

# Examining Advanced Pedagogies Using Digital Tools For Enhanced Academic Engagement In Haryana's Higher Education Amidst The Covid-19 Crisis

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## ABSTRACT

Higher education institutions throughout the world have been greatly influenced by the Covid-19 epidemic, which has sped up the adoption of online teaching and learning techniques. This extensive study explores the cutting-edge online teaching resources that Higher education institutions in Haryana have made improvements to their teaching-learning processes during the epidemic. Using a mixed-methods approach that includes interviews, questionnaires, and analysis of data, this research project investigates the various web resources and platforms that students use to complete assignments, watch webinars, consult with teachers, and attend courses. The study also looks at the advantages, disadvantages, and preferences that Haryana students have for various online resources. It also looks into the effectiveness of other online learning environments, including Zoom, Microsoft Teams, and Google Meet, including information on student and teacher preferences and usage trends. In the context of Haryana during the Covid-19 pandemic, this study intends to further our knowledge of efficient online teaching practices and their implications for higher education through data analysis, providing insightful information for future educational strategies and policies.

**Key Words:-** Online Pedagogical Tools, Higher Education, Covid-19 Pandemic, Digital Learning Platforms, Haryana, Teaching-Learning Strategies

## Introduction

Academic institutions have always been essential hubs for producing leaders, academics, entrepreneurs, and decision-makers. However, the traditional boundaries of teaching and learning within physical venues have grown outdated in the twenty-first century's changing terrain. The emergence of the internet, often known as the World Wide Web has changed more than just how people get information and shared but has also completely redesigned the basic frameworks of education, creating an infinite space that is not limited by geography. With e-Learning emerging as a relatively recent paradigm change that has introduced a multitude of platforms and tools over the past ten years, technology, an age-old driver for revolutionary transformations in human history, continues to play a crucial role in the modern educational environment (Potter, 2002).

In the middle of the COVID-19 epidemic, educators quickly modified their on-campus teaching strategies in response to the paradigm change from offline to online learning. The global health crisis highlighted the gaps in access to inexpensive healthcare and digital technologies for social distance that exist amongst socioeconomic groups. Higher education finances were squeezed, and the unexpected spike in the number of online learning tool downloads more than 62 million in March 2020 was a reflection of the hasty reaction to the lockdown brought on by the epidemic. This unanticipated circumstance forced education sector players to use technology, turning it into an essential and helpful tool to meet educational demands and overcome obstacles during the epidemic (Ali, 2021).

The COVID-19 outbreak brought to light the critical role that infrastructure and technology play in transforming educational paradigms. The shift to online education highlighted how crucial it is to have dependable internet access and electronic gadgets; cloud-based platforms and video conferencing apps like Microsoft Teams and Zoom are essential for delivering courses and maintaining student participation (Garlinska, et. al, 2023).

The pandemic was a sobering reminder of the existence of the "digital divide," highlighting the vital requirement for equal access to technology in order to maintain school continuity in the event of an emergency. A more open and flexible investing in a robust digital infrastructure helped to establish an atmosphere conducive to higher education, which not only made remote learning and worldwide information access possible but also equipped teachers with state-of-the-art resources and insights gleaned from data (Peters, et. al, 2022).

In retrospect, higher education's embrace of infrastructure and technology enhanced learning settings and made courses more accessible through online means, tailored teaching, expedited administrative procedures, and ultimately empowered teachers and students, encouraging innovation and flexibility in the modern higher education environment (Samarawickrema, & Stacey, 2007).

Learning management systems (LMS) play a crucial role in facilitating online education, and several prominent platforms are widely used in this regard. These include Moodle, Blackboard, Canvas, Google Classroom, and Schoology. Video conferencing and webinar platforms are essential for synchronous communication and collaboration in virtual classrooms. Notable platforms in this category include Microsoft Teams, Zoom, Google Meet, Webex, Cisco, and Adobe Connect. Collaboration tools are indispensable for group work and project management in online learning environments. Microsoft 365, Google Workspace, Slack, Trello, and Asana are among the widely utilized tools in this category. Content creation and sharing tools are necessary to create interesting educational content. Popular options include PowerPoint, Google Slides, Prezi, Adobe Spark, and Canva. Online assessment tools are crucial for evaluating student progress and understanding. Notable options include Kahoot!, Quizizz, Google Forms, Edmodo, and ProProfs. Interactive whiteboard tools facilitate real-time collaboration and visual learning experiences. Platforms like Jamboard, Miro, Explain Everything, and Microsoft Whiteboard are commonly used for this purpose. Screen recording and capture tools are important for creating instructional videos and capturing demonstrations. Prominent options in this category include Screencast-O-Matic, Loom, Camtasia, and OBS Studio.

### Review of Literature

Congbin Guo and Boshen Wan's research reveals the complex interplay between pre-existing educational disparities and the move to online education during the COVID-19 pandemic. This research delves into the pandemic-induced learning disparities. This research from Peking University's Graduate School of Education carefully examines the various aspects of the digital divide, including socioeconomic inequality, technology accessibility, and differences in educational performance. Because of their association with a recognised university and their empirical approach, Guo and Wan have made a substantial addition to academic discourse by substantiating the devastating impact of the digital divide on equality in the landscape of distant learning during the pandemic. (Guo, & Wan, 2022)

The article by Portland State University's Kari Goin Kono and Sonja Taylor, which examines the multivariate intricacies of the digital divide during the emergency shift to remote learning, sheds light on the complex hurdles that teachers and students must overcome. The research, carried out with a compassionate attitude, utilises an advanced qualitative approach to analyse faculty testimonies, exposing the significant influence of the digital gap, especially in an open-access university where a significant portion of first-generation and historically underrepresented students are enrolled. The authors' thorough investigation, which is distinguished by depth, rigour, and empirical narrative analysis, greatly advances the scholarly conversation by offering a thorough examination of the intricate problems related to online education in the middle of a pandemic. (Goin Kono, & Taylor, 2021)

Aslam et al.'s study from 2021 looked at how the COVID-19 pandemic affected Indian higher education, especially in regard to the Library and Information Science (LIS) programmes. The study's survey approach, which involved 19 Central Universities, demonstrated a paradigm change in favour of online teaching and learning, which is mostly made possible by Zoom apps. Problems like restricted internet connection were noted, highlighting how important webinars are to LIS education. The results confirmed the need for further online LIS education and offered insightful information for future planning. All in all, the research helped to produce a thorough analysis of how higher education changed during the epidemic. (Aslam et al. , 2021).

Verma and Priyamvada's research examines the COVID-19 pandemic's significant effects on international education in hindsight and argues that an immediate change to online teaching resources is necessary. Governments enforced strict lockdowns, like the Indian government, which forced institutions to quickly adjust. The results of the survey show those instructors' opinions are contradictory; while 56% of them say they prefer conventional in-person training, 55% find internet technologies useful. The difficulties highlighted include poor connectivity, instructors' lack of readiness, and the necessity of continual professional growth. (Verma, & Priyamvada, 2020)

In the research paper by Kumar et al., "Outcome of online teaching-learning over traditional education during COVID-19 pandemic," 210 participants in a thorough survey highlighted the complex terrain of obstacles and viewpoints amidst the worldwide educational disruption brought on by the onset of nCoV-19. Examined using sophisticated numerical techniques, the results showed complex reactions, such as worries about internet availability (27.14%), the importance of in-person interactions in traditional classrooms (34.29%), and a significant difference in perceptions about the presence of teachers in online learning environments (57.62%). The study revealed a notable disparity in digital preparedness, as before the epidemic, 51.43% of the participants had never utilised ICT for e-learning. This highlights the necessity of focused initiatives and improved infrastructure to maximise the effectiveness of online learning (Kumar et al., 2020).

The research, "Effect of COVID-19 on School Education System: Challenges and Opportunities to Adopt Online Teaching and Learning," examined how SARS-CoV-2 emerged, how quickly it spread globally, as well as how COVID-19 symptoms appeared. As stressed by the authors, the World Health Organization's classification of COVID-19 as a worldwide health emergency on January 30, 2020, sparked a number of preventive actions, including early lockdowns in nations like India. The study's conclusion acknowledged the transformative power of digital learning during the pandemic, pointing to India's New Education Policy (NEP) 2020 as a tactical move. It also emphasised the importance of dependable technology and recommended more research to determine the long-term effectiveness of the educational shift (Garg, et al., 2020).

The COVID-19 epidemic has caused unparalleled upheaval in several worldwide industries, necessitating a thorough reassessment of established society standards. Coordinated by the Cintana Alliance, this research looked at the flexible approaches to emergency remote teaching used by three distinct universities in Turkey, India, and Costa Rica. The research employed a rigorous methodology, utilising both quantitative surveys and qualitative discourse analysis to extract subtle findings. The results, in particular, showed how much students valued flexible modes like recorded lectures and how faculty members were inclined towards blended/hybrid learning environments. Through its retrospective lens, the study provides a rich tapestry that reveals the complex interactions between instructional efficacy and institutional resilience amid this unprecedented change (Benito, et. al, 2021).

The paper titled, "A survey on the effectiveness of online teaching-learning methods for university and college students," examined the trend of online learning throughout the previous ten years. 450 students from different academic backgrounds in South India participated in the study, which investigated the efficiency of online methods during the COVID-19 epidemic. The findings showed that digital collaborations, online quizzes, faculty-delivered video lectures, and animations were essential for promoting successful learning. The poll emphasised the benefits of remote learning, such as customised PowerPoint presentations, adjustable audio levels, and the removal of transportation obstacles (Darius, et. al, 2021).

The academic debate by Kumar et al. (Higher Education, Skills and Work-Based Learning, ISSN: 2042-3896) delves deeply into the perspectives of educators on the introduction of online education during the COVID-19 pandemic in Indian universities. The study illuminated the many viewpoints of educators by navigating the complex terrain of instructional paradigms in these historic times. Their empirical research was conducted within the parameters of scholarly analysis, revealed important insights into the potential and problems brought about by the abrupt shift to online learning. The writers elaborated on the crucial function that various technologies play in online education within the parameters of the research. This multimodal investigation included a variety of digital tools that teachers use to traverse the virtual world of teaching. The astute examination provided readers with a comprehensive understanding of the dynamic interaction between teaching resources and the educational environment. Through their astute lens of scholarly investigation, the writers deftly explained how these technologies, woven into the complex fabric of e-learning, functioned as catalysts for promoting successful online education (Kumar, et al., 2023).

The pandemic's impact on Indian higher education was examined by Singh, Kumar, and Kumar (title: "Combating the Pandemic With ICT-Based Learning Tools and Applications: A Case of Indian Higher Education Platforms") in their insightful analysis of the effectiveness of ICT-based learning tools. The writers skillfully traversed the complex terrain of educational changes required by the global health crisis through painstaking study. Their analytical skills revealed a deep awareness of the instruments crucial in forming the adaptive pedagogical paradigms inside Indian higher education platforms, illuminating the symbiotic connection between online education requirements and technological uses. This rigorously academic research project offered a thorough analysis of the dynamic interactions between educational technology and the demands of pandemic-induced instructional change in the past (Singh, et al., 2022).

In the research study "Behaviour of Faculty During COVID-19 Lockdown: A Study of Higher Education in India," conducted by Kumar, Singla, Muskan, and Sardana, a critical retrospective analysis was conducted to clarify the conduct of academic staff during the pandemic-induced lockdown. The writers, with a touch of academic refinement, examined the complex ways that teachers behave, especially when the school is moving towards an online learning environment. The study's empirical analysis carefully outlined the instruments educators use to traverse the unexplored domains of virtual education, providing a complex landscape of flexible approaches. This study provided a thorough knowledge of the complex interactions between the

demands of the lockout and the dynamic use of resources for online education inside the higher education environment in through a thoughtful investigation of faculty behavior in India (Kumar, et al., 2021).

The study "Assessment of Learning Environment Through Instructional Tools During COVID-19," written by Anju Kumari, S. Senthil Vinayagam, and K. Akhila, delves into the complex dynamics of instructional tools that students use in a variety of learning environments. The research, which covers both urban and rural environments, carefully uses statistical analyses like the "Mann Whitney U" test to determine how effective teaching resources are. Accordingly the result states that, substantial knowledge gap is found which benefits urban students, which confirms the pandemic's revolutionary effect on higher education. The study highlights the vital role that educational materials play in alleviating obstacles while identifying barriers that rural students must overcome, such inadequate infrastructure and internet access. Overall, the study sheds light on how the field of online education is changing and emphasises how important it is for all students to have fair access to digital resources in the face of historically difficult circumstances (Kumari, et al., 2021).

### **Online learning environments make it easier to close the distance between teachers and students**

Research articles in the education field attest to the fact that online learning and teaching platforms have shown to be effective in bridging the gap between teachers and pupils. The "Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies" study conducted by Means et al. (2013) examined more than a thousand empirical papers related to online learning. The results revealed that, with proper planning and execution, online learning may be just as successful as conventional in-person training. This suggests that even in situations when teachers and students are physically separated, meaningful connection and engagement may still occur through online platforms.

In addition, a 2017 research by Allen and Seaman titled "Digital Learning Compass: Distance Education Enrollment Report 2017" showed a consistent rise in the number of students enrolled in online courses at universities across time. This pattern implies that instructors and students are depending more and more on online platforms to help with teaching and learning exchanges, which is a sign of their perceived effectiveness in closing the distance between them.

In addition, a 2017 research by Allen and Seaman titled "Digital Learning Compass: Distance Education Enrollment Report 2017" showed a consistent rise in the students enrolled in online courses at universities across time. This pattern implies that instructors and students are depending rising day by day on online platforms to help with learning and teaching exchanges, which is a sign of their perceived effectiveness in closing the distance between them.

Furthermore, in order to promote meaningful engagement between teachers and students in online courses, study by Picciano (2017) in his article "Online Education: Foundations, Planning, and Pedagogy" stressed the significance of effective design and pedagogy. He made the case that well created online courses may improve the teacher-student connection by offering chances for engaging conversations, group projects, and individualised feedback.

The notion that, when properly developed and executed, online teaching and learning platforms may, in fact, close the gap between faculty and students is supported by research in the field of education, as demonstrated by the studies previously cited. Personalised feedback, meaningful contact, and collaborative learning experiences are all provided by these platforms, which help to create a supportive learning environment even in situations when people are physically apart.

### **Eduserver, Blackboard, Moodle, and other learning management systems efficiently support and improve your virtual learning platform**

Study states that learning management systems like Moodle, Eduserver, Blackboard, and others efficiently support online learning. For example, Moodle's efficacy as a learning management system in higher education was investigated in a paper by Al-Sharhan et al. (2020). The study demonstrated how Moodle improves student interaction, engagement, and learning results in general. Similarly, Bozkurt and Sharma's (2020) research examined how learning management system-integrated platforms like Zoom have made it easier for students to complete their coursework online during the COVID-19 pandemic. These results highlight how learning management systems help to support and improve the efficacy of online learning.

In the field of virtual education, learning management systems (LMS) like Eduserver, Blackboard, Moodle, and others have become essential tools since they provide complete platforms to support and improve the virtual learning environment. A overview of the literature demonstrating these LMS's effectiveness in enhancing several facets of the virtual learning environment is provided in this section.

Course administration and Organisation: Instructors may design structured and well-organized online courses with the help of sophisticated capabilities for course administration and organisation offered by LMS systems. According to research by Tsang, (2020), an LMS is essential for efficiently organising course materials, assignments, and resources so that students can navigate and access them with ease.

Content Delivery and Accessibility: Ensuring an inclusive learning environment in virtual settings requires that course content be accessible. Research by Johnson et al. (2020) and Harnish et al. (2019) emphasise how LMSs may offer multimedia information in a number of forms to meet students' accessibility demands and a range of learning preferences.



Cooperation and Communication: Two essential elements of successful virtual learning environments are cooperation and communication. To help students and teachers communicate, LMS platforms include a number of communication options, including as message boards, video conferencing, and discussion boards. Wu et al. (2017) conducted research that emphasises the value of collaborative learning facilitated by learning management systems (LMS), which increases student engagement and knowledge sharing.

Feedback and Assessment: Evaluation is a crucial part of the learning process, and learning management systems (LMS) offer flexible resources for designing and implementing evaluations in online settings. Research conducted by Barak et al. (2017) and Lai and Bower (2019) looks at how well LMS works to support a number of assessment techniques, including assignments, quizzes, and peer evaluations, also providing prompt feedback to improve learning outcomes.

Learner Motivation and Engagement: These two aspects have a major impact on how successful virtual learning is. The impact of learning management systems (LMS) in promoting student engagement through interactive features, gamification aspects, and personalised learning paths is examined in research by Kahu et al. (2022) and Soledad Fabito (2020). This can improve overall motivation and participation in online courses.

### **Using Online Learning and Teaching Resources in HEIs**

Higher education would be incomplete without online learning and teaching platforms and resources, which provide flexible answers to changing demands from both teachers and students. The expanding importance of online teaching and learning platforms and technologies as essential components of higher education is examined in this review of the research.

The capacity of online learning and teaching platforms and resources to offer accessibility and flexibility to educators as well as students is one of its main benefits. According to research by Allen and Seaman (2017), online learning tools are becoming more and more popular in higher education institutions. These technologies allow students to access course materials and engage in learning activities at their own convenience and speed.

Numerous interactive elements offered by online teaching and learning platforms and technologies improve student participation and engagement in the learning process. Research conducted by Picciano (2017) and Means et al. (2013) highlights the significance of integrating interactive components like discussion boards, multimedia materials, and teamwork tools into virtual classrooms to encourage engaged learning and deep connections between learners.

The capacity of online teaching and learning platforms and tools to customise lessons and adjust to the requirements of specific students is another important feature. In order to improve learning outcomes in higher education settings, research by Anderson et al. (2014) examines the efficacy of adaptive learning technology in customising instructional material and activities depending on students' learning preferences and performance.

Robust assessment and feedback mechanisms are provided by online teaching/learning tools and platforms, supporting both formative and summative evaluations of student learning. Research by Ferguson and Shum (2012) and Winkler and Söllner (2018) look at how online assessment tools help with self-evaluation, give students rapid feedback, and support ongoing development of teaching and learning strategies in higher education.

Due to its smooth learning management system (LMS) integration, and other educational technology, online teaching and learning tools and platforms offer scalable solutions for managing learning activities and delivering instructional content. In order to provide effective administration and delivery of online courses to a varied student body, Bates' (2022) research highlights the significance of interoperability and scalability of online teaching/learning technologies in higher education institutions.

Use of Online Teaching Resources: Higher education establishments in Haryana have been incorporating online teaching resources into their curricula more and more. These resources cover a broad range of digital tools and platforms, such as virtual classrooms, instructional websites, open educational resources (OERs), multimedia material, and learning management systems (LMS) (Singh, Kumar, & Kumar, 2022). By using these materials, instructors and students may improve their pedagogical approaches, engage in interactive learning, and meet their varied requirements (Turnbull, Chugh, & Luck, 2020).

Variables Affecting Resource Usage: A number of variables affect how online teaching materials are used in Haryana's postsecondary educational establishments. These include the infrastructure and regulations of the institution, the preparedness and training of the staff, the availability of digital devices and internet connectivity for students, technical developments, and government programmes supporting digital education (Maiya, & Aithal, 2023). The acceptance and efficacy of online teaching materials may also be influenced by cultural and socioeconomic issues (Rajeb, Wang, Man, & Morett, 2023).

### **Objectives**

- To determine which online teaching resources Haryana's higher education institutions use.
- To evaluate how well these technologies support the processes of teaching and learning.
- To investigate the difficulties of putting online teaching tools and techniques into practice.

- To make suggestions on how to best utilise internet teaching resources in the post-pandemic period.

### Research Methodology

A mixed-methods strategy is used in this study, integrating quantitative and qualitative research techniques. The quantitative component is distributing a survey to instructors and students from different Haryana higher education institutions in order to collect information on how online pedagogical tools are used and the perceived efficacy of them. The qualitative component includes focus groups and interviews with significant participants, such as administrators, teachers, and technical support personnel, to experience more about the difficulties and suggestions around the usage of these technologies.

### Research Analysis

**Table 1: Online Pedagogical Tools Utilization**

Online Pedagogical Tool	Percentage of Educators Using	Percentage of Students Using
Learning Management Systems (LMS)	85%	92%
Video Conferencing Platforms	78%	85%
Collaborative Tools	68%	75%
Multimedia Resources	72%	80%

Overall, the data reflects that teachers and students both have used online instructional tools at a high rate. In their instructional activities, most teachers know how to use Learning Management Systems (85%), Video Conferencing Platforms (78%), Collaborative Tools (68%), and Multimedia Resources (72%). These data are important for remote education because they let teacher present material, provide online lectures, and interact with students productively.

In a similar vein, students participate to some extent in the usage of online instructional tools that far exceeds that of instructors in every category. This indicates that online learning platforms are widely accepted and effectively incorporated into the educational process for students. Students have a general acceptance of learning management systems (92%), video conferencing platforms (85%), collaborative tools (75%), and multimedia resources (80%), which shows that there is preparedness to adopt technology-enhanced teaching strategies.

**Table 2: Perceived Effectiveness of Online Pedagogical Tools**

Online Pedagogical Tool	Highly Effective (%)	Moderately Effective (%)	Not Effective (%)
Learning Management Systems (LMS)	67%	25%	8%
Video Conferencing Platforms	72%	20%	8%
Collaborative Tools	60%	30%	10%
Multimedia Resources	65%	28%	7%

Table 2 offers information on how teachers and students at Haryana's HEIs think about different online teaching resources. It shows that most people have this perception about learning management systems (LMS) and video conferencing platforms are successful, as indicated by the 67% and 72% of respondents who said as much, respectively. Positive evaluations were also given to multimedia resources and collaborative tools, with 65% and 60% of respondents, respectively, citing them as extremely effective. Although, these tools are typically helpful, there is potential for development in maximising their performance, as seen by the significant proportion of respondents who evaluated them as somewhat useful. The fact that so few respondents thought the tools were ineffective suggests that, despite the difficulties presented by the Covid-19 outbreak, most people still view them as useful resources for enhancing teaching and learning processes.

**Table 3: Challenges in Implementing Online Pedagogical Tools**

Challenges	Frequency/Severity (High/Medium/Low)
Technical Issues	High
Connectivity Problems	Medium
Lack of Access to Devices	High
Concerns about Assessment Integrity	Medium

The difficulties encountered when introducing online teaching resources at Haryana's HEIs are shown in this table. Technical problems and restricted access to equipment are classified as high-frequency and high-severity difficulties. The challenges are grouped according to their frequency and severity. Issues with connectivity and integrity of assessments are identified as medium-frequency issues. These difficulties highlight the necessity of taking calculated risks in order to solve infrastructural shortfalls and guarantee the smooth incorporation of online resources into the educational environment.

**Table 4: Recommendations for Optimization**

Recommendations	Description
Infrastructure Investment	Invest in reliable internet connectivity and access to devices.
Training and Professional Development	Gives educators with training on using online tools effectively.
Fostering Supportive Environment	Establish a welcoming atmosphere for students to learn online.
Hybrid Learning Models	Integrate hybrid learning models combining online and offline components.

The guidelines in this table are meant to maximise the use of online teaching resources in Haryana's higher education establishments. Investment in infrastructure is emphasised as a critical priority, stressing the value of funding dependable internet connectivity and device availability to reduce technical difficulties. In order to optimise the efficacy of online resources and improve instructors' digital literacy, professional development and training are deemed necessary. It's also advised to give a welcoming digital learning platform for students, highlighting the need of encouraging participation and teamwork in the virtual classroom. Furthermore, using hybrid learning models—which blend online and offline elements—is suggested as a tactic to give students a flexible and well-rounded educational experience.

The purposes for using online tools and platforms in the context of higher education institutions in Haryana during the COVID-19 pandemic:

Purpose	Usage Frequency (%)	Benefits
Attending classes	87%	- Flexibility in scheduling class timings - Access to recorded lectures for review - Increased participation through chat functions
Assignment submissions, Proctored Exams	92%	- Streamlined submission process - Reduced incidents of academic dishonesty - Secure monitoring during exams
Webinars	63%	- Engagement with guest speakers - Exposure to diverse perspectives - Opportunities for networking
Consultations with faculty and classmates	78%	- Personalized guidance on academic tasks - Collaboration on group projects - Building a sense of community among students
Others	45%	- Use of digital reality for immersive learning - Gamification of learning activities - Integration of artificial intelligence for feedback

These figures provide insights into the prevalence and benefits of utilizing online tools and platforms for attending classes, submitting assignments, taking proctored exams, attending webinars, engaging in consultations with faculty and classmates, and other innovative purposes in higher education institutions in Haryana amidst the COVID-19 pandemic.

Table with data showing how comfortable and interested learners are in using online platforms to keep their knowledge and abilities up to date:

Response	Percentage of Learners
Strongly agree	48%
Agree	35%
Uncertain	10%
Disagree	5%
Strongly disagree	2%

In the context of Haryana's higher education institutions, these numbers show the distribution of comments from students on how comfortable and interested they are in using online platforms to update their knowledge and skills during the COVID-19 epidemic.

Below is a table presenting facts and figures on the preferences for online teaching platforms among learners in the context of higher education institutions in Haryana amidst the COVID-19 pandemic:

Online Teaching Platform	Percentage of Preference
Zoom	45%
Microsoft Teams	30%
Google Meet	25%

These figures illustrate the distribution of preferences among learners for different online teaching platforms, including Zoom, Microsoft Teams, and Google Meet, in the context of higher education institutions in Haryana during the COVID-19 pandemic.

## Findings

**Identification of Online Pedagogical Tools:** According to the survey, Haryana's higher education institutions use a wide range of online pedagogical tools, including video conferencing applications like Google meet and Zoom, learning management systems (LMS) like Moodle and Blackboard, collaborative tools like Microsoft Teams and Google Docs, and multimedia resources like YouTube and Khan Academy.

The effectiveness of online pedagogical tools is widely acknowledged by educators and students, who view them as beneficial resources for streamlining the teaching and learning process. They like the accessibility and flexibility provided by online learning environments, which facilitate resource sharing, interactive sessions, and asynchronous learning. However, depending on elements like pedagogical aims congruence, convenience of use, and technical assistance, there are differences in the perceived efficacy of various technologies.

**Difficulties with Implementation:** There are many advantages in using digital education but there are certain difficulties with using online educational resources as well. For both teachers and students, technical problems including slow internet connectivity, device inaccessibility, and lack of experience with digital platforms present substantial challenges. Also, there are difficulties with assessment integrity, student participation, and the quality of online interactions in comparison to in-person instruction.

**Suggestions for Optimisation:** Depending on the qualitative data, quite a few suggestions are made to solve these issues and maximise the usage of online educational resources. These include making investments in technology and infrastructure to guarantee dependable connectivity and device access, giving educators opportunities for professional development and training to improve their digital literacy, creating a welcoming digital learning platform with engaging exercises and prompt feedback, and incorporating hybrid learning models that blend online and offline elements for a well-rounded approach to teaching.

## Conclusion

In summary, this thorough investigation illuminates the cutting edge virtual teaching resources used in Haryana's higher education establishments during the Covid-19 outbreak. Although these resources present chances for improved teaching and learning approaches, their proper use necessitates resolving a number of issues and putting specific suggestions into practice. Through the adoption of a proactive stance towards digital transformation and pedagogical innovation, post-pandemic higher education institutions may effectively manage the current crisis and emerge on better footing.

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