education (which is the one that allows the use of Google Meet and Google Drive, where they saved the video tutorials), is that it can only be viewed with an institutional email account of the same, it offers more privacy, but if students do not log in with their institutional account, they may have access problems.

Virtual background on Google Meet. Initially, the Snap Camera tool was used to change the background or even the official avatar or presenter. They looked for the most discreet, blurred background, black and white and especially on the subject of online presentations they were more creative, with others who even changed the avatar for a pineapple or a pretzel. Strangely there was not enough curiosity to use it in their presentations, but it is assumed that it was the lack of time, a small tutorial was sent on the use of the snap camera and the use of it was left optional. Google Meet also includes features such as the blurred background and predefined backgrounds of patterns or images such as beach, kitchen, library, living room, office etc. With the exception that they can only be used if Google Chrome is used as a browser.

As for the duration, the full time of the class could be used, which was divided into two parts, one hour of theory and another hour of demonstration and interaction. In the theory section, reading was checked through generating questions that answered a) freely b) by the students on video c) by the students on the list of participants, the minimum required was to have a microphone, some did not have it and he sent his answer to the chat. When a student did not answer an express question in the chat and without a microphone (and most of the time with the camera turned off), there was a strong suspicion that they were in another distant situation, such as accompanying a relative in an office or hospital or connected from work. According to the instructional design of the subject, not only theoretical topics were covered, but

especially the first unit, they were proposed to create a portfolio with different web tools, for which, the other hour screen was shared with presentations for the theoretical topics and the other hour an exercise was designed to capture their research on the topic using a Canva-type web tool or a concept map. Or there was a collaborative practice with Microsoft OneDrive, for Excel online, where several students could participate at the same time, assigning cells to be solved by students and highlighting in yellow when they were correct and with a red background when they were not. Useful, but for technical reasons only half of the students came in and it caught my attention and that even outside of class hours the students worked on the shared file, which confirmed to me that it was a useful tool. When more specialized tools were used that the online version did not include, screen sharing was used to demonstrate how to perform the exercise. And especially at the end of the class, there were usually a couple of students who required personalized advice, demonstrating their doubt by sharing a screen.

Another tool that was very useful for distance learning, were the video tutorials, first we looked for similar tutorials on YouTube, which are good for general concepts, but since there were specific exercises, there was a need to do specific video tutorials for that subject (consisting of videotaping your screen when performing the exercises step by step according to the instructions that already came in the Moodle online course, which you could review several times once they were published in the moodle online course), along with the design of online courses for other subjects in the 2020A calendar, led me to be motivated to award extra points for developing video-tutorial teaching materials with the Loom tool, which allows you to record the screen and the audio (and / or video) that despite being in English, it is simple to use and is free for academic purposes, otherwise it only allows 5-minute videos. Once the video is finished, it is quickly uploaded to the cloud and with a link it can be shared with everyone. And with that I was able to obtain the word processor video tutorials, I could do the spreadsheet ones, I could let them review the video tutorial before class and demonstrate it to me online in Microsoft OneDrive (Excel Online) and it saved time in having to re-explain the same thing several times. We could reinforce the weak points and because the Loom tool allows to see the number of reproductions, it has a social component, where the students sent me comments and put reactions of likes or applause, it also gives me an idea of the amount of students who had previously reviewed the video tutorial (between 25% and 50%). The videos could be reviewed prior to the exercise and the comments of the students at the end of the semester, indicated that it helped them to better self-manage their time,

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repeat the instructions for the exercise as many times as necessary and outside of class time. With one student interested in each group, the 4 word processing practices in the 2020 A cycle were covered, in one in particular it had to be repeated because the student used another tool that showed a large watermark and a heavy file that she had to go up slowly.

Faced with the problem that the configuration of the personal firewall router was changed to high, even the Google Meet tool was blocked and then we went to plan B (in the search for video conferencing tools, we have the institutional support of Cisco Webex, where previously Upon failure, my address for videoconferencing and the instruction to have it installed as a backup tool had been shared in the online course. At the time of using it, it had the following characteristics:

Cisco Webex allows the easy scheduling of meetings with a personal link, has predefined wallpapers that look professional, allows you to record the session both in a file on the computer, and in the cloud. Only to share the screen you must request, it is as if you "asked to speak", it has multiple views to highlight either the participants or the content of the shared screen and has no time restrictions. With this tool, we also participated in a teacher training congress and we were widely 250 people, but the policy of microphones off must be established, because they can interrupt the main speaker (in Google Meet they are turned off automatically when there are multiple users connected).

Plan C, another institutional tool available from Microsoft Skype, allows you to easily set a virtual background photo even without a green screen. Screen sharing, chat room. I have not used it yet in classes for 2 reasons, first because of the main use of Google Meet for videoconferencing and the main institutional email account is Google, Microsoft has to be requested and depends on the work they are released, and it was not available of the email addresses of the 100 students, which, if it happened with those of Gmail, stored together with the attendance lists on the institutional site.

Results

Technical difficulties: according to an initial diagnosis, using an online Microsoft forms questionnaire, it was found that the average computer equipment is a processor from 10 years ago, shared computers and 20% of the students connect via data. The face-to-face laboratory that had Microsoft office 2016 installed was taken as a reference, but several students had older versions and unfortunately 2 students had chromebooks that can only run the version of Microsoft Office on the web. One of the challenges faced in the use of videoconferencing

was that few students kept their camera on, for better feedback on body language. Among the possible causes of this behavior is that several students worked, and took classes from their work, on the way in the truck (one told me), waiting in a doctor's office (waiting for a relative) and during the hours of the 7 am, several students preferred to have the camera turned off and some in the dark so as not to wake up relatives if they were sharing the room. Another key factor, I consider, was that many students were unaware of the possibilities of the software to replace the background with a still image.

Cycle 2020A the underperforming team also affected the author with a desktop computer from 10 years ago, no camera or microphone and a laptop with Mac OS from 5 years ago. In addition to technical problems with the internet. He had video tutorials recorded without voice, which the students missed, making it seem incomplete. The tutorials in the first cycle focused on web tools, rather than Microsoft office for Mac OS, which by the way I realized that there is very limited content on YouTube.

According to the comments with the students, their computers were from 10 years ago, and on some occasions they did not have legal Microsoft office licenses, with which the use of a face-to-face laboratory serves as a "uniform" standardizing the equipment among students for a optimal use.

In the presentation unit I was in charge of recording a video presentation, I myself trained in Prezi Video (I had only been doing presentations without video for 8 years), Loom (to create video tutorials and teaching material for students and teachers), Snap Camera (to change the teacher's background in a fun way) through YouTube tutorials on the 2020A calendar (at the same time I had to design 2 online courses in Google Classroom from 2 other different subjects). Most were able to do so.

Another advantage of the use of face-to-face laboratories is the availability of the internet, which in the city seems common with Wi-Fi, but in smaller populations it may depend more on data. And due to the economic situation of many students, who work and even help their parents, it is difficult for them to pay for cell phone data. There was 20% who had difficulties because they lived in the interior of the state in a small town, a student recorded herself with her cell phone and uploaded it to YouTube, another went to a cyber (especially if they had a Chromebook), others asked for a computer with a relative and even a neighbor.

Another difficulty of videoconferencing was having time on a shared computer, since all the brothers were in classes online and not all had a personal computer, in addition to the place

of study, one student reported studying with minor cousins making noise in an annexed patio and that they could not make him concentrate.

From the beginning of the course, an alternative means of communication was given via Twitter and 50% of the students used it for their questions from their mobile devices and 50% did so through the Moodle online course, typically from their laptops. They were also offered the possibility of processing their UdeG Live account with their institutional Microsoft email to have an academic office 365 and the use of LibreOffice was promoted for those who did not have a valid license and while their UdeG Live account arrived, the possibility of using the office from your cell phone, typically Android.

Students who did not have a microphone were invited to use a hands-free set, some said they had problems with the burned sound card, so when their microphone did not work they went to participation via the chat tool Google Meet It was also used to indicate how many were present and to highlight important notices and if there was any link to highlight, such as shared files. But if they were late, he couldn't see that data and had to review it in the online course notices.

For the data section, it was suggested to change portability to another company to have more data, or to use a shared network provider that has the most aggressive value / price plans, in addition to letting them know the Mobile Virtual Operators (OMV) they usually have attractive offers. In my particular case I used 2 mobile internet providers and on one occasion due to technical problems with the internet I used 800 Mb in one hour of videoconference with a group via data. It had a data plan of 20 to 40 Gb per month and another provider with 36 Gb of accumulated balance and the option of sharing data to the laptop via a wireless access point (hotspot). But because of the vulnerability of the students' situation, there were some who did struggle to get the data.

Discussion

The findings reflect that there was a sudden increase in the use of video conferencing from the COVID-19 pandemic, many teachers had to review various tools before finding the most appropriate to their way of working, teachers had to be trained in multiple related areas with video, not only in the label of videoconferences, their planning, development and evaluation but also in the curation of video materials, the development of online courses under the march in the 2020A cycle (spring), development of specific video tutorials by the teacher and motivation for the preparation of teaching materials by the students in order to optimize time.

Previously, videoconferencing was used in specialized distance education and postgraduate environments and this year it became popular for all subjects and levels from basic to postgraduate education, in technological and non-technological subjects. And it will very likely be considered a basic competence in the future not only for teachers, but for professionals in general and in the economic-administrative area in particular, where I work. Proof of this is the update in video prezi to first semester students in the presentation unit of the information technology subject.

As a latent weakness, there is the computing equipment of teachers and students, given that this technology requires more resources of hardware, memory and in the face of an adverse economic outlook, it can slow down progress in its use, but the experience gained this year has been mostly positive

Conclusions

The transition from the classroom to a videoconferencing tool is not automatic, some prerequisites for entry are necessary. As are the equipment, programs and Internet connection (which is provided by the physical laboratory), training in computer tools especially in videoconferencing (such as how to change your background for an image) and prior technical support to the video conference. The distraction-free workplace with an individual computer, not just for classes, but later for homework. And due to the economic situation and the fact that many worked or supported their relatives, neither the time of dedication was guaranteed, they had to work, move, support their relatives (perhaps even doing the chores while they were in class). Although the instructions were to read the materials prior to class to discuss the subject, sometimes the subjects had to be presented and that could bore those who did spend time reviewing them. To demonstrate the procedures, the recorded video tutorials were better, which had to be generated on the fly, increasing the work, the novelty of using Onedrive for collaborative work, towards only half of the group participating for technical reasons, and the topics loaded with reduced time did not they facilitated the use of time. On several occasions the date of the class fell on a non-working day and in the second work-at-home class, a videoconference or exam was scheduled and many could not attend because of their work.

Difficulties, among others, consisted of having the internet connection, the equipment to do the homework, the time available for classes and homework, and the self-management to carry out the tasks of the 6 subjects they took in the first semester.

Twenty years ago the author took classes at an online university, videoconferencing was never used, the technology was already in place, but it was expected that it will mature in features and equipment. As time has evolved, mobile devices also allow videoconferences, solutions such as Messenger, WhatsApp (which allow 8 simultaneous users) have been added to the now classic Microsoft Skype, Cisco Webex, Google Meet (formerly Hangouts) and zoom. Although it is a useful tool, it is not the only one that should be used, even in theoretical subjects, for distance education.

In the 2020 A cycle, it took time to select the best videoconference tool and the development of teaching material in the form of video tutorials, it was supported in part by the students to generate video tutorials with the Loom tool. Snap Camera was used for the Virtual Fund.

Video conferencing is a part of the teaching strategy along with online courses, video tutorials, flipped classroom tools, simulators, and collaboration tools.

In the case of distance education with videoconferencing, it is very important to have the course planning in advance and the didactic materials so that they can review them before the class, in addition to the fact that it is necessary to motivate the students and their self-management to be able to organize their times and places of study. To design a strategy for the use of videoconferencing, prior planning of the sessions is required, scheduling the date and the link and making it known no later than the start of the course, you must include the label of this, for example, have the cameras on, microphone off and use chat when they have technical problems like microphone failure and the teacher to jot down important points, as well as links to collaborative files and short notes. In planning, it is also important to select the main tool and the backup tool and send a tutorial on the use of the tool to the course online or by mail, and preferably the link for its download, both on the computer and on the cell phone.

During the session, it is recommended more than just presenting a presentation (taking into account a degree level) it is important to ask generating questions about resources that they should have read previously, as well as video tutorial resources and it is useful to ask permission to record the session for reference later, especially in exams. To name a list, you can take a photo of the list of attendees to use Chrome add-ons to name a list in Google Meet. It is very important to involve everyone and not only those who have the camera on and if anyone takes a long time to respond, leave the option to write down their response in the chat. For practical matters and the use of office tools, I have found it useful to use Microsoft OneDrive to collaborate in real time and annotate comments on the exercise.

Be careful with the specifics of the video conferencing tool when saving so that it can be used for future reference. It is good practice to make class recordings available to students.

Finally, have an emergency plan, what to do in case of: 1) having fixed internet failures (a data plan can help as backup) 2) having problems with the videoconferencing tool (having a plan B with another videoconference). 3) suffer a zoombooming disruption. (avoiding publishing the address on social networks) 4) having problems with electricity (having a no-break and an alternative means of communication connected). 5) have general technical problems (use of free software, mobile applications, simplified version of the exercise, etc.) Publishing a list of frequently asked questions and having a contact with the technical support desk of the university.

Future Research Lines

As future lines of research, it is proposed to study at other educational levels, upper secondary, basic and basic school. As well as the study of the subject by general teachers who do not teach computer science, as well as evaluating the skills of teachers in general in the area of video production and videoconferences.

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