

ANALYSIS AND DESIGN OF ONLINE VIDEO CONFERENCING PLATFORMS

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Abstract - Many colleges/universities have opted for digital schooling due to the pandemic that pressured them to prevent the use of their actual global infrastructure as a way of coaching. Affecting college students' who were pursuing their academics, this has predisposed lots of them to get acquainted with this new method of gaining knowledge, ensuring the elevated use of digital structures. The motive of the paper is to have a look and to describe the impact of videoconferencing gear on pupil's process of gaining knowledge via using video conferencing as a mode of communication between them, their teachers and their respective universities/colleges. The paper also focuses on presenting different video conferencing tools with their specific use cases, advantages and disadvantages in an elaborated manner. Also, a new video conferencing platform (CONFAB) is designed and implemented which provides various features at ease.

Index Terms - Online, Conferencing, Virtual

I. INTRODUCTION (HEADING 1)

The use of diverse software programs for imparting schooling to the scholar like Google Meet, Skype, Zoom, Microsoft Team and Discord are growing Globally because of the present day pandemic SARS-CoV-2, moreover known as COVID-19. More than a decade ago, videoconferencing became commonly applied to keep cash on enterprise travels however now, after the pandemic the use case of videoconferencing has widened a lot which includes a couple of industries like schooling, enterprise, production however this paper mainly talks approximately the academic facet of the scholars in detail.

With the emergence of the new virus, there has been a dramatic transformation. As a result, there may be a developing requirement for all students to create and get comfortable with this new education and mastering process, resulting in accelerated use of these platforms [1,3]. Teachers and college students had been interviewed, and around 2/3rd college students stated that either their academic performance has increased or remained unaffected. The majority of them grew comfortable with the structures; nevertheless, the handiest round 1 out of 4 of them stated their educational overall performance had not improved at all, and a few instructors nevertheless have mental troubles due to this new coaching method. Finally, instructors and college students accept that those gear are pretty useful in digital classes. It became tough for each the events to just accept the combination of a generation like video conferencing to their centuries vintage academic device/method however with time and the promoted use of the gear everybody understood that this is the handiest manner ahead which saves time for both the lecturers and the scholars without affecting the manner and the overall academic performance of college students.

Learning in an offline manner creates a brand new trouble which isn't absolutely a trouble however the urge of human beings to be as efficient and as productive as possible. The principle troubles are: transportation and distance. Institutions/colleges/faculties are dependent on the use of statistics and verbal exchange technologies (ICT) as a primary answer (ICT). They constructed the Virtual Class Box zero tool to guide virtual distance mastering among instructors and college students with the intention to attain a huge wide variety of college students.

China, on the alternative hand, rushed and experimented for a month on trial period by forcing its institutions to carry out remotely, attaining pleasant educational fulfilment due to their ICT. Though, it's been stated that on-line venues are not specially designed for college students.

Due to a trainer's shortage in Latin America, international locations along with Uruguay evolved a virtual application aimed entirely at enhancing the pleasantness of coaching and mastering in and for pupils.

Students' call for on-line instructions has surged via 80% within the short span of 12 months from all the types of students irrespective of their field of study except medicine. From March 16, 2020 to the present, almost everyone has been locked at homes due to which they have been disabled individually to save you from the unfolding of the virus [3]. To prevent the academic loss of students the world adopted the use of digital assembly structures along with Zoom or Google Meet, via which you can conduct virtual meetings.

Video conferencing provides a far more genuine and visible connection between teachers and pupils therefore it is currently the most inventive and versatile mode of communication for our new national lifestyle [4]. Assisting in the prevention of educational delays as well. According to a research published in 2019, online learning can assist university students to improve their grades [5].

Pandemic compelled all the lecturers to apply video conferencing while not having preceding know-how of these, creating a surprising need to learn the new online coaching methodology. Because the digital assembly structures are inclusive of zoom and meet and they have a time limit its get more important for instructors to be ready with all the materials to be used inside the classroom to save time and keep the communication between them and the scholars very precise, appropriate, and relevant[6]. Due to this, college students can become capable to get hold of commands as they have been in person, and can keep the synergy of real-time intercommunication [2], thanks to the use of innovative video conferencing technologies. However, certain courses that need explanations by the physical presence of an instructor do not accept these behaviours like the field of medicine and some students are not available with a good internet connection all the time as it's an important requirement for any video conferencing setup [7,8].

II. BACKGROUND

A. Advantages of Video Conferencing In Education

Due to the uncommon coronavirus epidemic, instructors who formerly taught best in the offline circumstances are now in trouble as they are trying to figure out what can be the most reliable option to teach students in his situation where they can be sure that the efforts of the teacher and students will not go waste and help students to grasp concept with same level of understanding and efficiency as it was in the past at schools/colleges in offline mode of education. And in that case Instructors can use a range of tools, such as pre-recording or live-streaming their lessons or using interactive video conferencing software [10,11,12]. Video conferencing has a number of educational advantages, which are discussed in further depth below:

- Allows Different faculties to attach and collaborate easily: Collaboration among or throughout faculties promotes healthful interplay that may enhance common performance. Unlike in the past, while faculties needed to bodily ship their instructions to different faculties to examine new coaching and control practices, modern day video conferencing makes interplay a good deal and easier for everyone. Schools can now use audio and video streaming to plot behaviour of school room training, educational meetings, and online schooling webinars.
- All this is required in a college for the implementation of a sturdy video conferencing machine that lets the individuals to view high-definition streaming. Teachers can then absolutely hook up with the individuals on the alternative side, talk with them, and change critical coaching gear and information. This sort of verbal exchange now no longer just saves time, however it additionally saves cash that would have utilised or wasted in commuting by the teachers and students to the institution [13].
- Facilitates Virtual Field Trips: If a college's price range is restrained or its journey plans appear like impracticable, video conferencing can be the high-quality option. Only some human beings can be dispatched to the sphere to offer the coverage. Students could be capable of viewing museums in actual time or study corporation operations in actual time from the comfort of their classrooms or home. This saves money and time via way of means of lowering the quantity of money and time spent at the real journey and its effective as in both the situations the learning doesn't gets affected.
- Makes Scheduling of Parents/Teacher Meetings Convenient: Video conferencing eliminates temporal and geographical constraints, permitting individuals to preserve conferences at any time and from any location. When a college makes use of video conferencing to set up parent/trainer meetings, it enables each aspects to keep away from agenda difficulties. Schools can usually use video conferencing solutions to encompass parents in parent-trainer meetings and conferences.
- Enables college students to report instructions for later review: One of the maximum treasured capabilities of video conferencing in schooling is to remove cap on potential to report and store training and conferences. This may be useful to college students who're absent from the premises or who definitely need to revisit the lectures later. Teachers can set up body of working/available conferences at any time and feature all people attend from anywhere so the students can use the video conferencing software for learning. The periods also can be videotaped in order that folks who have been not able to attend the class can cope up on what have been discussed. This saves money and time, particularly for instructors who've different commitments [14].

B. Disadvantages of Video Conferencing In Education

- Eliminates non-public interaction: Video conferencing in training has some of drawbacks, certainly considered one among that is the loss of private and in person interaction. Participants might also additionally pass over out on important facial expressions and frame language if online streaming of lectures or conferences is used. This may appear while an online presentation has a stuttering video or a pixelated photograph because of negative gadget or a web interconnection. These elements can hinder mastering and waste assets including time and net records subscriptions.
- Costs extra to collect and Set up A Video Conferencing System: A college might also additionally trust that adopting a video conferencing machine will keep cash on tour or operational costs, however the fee of shopping accompanying gadget and software program can be considerable. The necessity of spending on a good set of hardware and software can be a huge expenditure to provide a smooth and reliable experience to the student. Paying for a records connection and retaining it on a normal foundation might also additionally bring about extra operational expenditures.
- Bound to face technical problems: Technical defects with the video convention gadget can cancel an online meeting. This can be the end result of a hardware, software program, or community trouble. Such conditions necessitate the intervention of a technical guide team, and it can be hard to retain playing an online presentation in their absence. Even if the trouble may be fixed, it'll take a small amount of time and a little effort to reconnect.
- Limits the quantity of those who can take part on the same time: Video conferencing are of many types. While a few video conferencing structures can most effectively guide 25 to 50 people at a time, others might also additionally accommodate as much as 500 humans. Even so, you could want to spend money on notable audio system and microphones in case you intend to deal with a massive number of pupils. Because video calls needs extra bandwidth than audio, Institutions might have to additionally spend money on first rate video. When you want to satisfy or educate humans in a virtual or digital classroom, video conferencing gives essential challenges [15].
- It's been discovered that scholars pursuing Medicine, MBBS, Nursing, and different professions wherein it's essential to take a look at the problem that students are going through problems in mastering effectively as they want to exercise matters concurrently and it can't be finished from their residency. This category of college students are certainly considered one among those individuals who don't prefer online video conferencing for education [16].

III. ANALYSIS OF VARIOUS VIDEO CONFERENCING PLATFORMS

The following will describe the maximum influential factors of Video conferencing structures that make contributions to digital education, such as: Discord, Google Meet, Microsoft Teams, Skype, and Zoom. Here, all of the fundamental structures can be mentioned in phrases of what they offer their customers in phrases of features, advantages, and disadvantages [9].

A. ZOOM

Zoom is a synchronous online coaching platform that lets you draws the line on the gap created between students and teachers due to lockdown to achieve greater efficiency in academic performance. It has some of features, inclusive of annotation tools, polls, assembly rooms, and video and display screen sharing. These capabilities make studying easier. The most significant features of Zoom platform will be outlined in a Table below. It integrates video conferencing and teacher-student communication to provide novel learning opportunities and resources.

Table.1. Features Available In Zoom

<i>Tools</i>	<i>Usage</i>
Start a meeting	Create a video conference.
Schedule a meeting	Allows to schedule a meeting.
Use of the calendar	Give notifications of conferences.
Screen sharing	Share screen with members.
Screen Recorder	It allows recording of the meeting.
Virtual whiteboard	You can draw and write
Live Broadcasting	It is used to make stay pronounces the use of programs together

Table.2. Advantages And Disadvantages Of Zoom

<i>Advantages</i>	<i>Disadvantages</i>
The computer model and cell utility has an incredibly easy, and intuitive interface.	Despite being a clean to apply tool, it may be puzzling for a few individuals who aren't tailored to this new technology.
Free version.	40 minutes limit.
Allows screen sharing in real time.	Need stable internet connection.
No need to be registered to join a meeting, nor download the application.	It collects data and emails from all connected devices exposing the user.
A permanent ID to the user.	Web based use.

B. Google Meet

Google Meet is a relatively new software that was released in April 2020 and is available to all users for free. Previously, it was called Hangouts. It is primarily targeted at businesses and educational institutions. Google Meet is linked to Suite, making it easy to manage meetings using the Event Calendar.

Table.3. Features Available In Google Meet

<i>Tools</i>	<i>Usage</i>
Create a video call	You can create the video call.
other to join meeting	Gives a meeting code
Screen sharing	Share screen with members.
Screen Recording	It allows recording of the meeting
Chat	Participants have the choice to engage each without delay and privately.
Controls for hosts	Can mute and unmute

Table.4. Advantages And Disadvantages Of Google Meet

<i>Advantages</i>	<i>Disadvantages</i>
You can create meetings with 200 user	60 minutes limit
Facilitates real-time conversation	Few mechanisms to control user audio.
simple interface	Participant must have a Google account

<i>Advantages</i>	<i>Disadvantages</i>
The security of the videoconference is guaranteed due to encryption of the transmissions	Need Stable internet connection.

C. Skype

This virtual meeting platform, like the others, offers its services at no cost, allowing users to connect at a distance. Despite the fact that it is a Microsoft product. The characteristics of Skype are shown in the table below.

Table.5. Features Available In Skype

<i>Advantages</i>	<i>Disadvantages</i>
Speed per calls	24kbps / 128kbps
Courier writing	Unlimited call
Call recording	to see in future again
Shared screen	Share screen with members.
Multi-platform	phone, pc, laptops

Table.6. Advantages and Disadvantages of SKYPE

<i>Advantages</i>	<i>Disadvantages</i>
Skype can be used on different Operating Systems.	It is not used for academic meetings only.
Advanced Encryption Standard Security.	Sometimes video and audio quality drop.
It has capacity of 50 people connected in real time.	Time limit, which disconnects the video call midway.

D. Microsoft Teams

This digital assembly platform is likewise utilised through loads of students around the country, and it was introduced in 2017 but just became more well-known in the education industry in 2019. It also provides an excellent integrated teaching and learning area. The pros and cons of Microsoft teams are shown in the table below.

Table.7. Features Available in MS TEAM

<i>Tools</i>	<i>Usage</i>
Chat	Communicate personally with members.
Limited time	24 hours
Setting	options
Leave	By pressing you can leave the live session

Table.8. Advantages and Disadvantages of MS TEAM

<i>Advantages</i>	<i>Disadvantages</i>
Protect data	It has a paid version
Has resources at live meetings.	It does not allow more than 300 users.
Free version.	Difficult adaptability
Your files are stored in the cloud.	Requires the internet.

E. Discord

Using the Discord platform, you may create a high-quality environment for training. It's used to turn a regular class into a virtual one, and a boring class into an interesting one.

Table.9. Features Available in Discord

<i>Tools</i>	<i>Usage</i>
Add contact	add a someone to make the call
Create video call	Let user make the video call
Share screen	Allows participants to share screen
Chat	It serves as text

Table.10. Advantages and Disadvantages of Discord

<i>Advantages</i>	<i>Disadvantages</i>
Due to optimization performance, you can connect without loss of call	After the paid version, limited some features in free version
The tool is cross-platform	Requires training to use
The platform is free	video calling is not good
It is customizable	You cannot record video calls
can provide connection with up to a max 50 people	Not available on Linux
Technical support available to the users	Had complaints regarding scams

Through the comparisons done, it is obvious that the platforms have comparable qualities such as class time, interaction options, screen sharing, and writing internal as well as public messages to a User.

Except for Discord for now, no longer having the choice of video recording in the free version. Due to this it can be concluded that maximum of the video conferencing platform have a totally similar learning curve for both the students and the teachers in terms of technology.

IV. NEW VIDEO CONFERENCING TOOL(CONFAB)

Confab is an online video conferencing tool which can be used by academic institutions, business organisation and wherever there is a need for video conferencing.

This tool is no different from any other tool in context of use but it is different because of its simplicity and various features. It's simple and elegant interface is very easy to understand and use even for the people who aren't enough tech savvy. The sole purpose of building this tool is for people from tier 2 and tier 3 cities who need this technology just to communicate in the most efficient manner online and doesn't care about the extras. Although everything is same as compared to other tools available for video conferencing in the market but what makes CONFAB different are a small number of features like the user can share media like any document file, pictures, and videos in real time during the video conferencing from an "attach" icon available in the chat box. Some of the features that make it more interactive are polls and quizzes which pops up in the chat window for all participants during the video conferencing itself. The another thing which makes it different from tools available from same market is a "Desk" feature, in thus feature the user is already having an audio and video call with the host of the meeting but with desk feature the user can now have another call with peers present in the meeting who can be either a friend or a colleague inside the main meeting itself. The Desk feature only allows for an audio call with your peers. The importance of this feature is crucial and can lead to more engagement in the meetings.

The conferencing platform for CONFAB is implemented in Visual Studio using NodeJS, JavaScript, ExpressJS, WebRTC. GUI of CONFAB is presented in figure 1. Main attractive features of CONFAB are whiteboard (Fig.2), screensharing (Fig.3), chats (Fig.4), polls (Fig.5), file sharing (Fig.6).

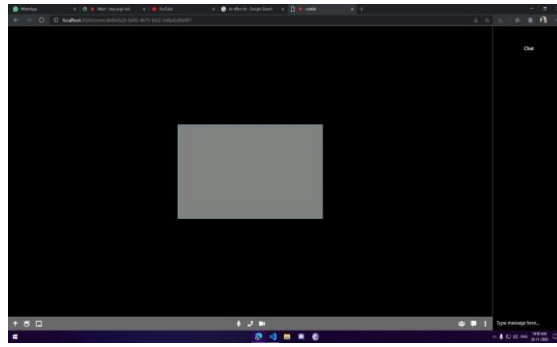


Fig.1.GUI (CONFAB)

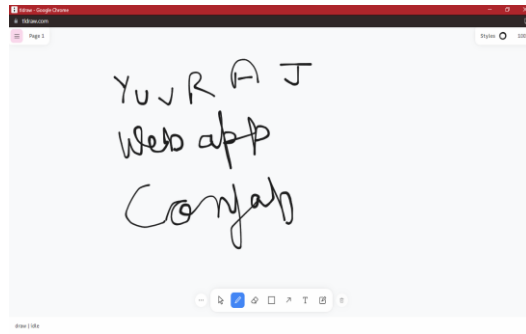


Fig.2.Whiteboard (CONFAB)

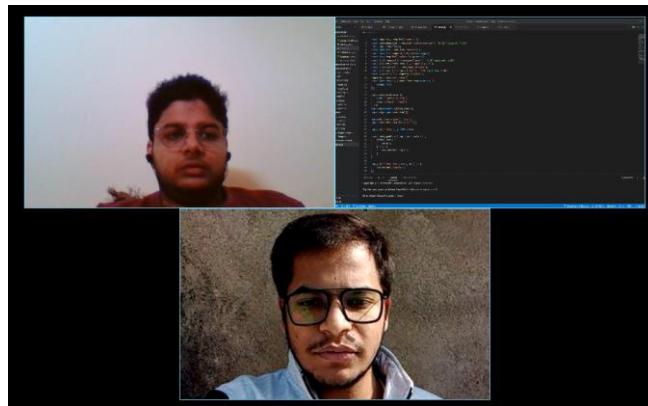


Fig.3.Shared Screen and Thumbnail

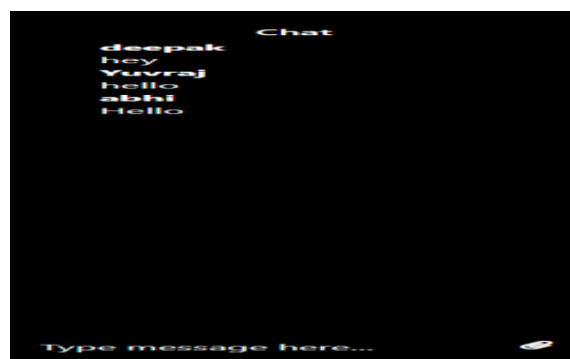


Fig.4.Chats (CONFAB)

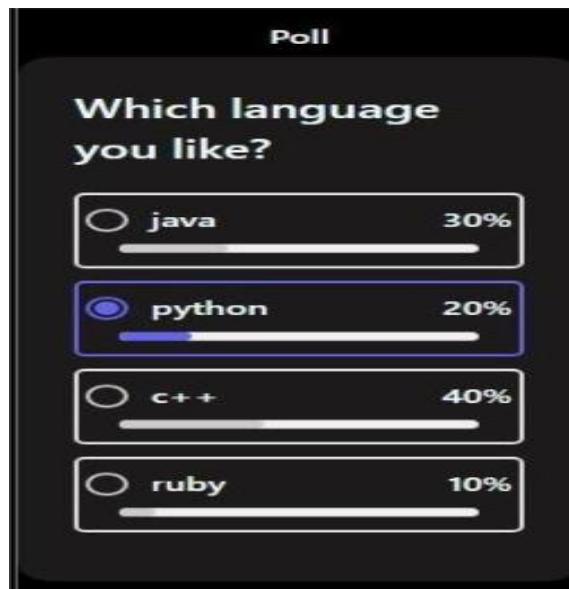


Fig.5. Polls (CONFAB)

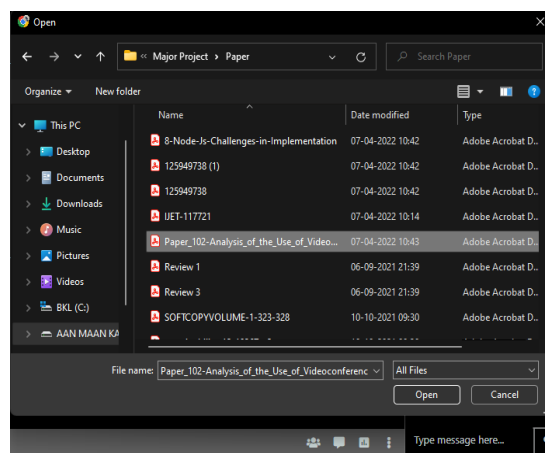


Fig.6.File Sharing (CONFAB)

All the apps and the tools used for video conferencing have some common features but CONFAB has some extra features like no attendees constraint, no time constraints and polls facility and many other features which make it better from all others. So, in terms of financial aspect also it is a better app used for video conferencing. Various features of CONFAB video conferencing app presented above makes this a simple, free and user friendly video conferencing platform as compared to other free platforms.

V. CONCLUSIONS

In conclusion, by using the platforms for virtual teaching and learning environments, the great majority of teachers and students perform at an advanced level. Similarly, during class partitions, teachers maintain continual and fluid dialogue with their pupils. However, some teachers are still having psychological challenges as a result of this new teaching method. The teachers stated that they are always receiving training in order to master new digital technologies. There are some of the benefits and drawbacks of video conferencing in education that any school or interested party should consider. Analysis of various video conferencing tools are done to understand the advantages and disadvantages. By this paper, anyone can find the elaborated analysis of every online conferencing tool. Also, a new video conferencing platform CONFAB is implemented which provides all the features of video conferencing platform with ease. Despite of the numerous financial and resource issues that video conferencing presents, CONFAB proves to be a useful tool for connecting instructors, students, parents, and other stakeholders.

VI. REFERENCES

- [1] T G. Chandra K. Massner, "The use of Video Conferencing in Higher Education," pp. 25, July 2021
- [2] Damian Maher, "Video Conferencing to Support Online Teaching and Learning," pp. 32, June, 2020.
- [3] Prof. Jack & Riley, "Video Conferencing & COVID-19," pp. 12, Jan 2021.
- [4] Pavle Gladović, Nemanja Deretic, Danislav Drašković, "Video Conferencing and its Application in Education," pp. 8, December, 2019.
- [5] Gökhan orhan, ömer beyhan, "Teachers' perceptions and teaching experiences on distance education through synchronous video conferencing during covid-19 pandemic," pp. 15, July, 2020.
- [6] Shannon Vandenberg, Morgan Magnusan, "A comparison of student and faculty attitudes on the use of Zoom, a video conferencing platform: A mixed-methods study," pp. 2-3, July, 2021.
- [7] Andrew Darr, Jenna Regan, Yerko Berrocal, "Effect of Video Conferencing on Student Academic Performance: Evidence from Preclinical Summative Assessment Scores," pp. 23, August, 2021.

- [8] Ravinder Singh, Soumya Awasthi, "Updated Comparative Analysis on Video Conferencing Platforms- Zoom, Google Meet. Microsoft Teams, WebEx Teams and GoToMeetings," pp. 7-8, August 2020.
- [9] Video Conferencing Review- Zoom vs Microsoft Teams vs WebEx vs Google Meet, April 2020.
- [10] The Big Impact of Video Conferencing for Education, August, 2021.
- [11] Main Advantages and Disadvantages of Video Conferencing in Education, pp. 5
- [12] The advantages and disadvantages of video conferencing in schools, pp. 18, November, 2019.
- [13] Wlodarczyk, Jordan R. M.D.; Wolfswinkel, Erik M.M.D.; Carey, Joseph N. M.D.," Coronavirus 2019 Video Conferencing: Preserving Resident Education with Online Meeting Platforms." pp. 10-11, July 2020.