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Emerging Application of Multi-faceted Approach on a Virtual Platform in Academic Domain

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A virtual learning environment assists as a digital hub for educational activities, where students and educators interact, share knowledge, and collaboratively construct knowledge. It is a versatile tool that can support various learning models and enhance the overall educational experience for learners. As technology rapidly continues to advance, these tools are likely to play an even more significant role in shaping the landscape of employment and education. They provide solutions to various communication and learning challenges, making the world a more inter-connected and digitally infused place.

0 INTRODUCTION

The Virtual Learning Software refers to inter-active web pages or applications designed to facilitate remote learning experiences. Learners can access these platforms through web browsers with an active internet connection, input their data and interact with the content to accept expected results. Both video conferencing platforms and virtual learning software have turned out to become increasingly important in the modern digital era, especially with the rise of remote work and online education. Video conferencing enables seamless communication and collaboration between teams and individuals, while virtual learning software offers a flexible and accessible way for students to learn and interact with educational materials remotely.

A Virtual Learning Environment (VLE) is a digital platform that is purposefully designed to facilitate and support learning activities. It serves as an online space where educational content, resources, and tools are made available to students and instructors.

1 OBJECTIVES

- Exploring Library Services in Academic Fields in India.

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- Comparative Study of Educational-Friendly Video Conferencing Tools Preferred by Academic Institutions.
- Creating a Virtual Environment Model Using Python.
- Linking Types of Library Services Preferred by Academic Institutions in India
- Discovering Suitable Video Conferencing Tools According to Academic Institutions.
- Measuring Simple Features of Tools Preferred by Academic Institutions and Making Them User-Friendly.

2 SCOPE

The scope of the study lies in identifying the ten video conferencing tools used by higher educational institutions in India for library services, assessing the structures and functionalities of each video conferencing tool. Gauging how the manner in which these tools are integrated into the library services of academic institutions. Conducting a thorough analysis of the user feedback and the satisfaction level with the video conferencing tools. Investigation of the impact of video conferencing on the accessibility and availability of library resources for users. Mapping of any challenges or limitations faced by institutions in utilising these tools for library services. Portraying comparisons between the varied video conferencing platforms and identifying strengths and weaknesses of each of these platforms.

3 METHODOLOGY

The research methodology employed in this study was a keen observation. The data that was collected from the official websites of various institutions using the tool "Open Site Explorer," which is a search engine optimization tool providing researchers with a wealth of data gathering, sorting, and exporting link data. Additionally, other search engines such as Google, Yahoo, and Bing were utilized for data collection purposes. Relevant data were also collected from notice boards, Google Playstore, and Google pages. The search engine, Google was utilized to establish the requirements of both measurements. The data collection process involved using the Google search engine to gather detailed information on the features of the tools.

4 LITERATURE REVIEW

The video conferencing software is a versatile tool with applications being utilised extensively across a broad spectrum of industries, fostering communication, collaboration, and connection in both professional and personal settings. Its widespread adoption has been accelerated by the increasing need for remote work, remote learning, and remote interactions in today's digital

age. Bierbaum, Just, Hartling, Meinert, Baker, & Cruz-Neira tried to pronounce VR Juggler, a virtual platform for the creation and execution of immersive applications that provide a virtual reality system-independent operating environment. Hsu, Chuang, Su, Yeh, Yang & Tseng presented a system-level virtual platform and simulation environment for multi-core system performance profiling and evaluation. Huerta-Canepa, & Lee envisioned a technique to overcome this issue by creating a virtual cloud computing platform using mobile phones. Olivier, Bruneau, Cirio, & Pettré (2014) explored the Virtual Reality (VR) as an experimental tool to perform such observations with an accurate control of experimental conditions. The paper presented by Soares, Dias, Carapinha, Parreira & Sargento displays the Cloud4NFV platform, which follows the major NFV standard guidelines. The platform is presented in detail and special attention is given to the aspects of data modelling.

5 DATA COLLECTION

It appears that the data for the present project was collected from various sources, primarily from Official Institution websites using the Open Site Explorer tool, which is a search engine optimization tool known for providing a wealth of data gathering, sorting, and exporting link data. Additionally, it was utilized through other search engines such as Google, Yahoo, and Bing for various data collection purposes.

***** HD High Definition; *LO RES. Low Resolution

The data on daily active users for distinct virtual learning software platforms is based on the information provided which offers the ranking of these platforms in terms of their daily active users.

DATA ANALYSIS

TABLE-1

61 Video Conferencing Platforms

No.	**Video Conferencing Platforms**	**Daily Participants (million)**	**App download in playstore (Thousand)**	**Meeting Duration (minutes)**	**Screen Sharing**	**Total User allowed**	**Chat support**	**Video quality**	**Encrypted Communication**	**Customer Rating in Playstore**	**Recording capabilities**	**Whiteboard**
1	Zoom	300	50000	40	Yes	100	Yes	HD	Yes	4.1	Yes	Yes
2	Microsoft terms	270	10000	60	Yes	250	Yes	HD	Yes	4.6	No	Yes
3	Google meet	100	50000	60	Yes	100	Yes	HD	Yes	4.1	No	No
4	Dialpad meeting	0	100	45	Yes	10	Yes	HD	Yes	3.8	No	No
5	Cisco Webex meeting	39	50000	50	Yes	100	Yes	HD	Yes	4.3	Yes	Yes
6	Go to meeting	12	10000	60	Yes	250	Yes	HD	Yes	3.8	Yes	Yes
7	Slack	145	10000	30	No	12	No	LO RES.	No	4.2	Yes	No
8	Skype	33	1000000	60	Yes	100	Yes	HD	Yes	4.2	Yes	Yes
9	Trueconf online	0	1000	40	Yes	120	Yes	HD	Yes	3.4	No	Yes
10	Fuze	0	100	30	No	12	No	LO RES	No	3.4	Yes	No

TABLE-2

62 Video Conferencing Platforms and Participants

1	Zoom	300
2	Microsoft terms	270
3	Google meet	100
4	Dialpad meeting	0
5	Cisco WebEx meeting	39
6	Go to meeting	12
7	Slack	145
8	Skype	33
9	Trueconf online	0
10	Fuze	0

The ranking is based on the data provided, and the numbers may vary over time as these platforms continue to evolve and attract more users.

VIDEO CONFERENCING PLATFORMS AND THESE APP DOWNLOAD RATE IN PLAYSTORE:

The data in Playstore downloads for these virtual learning software platforms is based on the information provided here with the ranking of these platforms in terms of their Playstore downloads.

TABLE-3

63 Video Conferencing Platforms and the App Download Rate in Playstore

No.	Video Conferencing Platforms	App Downlоad in Playstore (Thousand)
1	Zoom	500000
2	Microsoft terms	100000
3	Google meet	500000
4	Dialpad meeting	100
5	Cisco WebEx meeting	50000
6	Go to meeting	10000
7	Slack	10000
8	Skype	1000000
9	Trueconf online	1000
10	Fuze	100

The ranking is based on the data provided and represents the popularity of these applications based on their Playstore downloads. The number of downloads may vary over time as more users continue to download and use these platforms.

Among this, 10 virtual learning software indicating the application is in which position is being estimated from Table No 2 is based on the playstore downloads. Skype (video conferencing platform) is downloaded from playstore is highly rated which is 1 billion. This is the most downloaded video conferencing platform among these 10 video conferencing tools. In the second position, Zoom and Google meet both claims because of 500 million downloaders. The third position pertaining to Microsoft terms. This app has 100 million downloaders. The fourth place is for Cisco WebEx meeting**,** which 50 million people who have downloaded this application. Go to meeting and slack both are in fifth position with 10 million people who downloaded this video conferencing platform.

VIDEO CONFERENCING PLATFORM'S SCREEN SHARING OPTIONS AVAILABILITY

Information about the video conferencing platforms and their features. Based on the data you've provided, it seems that all of the video conferencing platforms, except for Slack and Fuze, offer the "minimize meeting" option

across all devices.

TABLE-4

64 Video Conferencing Platform's Screen Sharing 0ptions Availability

No.	Video Conferencing Platforms	Screen Sharing
1	Zoom	Yes
2	Microsoft terms	Yes
3	Google meet	Yes
4	Dialpad meeting	Yes
5	Cisco WebEx meeting	Yes
6	Go to meeting	Yes
7	Slack	No
8	Skype	Yes
9	Trueconf online	Yes
10	Fuze	No

The video conferencing interface, frequently sending it to the background while still being able to perceive other applications or perform other tasks on their device. It is a supportive feature for multi-tasking during virtual meetings and ensuring that the video conferencing tool does not interfere with other activities on the user's device.

VIDEO CONFERENCING PLATFORM'S MEETING DURATION (IN MINUTES)

The information on the meeting duration for a single, non-subscriber (free user) for these video conferencing platforms. Based on the data you've provided, here is the ranking of these platforms in terms of the time duration they offer for a single meeting.

TABLE-5

65 Video Conferencing Platform's Meeting Duration (in minutes)

No.	Video Conferencing Platforms	Meeting Duration (In minutes)
1	Zoom	40
2	Microsoft terms	60
3	Google meet	60
4	Dialpad meeting	45
5	Cisco Webex	50
6	Go to meeting	60
7	Slack	30
8	Skype	60
9	Trueconf online	40
10	Fuze	30

As technology and software features is bound to transform over time, it is crucial to verify the latest details and offerings from each video conferencing platform before making decisions, based on their meeting duration capabilities.

VIDEO CONFERENCING PLATFORM'S TOTAL USER ALLOWED (FREE VERSION)

TABLE-6

66 Video Conferencing Platform's Total User Allowed (Free Version)

No.	Video Conferencing Platforms	Total Users Allowed (Free Version)
1	Zoom	100
2	Microsoft terms	250
3	Google meet	100
4	Dialpad meeting	10
5	Cisco WebEx	100
6	Go to meeting	250
7	Slack	12
8	Skype	100
9	Trueconf online	120
10	Fuze	12

The information on the frequency of total users allowed for a single meeting for free users. Based on the data you've provided, here is the ranking of these platforms in terms of the number of participants allowed for a single meet.

In case of users who require larger meeting capacities or additional features, some platforms might offer premium or subscribed plans with increased participant limits and other functionalities. It is always prudent to verify the latest information and offerings from each video conferencing platform before making decisions, based on their participant limits.

CHAT SUPPORTED OPTION IN VIDEO CONFERENCING PLATFORMS

It appears that almost all video conferencing platforms, except for Slack and Fuze, offer chat support across all devices based on the data and information that has been provided about the video conferencing platforms and their attributes.

TABLE-7

67 Chat Supported Option in Video Conferencing Platforms

No.	Video Conferencing Platforms	Chat Support
1	Zoom	Yes
2	Microsoft terms	Yes
3	Google meet	Yes
4	Dialpad meeting	Yes
5	Cisco WebEx meeting	Yes
6	Go to meeting	Yes
7	Slack	No
8	Skype	Yes
9	Trueconf online	Yes
10	Fuze	No

Slack and Fuze might not offer this specific chat support feature on all devices, which ultimately means that the users of these platforms might have a altered method of communication during video conferences.

Since there is every likelihood that the characteristics and competences of software platforms can alter over time, it is all the more important to verify the latest updates and functionalities for each application to ensure they that they meet the users' specific requirements.

VIDEO QUALITY TYPE FOR VIDEO CONFERENCING PLATFORMS

The information about the video quality offered by the video conferencing platforms, which is dependent on the data that has been provided; it appears that the following platforms offer HD (High Definition) video quality.

TABLE-8

68 Video Quality Type for Video Conferencing Platforms

No.	Video Conferencing Platforms	Video Quality
1	Zoom	HD
2	Microsoft terms	HD
3	Google meet	HD
4	Dialpad meeting	HD
5	Cisco WebEx meeting	HD
6	Go to meeting	HD
7	Slack	LOW RESOLUTION
8	Skype	HD
9	Trueconf online	HD
10	Fuze	LOW RESOLUTION

As technology and features evolve, it's important to keep a check for the latest updates and capabilities of each platform to ensure that an individual has access to the desired video quality and other features that meet a person's requirements.

ENCRYTED COMMUNICATION OF VIDEO CONFERENCING PLATFORMS

The information about the encryption capabilities of these video conferencing platforms is based on the data that has been provided, it appears that the following platforms offer encrypted communication, thereby enhancing the safety and security of meetings.

TABLE-9

69 Encrypted Communication of Video Conferencing Platforms

No.	Video Conferencing Platforms	Encrypted Communication
1	Zoom	Yes
2	Microsoft terms	Yes
3	Google meet	Yes
4	Dialpad meeting	Yes
5	Cisco WebEx meeting	Yes
6	Go to meeting	Yes
7	Slack	No
8	Skype	Yes
9	Trueconf online	Yes
10	Fuze	No

Since the security is crucial for video conferencing, it is necessary to select platforms that meet an organizations or personal security requirements and have a robust encryption protocols in place. It is advantageous to remain informed about the latest security features and updates from each platform to make informed decisions.

VIDEO CONFERENCING PLATFORMS' CUSTOMER RATING IN THE PLAYSTORE

The customer ratings for these video conferencing platforms on Playstore are dependent on the data that has been provided the ranking of these platforms are based on their customer ratings.

TABLE-10

610 Conferencing Platform's Customer Rating in Playstore

No.	Video Conferencing Platforms	Customer Rating in Playstore
1	Zoom	4.1
2	Microsoft terms	4.6
3	Google meet	4.1
4	Dialpad meeting	3.8
5	Cisco WebEx meeting	4.3
6	Go to meeting	3.8
7	Slack	4.2
8	Skype	4.2
9	Trueconf online	3.4
10	Fuze	3.4

Customer ratings can reflect the user satisfaction with the platform's features, performance and overall user experience. However, it is essential to consider other factors such as the specific features a person's need, security, ease of use, and platform compatibility while choosing the right video conferencing tool for individual needs. It is always prudent to maintain a constant check for the latest reviews and ratings, as they can change over time, due to software updates and improvements. Additionally, it is imperative to consider conducting one's own research and testing to determine which platform aligns best with your specific requirements.

RECORDIING CAPABILITIES OF VIDEO CONFERENCING PLATFORMS

Information about the recording capabilities of these video conferencing platforms is reliant on the data that has been provided by an individual and it appears that the following platforms offer recording capabilities for free.

TABLE-11

611 Recoding Capabilities of Video Conferencing Platforms

No.	Video Conferencing Platforms	Recording Capabilities (Free of Cost)
1	Zoom	Yes
2	Microsoft terms	No
3	Google meet	No
4	Dialpad meeting	No
5	Cisco WebEx meeting	Yes
6	Go to meeting	Yes
7	Slack	Yes
8	Skype	Yes
9	Trueconf online	No
10	Fuze	Yes

The video conferencing platforms, such as, Dialpad Meetings, TrueConf Online, Google Meet, and Microsoft Teams do not offer recording capabilities for free users. To access recording features on these platforms, users may be required to subscribe to a premium plan or pay for additional features. Recording can be a valuable feature for capturing important meetings or presentations for later reference or sharing with others.

WHITE BOARD OPTION AVAILABILITY ON VIDEO CONFERENCING PIATFORMS

The following video conferencing platforms offer the white board feature which based on the data and information that has been provided:

TABLE-12

612 White Board Option Availability on Video Conferencing Platforms

No.	Video Conferencing Platforms	White Board
1	Zoom	Yes
2	Microsoft terms	Yes
3	Google meet	No
4	Dialpad meeting	No
5	Cisco WebEx meeting	Yes
6	Go to meeting	Yes
7	Slack	No
8	Skype	Yes
9	Trueconf online	Yes
10	Fuze	No

The latest features and offerings from each platform, as software updates and improvements may introduce new functionalities over time. The availability of some of the features may vary depending on the specific plan or subscription level offered by each video conferencing platform.

INTRODUCTION OF A VIRTUAL ENVIRONMENT MODEL USING PYTHON PROGRAMMING LANGUAGE**:**

In the prevalent Digital environment, there is an attempt to introduce the Virtual environment by using the Python programming language. In this instance, the model of virtual environment is represented with a pictogram.

STEPS OF CREATING VIRTUAL ENVIROMNENT IN PYTHON WITH PICTORIAL REPRESENTATION

Steps:

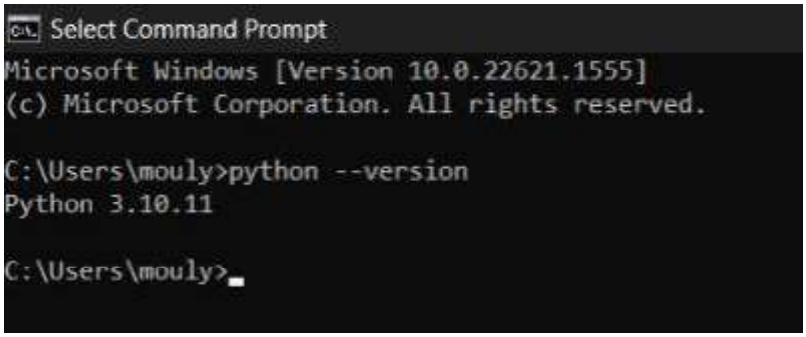
There are four basic steps to install a virtual environment on Windows are:

- Install Python
- Install PIP
- Install VirtualEnv & Activate

STEP 1

You can install VirtualEnv to the host Python by running this command in your terminal. First open the command prompt in the system. Then check out

the python version in your system by using "python space —version" command. Then the version available on the system will be shown. Here the version is showing Python 3.10.11

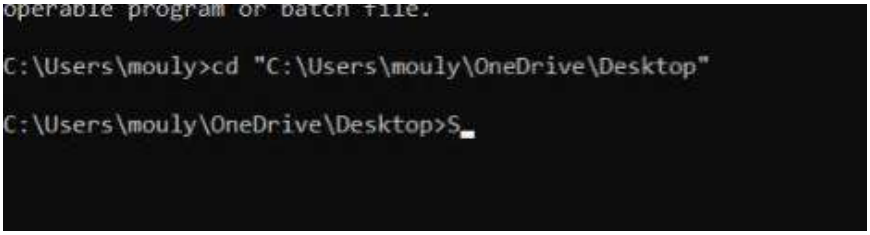


Model 1

STEP 2

Now discuss how does one go about creating a python environment. First, decide where to store the virtual environment. After checking the version of the python copy, the path where an individual would want to locate store would be chosen. Here Desktop path is chosen

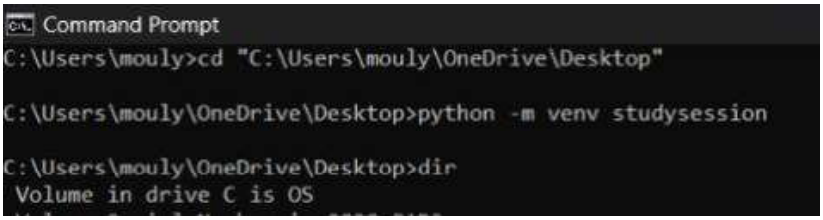
Open file explorer - right click on the desktop – copy as path Back to the command prompt type *Cd space right click to paste copied directory link – type enter "This is locating the desktop directory".



Model 2

STEP 3

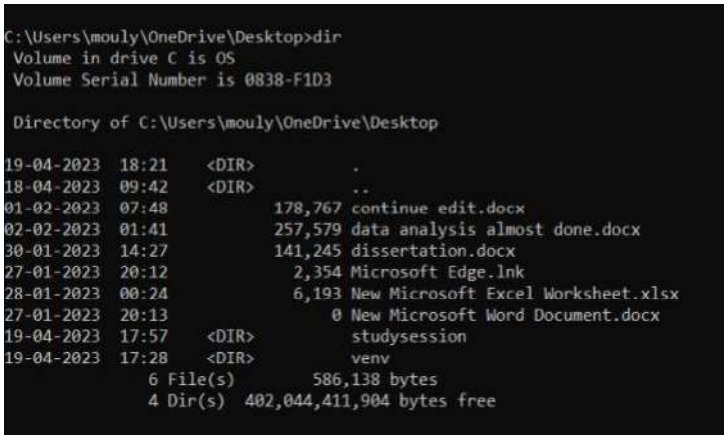
Now to create virtual environment, type "Python -m Venv – type name of the virtual environment (studysession)



Model 3

STEP 4

In the command prompt type "dir" which stands for directories. The command prompt will list all the available subdirectories of current directories. Here seen newly created virtual environment "study session" is presented here



Model 4

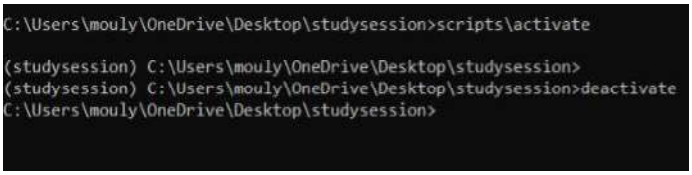
STEP 5

To enter virtual environment folder type "cd virtual environment name (studysession)"

Model 5

STEP 6

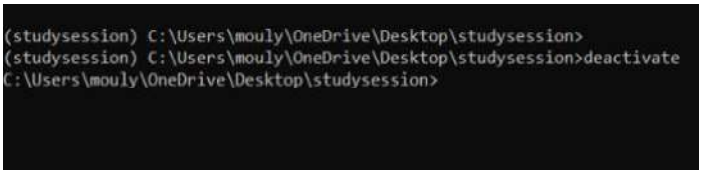
Now it is seen under the virtual environment folder named "studysession". To active virtual environment type "scripts\activate" then press enter



Model 6

STEP 7

To deactivate virtual environment type "deactivate"



Model 7

7 RELATIONSHIP WITH LIBRARY AND INFORMATION SCIENCE

In the academic field, the following Universities have been selected to examine which virtual learning platform have used during the COVID -19 period, and draw a relationship between these virtual learning platform's practical use in library and information science

- University of Calcutta,
- Rabindra Bharati University,
- University of Kalyani,
- University of Burdwan,
- Vidyasagar University,
- West Bengal State University,
- Kazi Nazrul University,
- Sidhu Kanu Birsha University,
- Jadavpur University,
- Visva Bharati University

These 10 universities used Google meet And Zoom for their Educational purpose during the COVID -19 period and till date.

8 APPLICATION OF VIRTUAL LEARNING SOFTWARE IN DIFFERENT UNIVERSITIES IN WEST BENGAL:

The following are the names of the Academic Institutions and Office Website along with the Tools that are mostly utilised in the field of Library Science.

TABLE 12

812 Virtual Learning Software

No.	Name of the Institution	Website	Used Virtual Tools	Virtually Library Services Provided
1	University of Calcutta	https://www.caluniv.ac.in/	Google meet, Zoom	SDI, Reference Service, Document Delivery Service
2	Rabindra Bharati University	https://rbu.ac.in/	Google meet, Zoom	SDI, Reference Service, Document Delivery Service
3	University of Kalyani	https://klyuniv.ac.in/	Google meet, Zoom	SDI, Reference Service, Document Delivery Service
4	University of Burdwan	https://buruniv.ac.in/	Google meet, Zoom	SDI, Reference Service, Document Delivery Service
5	Vidyasagar University	http://www.vidyasagar.ac.in/	Google meet, Zoom	SDI, Reference Service, Document Delivery Service
6	Barasat University	https://wbsu.ac.in/	Google meet, Zoom	SDI, Reference Service, Document Delivery Service
7	Kazi nazrul University	https://www.knu.ac.in/	Google meet, Zoom	SDI, Reference Service, Document Delivery Service
8	Sidhu kanu birsha University	https://skbu.ac.in/	Google meet, Zoom	SDI, Reference Service, Document Delivery Service
9	Jadavpur University	http://www.jaduniv.edu.in/	Google meet, Zoom	SDI, Reference Service, Document Delivery Service
10	Visva Bharati University	https://www.visvabharati.ac.in/	Google meet, Zoom	SDI, Reference Service, Document Delivery Service

Most of the universities are following the Zoom and Google meet software for the purpose of teaching and learning methods. It has over a million daily users. Also, Zoom and Google meet is plagued with security and privacy. These are the most preferred video conferencing platforms due to its ease of use. Zoom and Google meet has great features. Also, it has extremely decent features like screen sharing, screen recording, team chats and searchable history.

Not only can these but you add custom backgrounds to your meetings in Zoom.

These universities provided library services through online like SDI, Reference Services and Document Delivery service through video conferencing platforms, using the implicational of the features, using these tools and make more easy connectivity worldwide.

It's true that Zoom and Google Meet have become one of the most widely adopted video conferencing platforms, especially in the education sector. Many universities and educational institutions have integrated these platforms into their teaching and learning methods, especially during the shift to online education.

The popularity of Zoom and Google Meet can be attributed to their user-friendly interfaces, ease of use, and availability on multiple devices and operating systems. These platforms have seen significant growth in their daily user base, making them go-to choices for virtual meetings, classes, and collaborations.

However, it's essential to acknowledge that with their increased usage, Zoom and Google Meet have faced security and privacy concerns. As with any widely used software, ensuring secure settings, managing access controls, and keeping the software updated are critical for maintaining the privacy and security of virtual interactions.

9 FINDINGS

- In this 10 video conferencing platforms, Skype is downloaded from playstore at a high rate, which is 1 billion, on the other hand, Dial pad meeting and Fuse is downloaded by only 100,000 people. If the low-rated video conferencing platform could be exquisitely designed and organised in a well-mannered and introduce new features then it will be rated as highly rated.]
- Having such beneficial and important features Zoom achieved 300 million daily active users worldwide. Whereas go to meeting have 12 million Daily active users. Zoom being so popular worldwide has claimed the first position among these 10 video conferencing platforms.
- Zoom and Trueconf online Provide 40 minutes meeting duration for a non-subscriber (for free). But the other platform tools provide more than 40 minutes for free of cost. If Zoom and Trueconf online offer a bit longer than 40 minutes then it would be more beneficial for the free users and it will be more adoptable.
- Accordingly, followed the synchronization Microsoft terms and Go To meeting who provide 250 participants allowance for a meeting. But Slack, Fuze and Dialpad meeting offer 12 and 10 participants. If the

accessibility of participation will be increased then it will be more acceptable or substitutes will be in vogue.

- The base features and popularity of Microsoft terms have the highest rating with 4.6 thereby, holding the first place. The lowest rating has Trueconf online and Fuze both.
- Dialpad meeting and Trueconf online doesn't have video recording capabilities, Google meet and Dialpad meeting does not provide White Board, Slack and Fuze does not Support Encrypted communication, Cisco WebEx meeting and Slack does not support Screen Sharing in Android and IOS it is only supported on Windows and Mac OS. The visible test results are that almost all these apps have varying terms and conditions for accessibility. Hence, if the above-mentioned features could be introduced in a better way to ensure about accessibility.
- In a nutshell, all apps should provide support in most of the devices and should provide high resolution video quality and the features should be more up to date followed by the scenario.
- In the academic field, the University of Calcutta, Rabindra Bharati University, University of Kalyani, University of Burdwan, Vidyasagar University, West Bengal State University, Kazi Nazrul University, Sidhu Kanu Birsha University, Jadavpur University, Visva Bharati University, these 10 universities used Google meet And Zoom for their Educational purpose During COVID -19 period and till date.
- These universities provided library services through online like SDI, Reference Services and Document Delivery service through video conferencing platforms, using the implication of the features, using these tools and make more easy connectivity worldwide.

10 CONCLUSION

By evaluating the usability of these online learning platforms and comparing their features and functionality, this study aims to support educators and students in making informed decisions about the best virtual learning software for their specific needs. This effort becomes especially crucial as academic institutions continue to adapt to the changing landscape of education and explore more flexible and accessible ways of teaching and learning.

Additionally, the study found that Slack, Fuze, and TrueConf Online lack support for most of the features needed for effective online teaching and learning. As a result, the findings provide valuable insights for educators and students when choosing the appropriate platform for virtual learning.

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