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RESEARCH PAPER

A Study of Students' Perception about Role of Technology in promoting Online Education during Covid-19

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ABSTRACT

The COVID-19 pandemic situation all over the world forced universities to close their campuses and educational activities were shifted to online platforms. In Pakistan Universities were partially ready for online shifts, and the students' learning processes were sustained through different online platforms. The main purpose of this study was to identify the role of online platforms in facilitating students during pandemic. The present study was based on the opinions of BS and Master Students in Pakistan universities, and their points of view about various aspects of online classes were sought during the ongoing pandemic. 312 students responded to our survey. Students believed that the implementation of online classes simplified lectures, activities, discussions, and assignments. Students' performance was assessed with online quizzes and tests. Students' interest in learning grows as a result of the interactivity fostered by online classes. In conclusion, they discovered that online education will be advantageous in the future. Based on the findings of this study it is strongly recommended that online education and online learning should be continued in future as well.

Keywords: Online Classes, Student Assessment, Student Interaction

Introduction

The coronavirus disease was discovered in December 2019 in China. It spread worldwide in a few months, and on March 11, 2020 (WHO), it was declared a pandemic. This disease was first described in Wuhan, China on December 31st, 2019. The first death of a 61-year-old man due to COVID in Wuhan, China, was on January 11, 2020. On February 26, 2020, a deadly coronavirus attack and emergency were discovered in Pakistan. In the beginning, two cases were reported: one pupil at Karachi University and a second in Islamabad (the federal territory of the country). Since the deadly virus caused death in Lahore, 808 inhabitants have been involved in five deaths in the last twenty-four hours (PDMA Punjab, 2020). In the entire world, more than 4.5 million people have been affected by this virus. Besides that, all educational sectors became closed. In academic fields, classes were suspended, and entrance tests and examinations were indefinitely cancelled. In spring 2020, universities shut their campuses worldwide, and all educational programs shifted online (Bao, 2020).

To date there are higher educational institutions and 177 universities in Pakistan. Of the 177 universities, 42% are integrated into the private sector and 58%, into the public sector. All institutions of higher education are committed to following the rules of (HEC). (HEC), Pakistan's educational authority, instructs all universities to start online classes. This online system was supposed to after the coronavirus. The online system can help avoid educational loss for pupils. Online learning is defined as the use of modern multimedia technology and the internet to improve the learning process by providing accessible

services and resources as well as remote collaboration and communication (Freeze, Alshar e, & Lane, 2019).

The phrase "online learning" is expressed using network-based modern technologies to generate, adapt, smoothen, and deliver the learning process, anywhere and anytime in the whole globe (Kung, 2019). Academic institutions and educational experts were urged by social distance to adopt modern learning environment, utilizing modern technologies, rather than rely on traditional education (Kaur, 2020). The university students and professors gradually adopted the scenario. Teachers now use Google Classroom to deliver information related to courses and course material, and live lectures are delivered with the help of Google Meet. Moreover, professors use an online instrument to support programming, designing, and problem-solving activities depending on the nature of the courses. We were particularly interested in learning about students' perceptions of interaction and assessment in online classes and various applications during COVID-19 to promote online education.

Literature Review

Impact of Technology during Covid -19

The coronavirus spread worldwide and forced the human community to continue maintaining social distance. The WHO 11 February 2020 described the actual title of this virus as COVID-19, which is an acronym for the 2019 disease "coronavirus". This disease was first spread in Wuhan, China on December 31st, 2019. The Lockdown forced several academic institutions to postpone their internships, examinations, physical classes, etc. and adopt online modes. Pakistan belonged to the developed country category, and the coronavirus outbreak compelled the universities to transition into online classes as ordered by the Ministry of Education (Zhang, 2020). Thus, COVID-19 has created different opportunities and challenges for educational institutions to reinforce their infrastructural and technological knowledge (Pravat, 2020a). The Lockdown gives a ray of hope to students and teachers to maintain their academic activities online. Teachers assign work to pupils via the internet, and lectures are delivered with the help of live video conferencing using various applications like Facebook, Google Meet, Zoom, Skype, and YouTube etc.

In synchronous form, the tutee and the tutor jointly operate by using online mode through Zoom or any other online platform at a specific and pre-planned time (Tan, 2021). The asynchronous format does not include learning among students and teachers at the same time. Teachers can upload learning material whenever they consider it appropriate, and students can learn according to their availability (Agarwal et al., 2020).

The challenging task for universities to transition all offline courses into remote learning. Transitions into remote learning are tricky in a brief period. Mainly, remote learning in Pakistan is a huge shift. In growing nations, technology advancement is not much practiced. The online course runs through all the essential steps of teaching materials (video and audio), lesson plans, installation of relevant software, and technology support. HEC is supporting institutes of higher education in managing online teaching courses. Capacity-building strategies and programs are provided by HEC (Academia, 2020). The only benefit of technology is that it has enabled educators to engage their pupils at the age of COVID-19. The medium of online classes plays the most efficient role in learning by living at home. Several resources (G-suite, Voov, We chat, Superstar, Zoom, Cloud Meeting, Teams, Google Classroom, and so on), associated with the latest ways of learning, are available for conducting online classes. The use of technology is now a vital modern tool in the educational field. These webinars documents, PDFS, slides, and emails are used.

Educators are used several sources to share relevant learning materials with pupils during the coronavirus. Teachers have organized workshops and visual seminars to cope

with the present scenario. Several educational applications are easily available to provide video/audio lecture like Google Classroom, Voov, Superstar, WeChat, Zoom, and Team to complete academic requirements (Naik et al., 2017). The Ministries of education in several countries have started their own channels and educational programs. Online classes' duration has been enhanced to various countries' requests (Rani, 2020).

Technology influences remote, distance, virtual, cooperative, machine, and mobile learning. The application of technology in learning enhances the accessibility of educational resources such as programs and many online courses to fulfill the needs of distance learning (Onyema, 2019). There are several tools and platforms that students and teachers use for online learning, such as Skype.com, WhatsApp.com, Zoom, Google Classroom, and Youtube.com. Platforms of online learning allow pupils to turn in their assignments, or teachers to keep track of students' performance. Video conferencing tools such as Zoom, Microsoft Teams, and Google Meet are helpful in discussion sessions and online lectures.

Role of the various apps during online classes in COVID-19

Technologies have replaced traditional ways with a new way of education, such as artificial intelligence (Di Vaio et al.2020a). Hence, e-learning has covered a massive duration of technology-based education with the help of video conferencing, learning portals, mobile applications, YouTube, and the thousands of free websites accessible for blended learning instruments. Through the internet, e-learning increases pupils' knowledge, industry and professional skills, and even academic staff (Adams, Sumintono, & Mohamed, 2018; Chopra, Madan, & Jaisingh, 2019). Today, e-learning is very popular in the entire world. E-learning is defined as the delivery of education with the help of the internet and technology. (Gros & García, 2016; Hong, Tai, & Hwang, 2017; Aljawarneh 2020).

Currently, two applications, Zoom and Google Classroom, are gaining popularity among students and teachers in the present online duration. The growth of Zoom and Google classroom applications was very fast during the coronavirus, as reported by Kompas.Com (Riyanto, 2021). During online learning, the use of Zoom and Google Classroom can be realized because previous research has shown that the use of Google Classroom is beneficial for students to understand lecture material systematically and independently. During COVID-19, the uses of Google classroom also positively influence pupils' learning outcomes or motivation during attending lectures (Alfina, 2020).

In efficiency terms, the use of Google classroom is supposed to be effective for pupils in submitting materials and assignments. During the coronavirus pandemic, Zoom was chosen by various government agencies, non-profit organizations, universities, and individuals. Eric Yuan founded Zoom in 2011. This website-based collaborative video conference instrument offers video, screen sharing, and quality audio, making it suitable for online lectures, virtual conferences, webinars, online meetings, and more. Moreover, in learning, the efficient use of zoom makes it easy for pupils to communicate with other students and lecturers and is supposed to be more practical (Far-Far, 2021).

Income disparity affects online learning resources in Pakistan

The fifth most famous country in the world is Pakistan. Only minor sections of the population of Pakistan have access to the necessary latest innovations such as the internet and laptop because only a small percentage of people with a high income or can gain advantages with technology that can guarantee academic guidelines proceed digitally in the time of pandemic lockdown. According to the 2017 statistics, only 15.5% of the population of Pakistan was reported to haves access to the internet (Pakistan: internet penetration rate 2020, 2017).

Internet and mobile usage availability in Pakistan

The number of cell phone users in Pakistan has rapidly increased from 5.02 to 164 million (teledensity 77.69%) in the last few years (Pakistan Telecommunication Authority, 2020). A maximum of 77% of the population of Pakistan owns a cell phone. There are 74 million (penetration 35.21 %), 75 million (penetration 35%) broadband subscribers, and in Pakistan, 4G and 3G subscribers (PTA, 2020). Cell phone devices such as tablets and smartphones have become a necessary part of a young person's daily life. The annual Status of Education Report identifies that 68 % of people living in remote and rural areas own cell phones. Forty four percent of cell phone users use WhatsApp for communication and 67 % use SMS for communication in rural areas of Pakistan (ASER, 2019). In 2018-19, a total of 53.6 million students are projected to enroll in colleges, universities, and schools, with a total of 563,300 educators serving the whole country (Pakistan Economic Survey 2018-19). In Pakistan, online education is growing at a rapid pace.

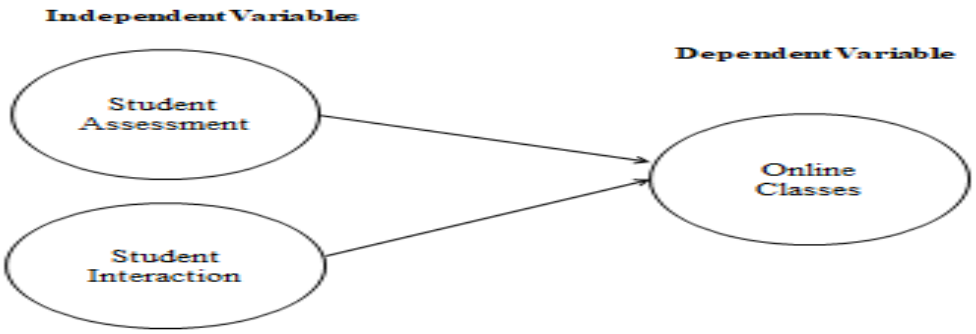

Figure 1 The Conceptual Frame -work

Material and Methods

Procedure

The research instrument developed containing 27 statements regarding the role of technology in promoting online education during covid-19. The survey was distributed to 312 university undergraduate and graduate students in December 2021, and responses were collected until March 2022. The students responded to each statement using a 5-point Likert scale, where a score of "1" meant "strongly disagree" and a score of "5" meant "strongly agree."

The Research instrument was comprised of 18 items and was adopted from the research instrument developed by Ahmad Fauzi, Raju Wandira, Domi Sepri, and Afdhil Hafid, Faculty of Science and Technology, UIN Imam Bonjol, West Sumatra, Indonesia (2021). This research instrument was modified according to the norms and culture of Pakistan. Validity of the instrument was insured by expert opinion and reliability was confirmed by pilot testing.

Data analysis

The data was analyzed using various statistical software. The software of SPSS was supported for data screening and data entry purposes. In SPSS, an independent sample t-test was used to compare the male and female perceptions about the online classes, students' assessments, and student interaction; one-way ANOVA was also used for department-wise perceptions of basic and social science students. The AMOS software was applied for the hypothesis testing. Kurtosis and skewness in the SPSS software were used to examine the gathered data's normality. Confirmatory factor analysis (CFA) and composite

reliability are used for the data reliability, and this part is also used in the AMOS software. A CFA was used to examine the questionnaire items' sustain variables in the study. At the same time, an essential purpose of the CFA is to investigate the validity of the construct. Data validity is analyzed by convergent or discriminant validity in AMOS software through CFA. Ultimately, we also constructed structural equation models (SEM) for hypothesis testing

Results and Discussion

Table 1
Demographics of Respondents

Demographic Variable		Frequency	Total sample
Gender	Male	140	44.9 %
	Female	172	55.1 %
University types	Public	181	58.0 %
	Private	131	42.0 %
Program	BS	161	51.6%
	Master	151	48.4%
Semester	4 or 6	312	100.0 %
Students CGPA	2.5-3	33	10.6%
	3-3.5	101	32.4%
	3.5-4	178	57.1%
Online Platforms	Zoom	120	38.5%
	Google Classroom	100	32.1%
	Google meet	30	9.6%
	Any other	62	19.9%
	Chemistry	57	18.3 %
	Physics	54	17.3%
	Zoology	44	14.1%
Departments	Education	50	16.0%
	Sociology	54	17.3%
	Management Sciences	53	17.0%
	Basic Science	155	49.4%
	Social science	157	50.6%

To ensure data normality in the current study, the kurtosis and skewness tests were conducted through SPSS. Kurtosis and skewness tests are used to ensure the normality of data. In normality tests, kurtosis and skewness levels were -1, +1, or -3, +3. Only average data was used for further analysis (Hair et al., 1995). Suppose the normality test rang out of +1, -1, or +3, -3, so it means the data is abnormally distributed. We discovered that the kurtosis and skewness levels in all variables are -1, +1, or -3, +3. Analysis of reliability was also conducted through Cronbach's alpha and composite reliability. This analysis ensured the composite reliability; the Cronbach alpha threshold level is greater than 0.7 (Fornell and Larcker, 1981).

Table 2
Results of average variance extraction (AVE), factor loadings, Cronbach s Alpha and composite reliability

Students Assessment	Indicator	Outer loading	Average Variance extraction	Composite Reliability	Reliability or Cronbach s Alpha
	SA1	.75	0.581	0.873	.878
	SA2	.70			
	SA4	.67			
	SA5	.83			
	SA6	.85			

Students Interaction	SI1	.62	0.534	0.818	.829
	SI2	.70			
	SI3	.91			
	SI4	.66			
Online Classes	OC1	.76	0.589	0.949	.958
	OC2	.81			
	OC3	.78			
	OC5	.71			
	OC6	.77			
	OC7	.76			
	OC8	.74			
	OC11	.78			
	OC12	.76			
	OC14	.72			
	OC15	.76			
	OC16	.78			
	OC17	.83			

Table 2 describes the results of average variance extracted, composite reliability, Cronbach alpha, and factor loading. All indicators are valid if the average variance extracted values and factor loading values are greater than.5 (Chen & Tsai 2007). Chen and Chang (2012) ensured the average variance extracted values were greater than.5 and composite reliability values were greater than.7. We found that in all indicators, factor loading values and average variance extracted values were greater than.5 and composite reliability values greater than.7. According to variables, discriminant validity is described in table 3.

Table 3
Discriminant validity

	AVE	SI	SA	OC
SI	0.534	**0.731**		
SA	0.581	-0.002	**0.763**	
OC	0.589	-0.034	0.050	**0.767**

Confirmatory factor analysis (CFA) or its results are good when the model fits. A previous study showed (CFA) was used to estimate only the discriminant validity of the data and convergence validity (Hair et al., 2011). Firstly, in CFA, a model is drawn in the AMOS, and all variables are shown in Figure 2. Some items in the CFA model were interrupted, so these items were deleted for accurate results. Deleted items were SA3, OC4, OC9, OC10, and OC 13. After deleting disturbing items, the output results fit and are suitable for this research. We found the value of CMIN/DF was 1.319; it works in this research because the threshold level is between 1-3. In the confirmatory factor analysis model, the value of GFI is.930, the value of AGFI is.912, and all these thresholds are.9 and near.9. Another value in the CFA model is IFI, NFI, and CFI values of.984, .937, and.984. All threshold values were near.9 (Hu and Bentler, 1999). Lastly, the value of the RMSEA model is.032, and this value is also suitable for the model.

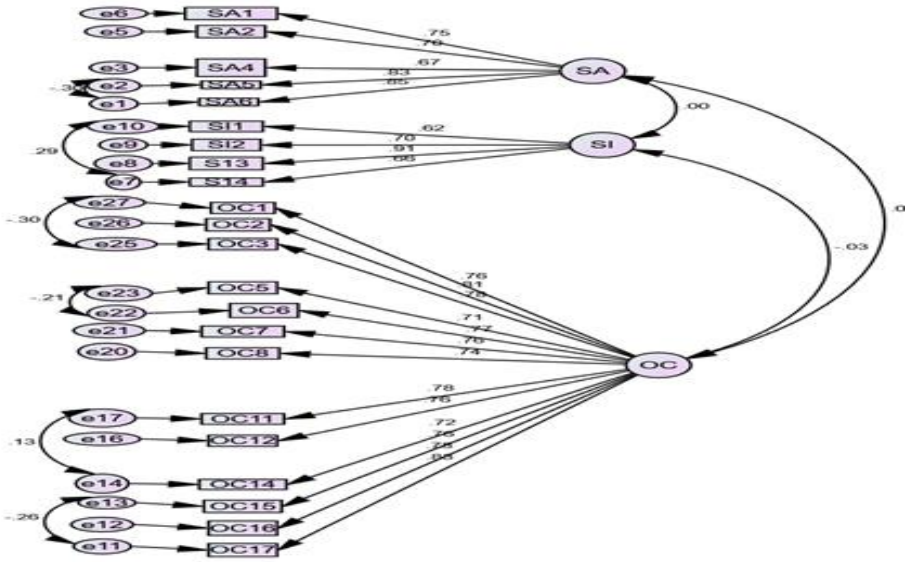

Figure 2 Confirmatory Factor Analysis

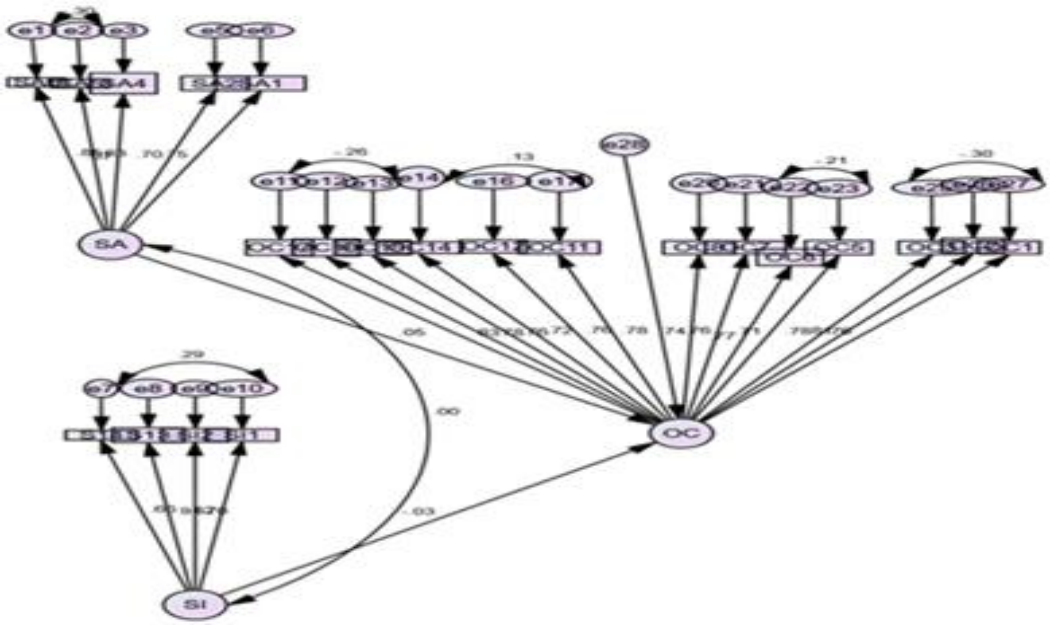

Figure 3 Structural Equation Model

In the meantime, when the CFA procedure is over, structural equation modelling (SEM) is used in the AMOS software. Structural equation modelling used in the AMOS for hypothesis and testing is shown in figure 3, and figure 4 presents the hypothesis results. The first hypothesis is that student' assessments positively influence online classes. According to SEM results, the p-value of the hypothesis was below 0.01; its value was less than the p-value, which showed a significant value with three stars. The second hypothesis is that student interaction positively influences online classes.

This hypothesis is accepted because the p-value is below 0.01 and is also a significant value with three stars. In the results of SEM, we found the CMIN/DF value of 2.114 and the threshold value between 1-3. In the SEM model, the value of GFI is.902, and the AGFI, IFI, NFI, and CFI are.979, .975, .956, and.9 77, with a threshold value near.9. The RMSEA factor

is.053. According to the model fit, all these values are accurate (Hu and Bentler, 1999); therefore, all the values are correct, which means the model of SEM fits in this current study.

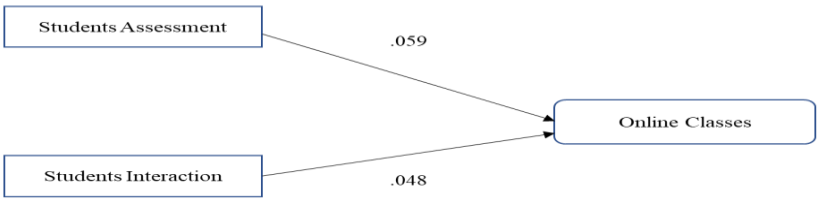

Figure 4 Structural equation model Significant at ***p –value Significant at p < 0.01

Table 4
Results of the Independent sample t-test

	Gender	N	Mean	Std. Deviation	T	Df	P
Student Assessment	Male	140	3.5869	1.03833	-1.572	310	.000
	Female	172	3.7587	.89113	-1.548	310	
Student Interaction	Male	140	3.6107	1.05440	-.780	310	.227
	Female	172	3.7020	1.00813	-.776	310	
Online Classes	Male	140	3.8147	.98025	-1.598	310	.000
	Female	172	3.9733	.77242	-1.560	310	

Significant p< 0.05

The One-Way-ANOVA test has been built on SPSS software, and is used for basic science and social science students' perception of the online classes, student assessment, and student interaction. It revealed the precise variation of the p 0.05. Basic science or social science students' perceptions for student assessment F (5, 306) =.996 and the significant value.420 >. It revealed no significant variation in basic science and social science students for the student assessment. So basic science and social science students' perception of the online classes and the significant value is.172, which proves that there is no significant variation for online classes. Social science and basic science students' perceptions of student interaction and their significant value is.744 >, so there are no noteworthy variations for student interaction.

Discussion

We examined the role of technology during COVID-19 in promoting online education. We asked pupils to contrast students' assessments and interactions related to online classes. We know the contrasts in online education and student interaction are preferably not uneven. Students' assessment and interaction relate to collaborative activities, and discussion is not tricky in online classes. Professors and students use various platforms and tools in online classes: Google Classroom, youtube.com, Zoom, and skype.com. Online learning platforms allowed the students to shift their assignments and other online platforms organized for lecture sessions. A few online educational instruments facilitate collaborative learning (Adhikary, Gupta, Singh, & Singh, 2010). The MOOCs test provides students with immense information and modern technologies in online classes. Typically, undergraduate engineering pupils like to participate in MOOCs on subjects such as system design and computer programming (Sra & Chakraborty, 2018). We found educators use different online educational tools to disseminate knowledge. A digital pen used during online classes creates interaction and makes lectures attractive for students. During online lessons, if professors post questions in a chat box, it makes the study area more attractive for discussion and solving problems. Education technologies require support for quality interaction (Singh, Adhikary, Gupta, & Singh, 2010).

Conclusion

Online education is a viable option for students in the Covid- 19 situation. Online education creates a variety of opportunities for educational institutions during Coronavirus. In this pandemic situation, we conducted a survey of BS and Master's students in Pakistan public and private universities on various online education features. We discovered that students recognize online education as a viable option in the current pandemic situation. We believe that professors should make the online education system more acceptable by incorporating digital pens and chat boxes during online classes, thereby increasing student interaction and influencing their studies. We learn from pandemics that online education will be useful in the future (Pinaki Chakraborty, Prabhat Mittal, & Manu Sheel Gupta, 2020; Gupta et al., 2022).

Recommendations

Based on the findings of the study examining the role of technology during COVID-19 in promoting online education, several recommendations can be made:

- Enhanced Integration of Collaborative Tools: Encourage the further integration of collaborative tools in online education platforms to facilitate seamless interaction among students. Platforms like Google Classroom, YouTube, Zoom, and Skype have proven effective; therefore, their continued use and potential improvement should be encouraged.
- Diversification of Online Learning Platforms: Advocate for the diversification of online learning platforms to provide students with a variety of tools and resources. This can include platforms that specifically cater to collaborative learning, fostering a more engaging and interactive educational experience.
- Promotion of Massive Open Online Courses (MOOCs): Emphasize the benefits of Massive Open Online Courses (MOOCs) as an effective means of providing students with extensive information and exposure to modern technologies. Encourage educators to incorporate MOOCs, especially in subjects like system design and computer programming, which are popular among undergraduate engineering students.
- Training and Support for Educators: Provide training and ongoing support for educators in the effective use of various online educational tools. This may include workshops on utilizing digital pens, creating interactive content, and fostering engagement through virtual discussions and problem-solving activities.
- Enhancement of Digital Interaction Techniques: Encourage the adoption of digital interaction techniques, such as utilizing chat boxes for posing questions during online classes. This can enhance the attractiveness of the study environment, promoting discussions and collaborative problem-solving.
- Investment in Education Technologies: Advocate for increased support and investment in education technologies to ensure the quality of interaction in online learning environments. This could involve the development and implementation of advanced tools and technologies that enhance the overall educational experience.
- Continuous Research and Evaluation: Encourage ongoing research and evaluation of the effectiveness of various online educational tools and platforms. This will help in staying abreast of technological advancements and ensuring that educators are using the most efficient and beneficial tools for online teaching.
- Flexibility in Assessments: Promote flexibility in assessment methods for online classes, taking advantage of the diverse range of tools available. This can include innovative approaches to evaluate collaborative activities, ensuring a comprehensive understanding of students' skills and knowledge.

By implementing these recommendations, educational institutions can contribute to the continuous improvement of online education, making it a more engaging, interactive, and effective learning experience for students.

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