



Role of ICT in Higher Education in Selected Places during COVID-19

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How to cite this paper: Shettar, R.M., Lathiwale, M.S . Z. & Kulhalli, M. (2021). Role of ICT in higher education in selected places during COVID-19. *Journal of Research in Social Sciences and Language*, 1(1),42-54.doi.
<http://dx.doi.org/10.20375/0000-000D-FF90-1>

DOI: 10.20375 / 0000-000D-FF90-1

Article Info

Received: 2021-01-22

Accepted: 2021-03-28

Abstract

Owing to the accelerated adoption of digital technology triggered by the lockdown, educational institutions are forced to work online by maintaining social distance. Higher Educational Institutions (HEIs) are considering this fact as an ideal time to experiment and deploy new digital technology to impart quality education. By considering the need of the hour, the present study focuses on the role of Information Communication Technology (ICT) in higher education in selected COVID-19 affected cities viz., Hubballi-Dharwad and Belagavi. The present study is made with the objective to understand the usage of ICT in higher education in specified regions (Hubli-Dharwad, Belgavi). It attempts to know the extent of student participation in ICT-based learning and the problems faced by both teacher and student communities. Finally, it suggests measures to overcome the problems in effective teaching-learning.

Keywords: ICT, teaching, learning, higher education, COVID-19, lockdown, teaching apps.

Introduction

Higher education is any type of education given in post-secondary institutions, affording a name and degree or certificate of higher studies. It involves Junior colleges, degree colleges, institutes of technology, teacher training schools, etc.

Being the third-largest education system India has over 1000 universities with a breakup of 54 central universities, 416 state universities, 125 deemed universities, 361 private universities, 7 institutes under the State Legislature Act, and 159 institutes of National importance like IIMS, IIT's, AIIMS, etc. as of 2020 (as reported by the MHRD in 2020). As Per All India Survey on Higher Education (AISHE) 2011-12 Government of India, Ministry of HRD report there are 3149 Degree colleges in Karnataka. As per the same report, the study area (Hubli-Dharwad and Belgavi) covers approximately 215 higher educational institutions. To upgrade the content delivery and performance enhancement, Higher education Institutions utilize information and communication technology (ICT). In India, the influence



of ICT in higher education is more in urban and semi-urban areas. In the study area, the use of ICT is more prominent in the teaching-learning process.

COVID'19 -the Pandemic which started in India in early January led to its severity by March and to join the efforts in curbing this global pandemic India declared a lockdown from March 16th, 2020 in the education sector by shutting down all the education sector activities. This global crisis has disrupted the education of 285 million young learners in India which affects the country's economic future.

The teaching-learning methodology was the first to be affected by the suspension of classes. This pandemic has transformed the centuries-old chalk-talk teaching model to one driven by technology-E-Learning, by use of ICT at a large scale tackling the digital media. Its intervention has brought the education context to a new level with more challenges to deliver quality education across all levels; this revolution of technology is still in the form of experimentation. Adapting to a complete online learning platform is still difficult to accept as a sudden paradigm shift and build a resilient Indian education system in the long term.

Literature Review

Joseph (2012), research paper discussed the technology is an effect on education and learning takes place in the true sense. The higher the usage of technology, the lesser the interaction is. He concluded that technology is not the best tool in the learning process.

Aziz, Abdelsalam, and Zerpadei – Sayad (2016), in their study, ICTs are categorized into 4 elements viz., wi-fi networks, digital interactive media facades, interactive public displays, and smartphones' applications in public spaces. These elements will play critical roles in the public space. In order to meet the needs of the users of the digital era, these devices can be used.

Hakkarainen, Muukkonen, Lipponen, Ilomäki, Rahikainen, and Lehtinen (2017), authors have observed that the enhancement of their ICT literacy helps to develop ICT-related capability of teachers. In their work, data were collected through questionnaires administered to 475 Assistant Professors and Assistant Librarians who attended the Orientation program and Refresh courses conducted by the UGC – Academic Staff College. They observed that teachers can employ effective strategies to make learning interesting.

Bhat, Nazir, and Khan (2018) address the opportunities and challenges posed by the integration of ICT in various aspects of higher education in the present scenario. And they critically analyze challenges related to ICT in the Indian education system.

Yi-Chi, Chen, and Ching (2020) pointed out that the disease is officially named as COVID – 19, by WHO on Feb. 11, 2020. Unidentified coronavirus emerged from Wuhan, China, and resulted in a formidable outbreak globally in December 2019. It is a potential zootoxic disease with a low to moderate mortality rate. Person to person transmission may occur through droplet or contact transmission. Although some drugs are under investigation,



currently there is no definite treatment or vaccine for COVID -19 as per WHO. They have concluded that many experimental trials are on the way, the best we can do to prevent a rampant outbreak is stringent infection control operation.

Shenoy, Mahendra, and Vijay (2020) have used inductive reasoning and qualitative research method to collect the data from faculties of PG institutions in Bangalore. Understanding the technology adoption, teaching, learning, student engagement, and faculty experience influence during COVID – 19 lockdown was the objective of the study. A telephonic interview was conducted among respondents. They have concluded that the virtual engagement of students is better than normal classrooms and suggested that the policymakers can start implementing similar approaches.

Habib and Johanson (2020), addresses how technology-enhanced learning (TEL) is implemented in higher education institutions. It is based on data collection from a nationwide survey and semi-structured interviews. The paper signifies that there is a need for the proper understanding of education technology which has a supporting role in TEL.

After reviewing the literature, it was observed that many research works were carried on the role of ICT in higher education but the role of ICT in higher education during the pandemic was not yet done. The present study focuses on the impact of ICT during the pandemic to continue the educational activities

Objectives of the study

Based on the identified research gaps and therefore the problem statement, a requirement is felt. The present study is predicated on the subsequent objectives:

- 1) To analyze the usage of ICT during COVID-19,
- 2) To know the students' participation in ICT based teaching,
- 3) To know the problems of ICT usage in the effective teaching-learning process and to suggest measures,
- 4) To know the teacher's ability to conduct, adopt new teaching methodology on ICT.

The problem of the study should be clearly indicated in the Introduction. The introduction section is followed by the method, findings, discussion, and conclusion.

Method

The study was a descriptive method with quantitative analysis. A quantitative research study collects numerical data that must be analyzed to help draw the study's conclusions (2017). And descriptive statistics have been used to summarize data in an organized manner by describing the relationship between variables in a sample or population (Kaur, Stoltzfus & Yellapu, 2018).



Study Group

Table 1: Characteristics of Students

No of students	Cities				Courses			Learning Preference (%)	
	Hubli-Dharwad (100 students)		Belagavi (75students)		General	mgmt	Technical	Online classes	offline classes
	Male	Female	Male	Female					
175	43	57	33	42	97	33	45	45	55

Table 1 shows the characteristics of student respondents. The sample of the study was selected from 100 teachers and 175 students from the COVID-19 affected selected cities of Karnataka State, India, viz., Hubballi-Dharwad and Belagavi. Separately designed questionnaire link was sent randomly to the teachers and students. Mixed, Liker-type scale and close-ended questions were set. Liker-type questions responses and close-ended questions responses were analyzed separately. Google form data analysis is employed.

Limitations

The present study relies on the online responses of teachers and students. Due to the connectivity problem, absence of technical knowledge, delay in sending responses, and other related problems, and during the crisis researchers are not able to move places to collect the information. The sample size is limited and Google form data analysis only is used.

The understanding of ICT in higher education

Information and Communication Technology (ICT) is playing a significant role in every aspect of education. This acronym refers to the combination of audiovisual and telephone networks with the computer single unified system of cabling. Thus, ICT includes any communication device – including radio, television, cell phones, computer and network hardware, satellite systems, etc. ranging from teaching-learning, the conduct of examinations, evaluation, research, conduct, and attending webinars on various burning titles to communication purposes. COVID - 19 brought a new change in the educational atmosphere. This new learning method makes it more student-centric, can access information from varied sources rather than depending on only teacher notes. So teachers now become judges and mentors only and students gained focused attention.

The present generation of students now observing competency-based curricula rather than content-based curricula. This unprecedented change is offering skill enhancement as students are taking responsibility for their learning to possess a skill-based degree.

A lot of logistics and paperwork is minimized through ICT-based assessment. ICT provides effective and time-bound conduct of the assessment. It brings a radical change in assessment from manual to online. UGC- NET exam is the best example of that.



For research, ICT is offering various tools to collect data. One should possess the ability, skill to analyze and organize complex data. The best use of ICT would be to improve one's cognitive skills to analyze, organize the data.

Findings

Teacher- Student participation in ICT

Teacher Participation in ICT: The present study focused that the teacher ability to conduct, adopt new teaching methodology on the following ground:

Table 2: Analysis of Teachers' Data Collected during Survey

SINO	Particulars	Parameters (%)						
1	Which app you are using for teaching?	ZOOM	google classroom	Cisco webx	jio meet	google meet	study blue	trello
		85.5	63.2	13.2	6.6	2.6	2.6	1.3
2	Which government app you are using for teaching?	swayam	E pathshala	udemy	Diksha	Byju's		
		69.6	29	17.4	1.4	1.4		
3	How many hours of online teaching you are engaging per day?	2 hours	1 hour	3 hours	4 hours	Above		
		61.8	21.1	14.5	-	-		
4	Which method of teaching is more preferred by you?	Lecture with LCD	Lecture	smart classes	Online teaching			
		75	27.6	25	11.8			
5	Do you feel comfortable opting for online or offline teaching?	Both	Offline	Online				
		75	25	0				
6	Which mode of communication is easier for you to communicate with students regarding assignments submission, meetings .classes etc?	WHATSAPP	SMS	E-Mail				
		98	1.5	0.5				
7	Social media is successful in making the awareness of upcoming webinar before scheduled time -	Agree	Neutral	Disagree				
		55.3	43.4	1.3				
8	Scope for interaction in ICT-enabled classes is less? Do you agree?	Agree	Disagree	Neutral				
		55.3	42.1	2.6				
9	Mention the problems faced during the webinar	Technical	Communi- cation	Webinar awareness				
		83.8	28.4	12.2				



10	What percentage of online classes do you prefer in the future?					
		Below 30%	30-50 %	51-70%	71-90%	Above 90%
		40.8	38.2	18.4	2.6	-

Above table 2 shows that the list of applications for teaching, in which more than 85% of teachers using Zoom App for virtual activities. About 63.2% of teachers use the Google classroom app, whereas about 13.2% of teachers use Cisco WebEx. It was observed that all the teachers in the survey expressed that they have started virtual classes, activities.

Government app used: SWAYAM is the most used government app by the teachers in the survey. About 70% of teachers are using it. The next preferred app is pathshala used by the teachers is shown in the table.

The number of hours conducts of online classes per day: The data taken shows us that approximately 62% of the teachers conduct a minimum of 2 hours online classes for students which are during the pandemic. This may help us to find out the issues to be dealt with in the next academic year classes to be conducted with full pledge online virtual classes. This could also help us to come up with new strategies to plan and make effective classes.

Teaching mode: The mentioned options in the questionnaire for teachers gives us a clear picture that they prefer offline mode classes with LCD. This helps the students to learn the concepts more easily with the chalk and board method and also LCD presentation. It also provides 2-way communications with students which makes the topics more clear. If options are given in teaching methods for teachers, they prefer LCD presentation opined by 75% of teachers in the survey. The minimum number of teachers i.e., around 11% of teachers prefer online.

The teachers are getting adapted to the new norms in which they should be flexible enough to conduct both online and offline classes. The above table clearly shows that 75 % of teachers prefer both modes of teaching. This makes the learning process more interesting and also gets the student's interest- to get adjusted to both the methodology of learning. It is interesting to note that teachers do not prefer online teaching only. Instead, they prefer both.

WhatsApp is very popularly used by both fraternities (98.7%). This mode of communication for students to give assignments wherein the assigned work or project could reach to them easily. We can see that WhatsApp is the easiest way of reaching to students with any information and also get the response back.

Scope for interaction is less - opined by 55% of teachers in the survey. Owing to the late reachability of the information students may miss an opportunity to interact. If the teacher asks by name then only interaction is frequent.



Preference for an online class in the future: Approximately 40% of teachers prefer online classes in the future below 30% only. As online classes are not an effective mode of teaching they expect only less no. of virtual classes in the future.

During the survey, it was observed that below 30% of teachers are interested to engage in virtual classes. About 40% of teachers in the future prefer to engage below 30% of virtual classes according to the survey. They admitted that virtual classes are not an effective mode of teaching in handling practical subjects.

Table no 3 shows the analysis of closed-ended questions' responses from the teachers which were collected during the survey.

Table 3: Analysis of Teachers' Data Collected During Survey

SL NO	particulars	Yes	NO
1	Do you feel we can overcome the drawbacks of the offline class by using Information communication and Technology (ICT)?	77.30%	22.70%
2	Have you attended any Webinars?	98.70%	1.30%
3	Do you think the use of ICT affects your health?	93.30%	6.70%
4	ICT mode of education may lead to unfair evaluation of a student.	89.30%	10.07%
5	Retention rates of students are higher in online teaching compared to traditional teaching in colleges-	65.80%	34.25%
6	Do you think online classes have a threat to the workload of a teacher?	92.10%	7.90%
7	Do you feel online teaching is effective for practical subjects?	45.30%	54.70%

The use of ICT in the education sector with new tools and applications for learning has made us to opt both online and offline teaching where we can overcome the issues which were not able to be covered in the offline mode of learning.

To understand the use of ICT, the questionnaire shows that approx. 99 % of teachers go for updating themselves with the knowledge by attending the seminar online. Almost all teachers attend webinars which break the limitations and barriers of location, schedule and makes it possible to get the inputs from the renowned resource persons.

Eye-Strain can occur after using computers for a long time during online classes. Reduced physical activity: A negative effect of ICT is that users may adopt a more sedentary lifestyle, which leads to health problems such as obesity, and diabetes. Thus, 94% of teachers agree that it affects health.

Based on the student demographic factors, online interactions would facilitate learning without time constraints and it will be much easier to conduct assessments and generate reports since the necessary information doesn't have to be manually handled. It doesn't give



any other way to check the intellectuality of the person apart from exams. The potential of a student, the caliber can't be judged online mode. That is why; approximately 84% of teachers feel student's evaluation may be unfair.

As students have flexibility in attending classes, they can opt for simultaneous courses too. There is no restriction of physical attendance in college .thus the student feels more comfortable in attending college and other courses too. Hence about 68% of teachers' feel that retention of students is attained more with existing students for the academic year.

About 92% of teachers agreed in the survey that ICT threatens the workload of a teacher. Teachers can engage more than 100 students in a class in the virtual system. Then there is no question of making divisions of a class. Hence there is a threat to the workload of a teacher.

Virtual classes are not effective for practical subjects. Students can learn practical subjects easily in offline engagement as they can see and do it simultaneously. But virtual engagements do not pose this opportunity. So 54% of teachers who are teaching practical subjects are not happy with this virtual mode.

Students ' participation is realized from the below

Table 4: Analysis of Student's Data Collected during Survey (liker type responses)

SINO	Particulars	Parameters				
1	Which Method Of Conducting Class Is Comfortable For You?	Lecture With Blackboard	Smart Classes	Online Teaching	Lecture With LCD	All Of The Above
		64.8	10.3	4.8	4.1	:5
2	Your Adaptability To Online Classes Is -	Below 30	31-50	51.7	0 % Above	
		47.9	22.6	19.9	9.6	
3	The Reasons To Prefer Online Classes Are -	Flexible Schedule, Learning At Your Place	Improves Technical Skills	Simultaneous Manage Multiple Courses	Others	
		47.2	18.45	17.6	1675	

Method of conduct of class: The traditional chalk and board method are preferable as it makes the classroom livelier by two-way communication. An about good percentage of 64.8 % of students feel off-line classes are more effective. As they need time to adjust to the new paradigm shift.

Adaptability to the online mode of learning: As per the records taken by students, they feel adapting to the new norms is a difficulty due to various reasons like - technical infrastructure issues, internet connectivity, and the scope for the methodology to conduct practical subjects. About 47.9% of students are adapted to online learning below 30%. They have considered that they need time to adjust.



In terms of the reasons to prefer online learning, the present survey shows that 47.2 % of students preferring online learning as they feel flexible schedule, comfortable in learning at their place. 18.4 % of students expressed that it improves their technical skill sets. There is every possibility to manage multiple courses, activities as per 17.6 % of students.

Table 5: Analysis of Students' Data Collected during Survey (close-ended responses)

SL NO	Particulars	Yes	No	May Be
1	Accessibility To Online Class Is Easy	27.60	72.40	
2	Do You Feel Online Teaching Is Effective For Practical Subjects?	16.60	63.40	20
3	Do You Feel Online Class Lacks Class-Room Environment?	82.60	17.40	
4	Do You Feel Online Teaching Has Affected Studious And Meritorious Students?	61.40	38.40	
5	Do You Think Parent Engagement With Student Online Learning Is Important	37.10	62.90	

Accessibility online is easy: 72.4% of students opined that the technical infrastructure is not yet as per the expectations and due. To which they find difficulties in accessing the online class.

Effectiveness of online class for practical subjects: The above table shows that the apps which are available to conduct online classes for practical subjects are not effective. 63.4% of students are not satisfied with the way to conduct online for practical subjects.

The online class lacks a classroom environment: The vibrant, healthy, dynamic atmosphere of offline classes is not found in virtual classes according to the majority of students (82. 6%) in the survey. They feel it is lacking the essence of true learning by having group discussions, clarifying doubts, and also the simultaneous process of communication. Hence 82.6% of students miss the real-life environment of the learning process.

Online teaching has affected studious and meritorious students: About 61% of students have opined that online teaching has affected studious students. These kinds of students are very particular about their studies and career. They are not happy with online teaching.

Parent engagement with student online learning: As students are mature and can manage themselves easily, parents' involvement is not necessary. Approximately 62% of students denying parent involvement in student online learning.

Problems Faced By Teachers and the Students

The act of integrating the use of ICT into teaching and learning is a complex process and one may encounter several difficulties. Teachers' insufficient ICT knowledge and skills, the difficulty of integrating the use of ICT in instruction, and delay in investment in tools and equipment make the problem complex.

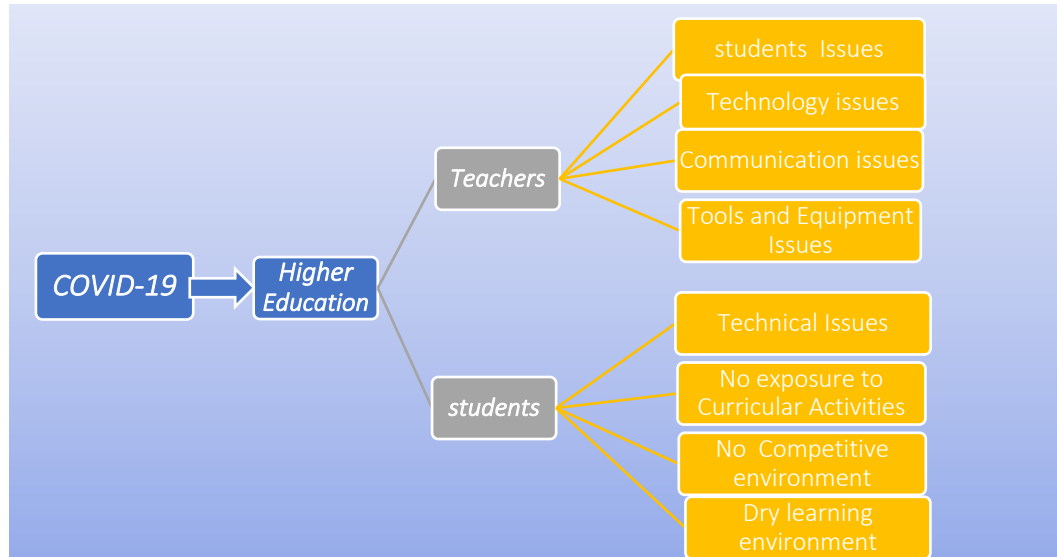


Figure 1: Analysis of Students’ Data Collected during the Survey the following table no. 6 shows problems faced by the teacher community.

Table 6: Analysis of Teachers’ Data Collected during Survey (problems Faced)

SINO	Parameters (%)								
1	<table border="1"> <thead> <tr> <th>Technology issues</th> <th>students issues</th> <th>Took & equipment issues</th> <th>Communication issues</th> </tr> </thead> <tbody> <tr> <td>80.3</td> <td>78.93</td> <td>39.5</td> <td>21.1</td> </tr> </tbody> </table>	Technology issues	students issues	Took & equipment issues	Communication issues	80.3	78.93	39.5	21.1
Technology issues	students issues	Took & equipment issues	Communication issues						
80.3	78.93	39.5	21.1						
2	<table border="1"> <thead> <tr> <th>Technical</th> <th>Registration</th> <th>Others</th> </tr> </thead> <tbody> <tr> <td>89.3</td> <td>6.7</td> <td>3.9</td> </tr> </tbody> </table>	Technical	Registration	Others	89.3	6.7	3.9		
Technical	Registration	Others							
89.3	6.7	3.9							

Above table 6 reveals that more than 80% of the teachers faced technology-related problems like connectivity problems, network problems, and login credentials. Network connectivity problems are rampant which is not there in anybody’s control. About 64% of teachers faced student-related problems like disturbing the class, chatting among themselves check the patience of teachers. Communication-related problems faced by 28% of teachers. Availability of tools is about 28%. Teachers find it difficult to get tools and equipment if institutions delayed in purchasing tools that are essential for virtual meetings.



Table 7: Analysis of Students' Data Collected During the Survey (Problems Faced)

SI.No	Particulars	Parameters (%)			
1	Problems faced by you to attend online classes	Technical issues	No exposure to extracurricular activities and real-life skills	No competitive environment	Others
		46.5	31	14.1	8.4

During the survey, it was observed that students faced the problems is shown in the above table no.7.

In the present survey, about 46.5% of students face technical problems. It may be related to network, connectivity, poor audibility problems. If these problems occur repeatedly discouraging the students. Active participation is not possible which further poses difficulty in understanding the content. Further, 31% of students opined that virtual classes provide no exposure to curricular activities. Talented students were disappointed as they could not find an opportunity to display their talents. No competitive environment makes the learning dry- about 31% of students expressed. Students were not happy as they were not able to clear content-related doubts. Though these are the problems faced by the students they have realized that virtual learning is inevitable. They need time to adjust their mindset to the new change.

Discussion and Conclusion

With the help of ICT, new tools can replicate the physical classroom environment for a better understanding of concepts. As per the need for virtual activities, restructuring in the way of learning has to be bought into practice with new pedagogies. COVID - 19 - has brought a new change in education - from the traditional chalkboard to virtual, from pen to touch screen. Virtual classes started experimenting with the existing technical facilities. Many teaching apps were used where Zoom and SWAYAM government apps are more preferred by the teachers. While engaging in virtual activity, the majority of teachers were frustrated due to technical issues like internet connectivity, accessibility, network issues, security and assessment management problems, etc. which finally led to fewer students getting engaged with online classes.

It is interesting to know that if an option is given to the teachers, they certainly prefer offline classes as observed in the study. Offline classes have more impact not only on teachers but students also who feel that it is more effective. During the study, it is observed that the students are not happy with virtual learning since it is not offering a competitive learning environment.

Pandemic disease COVID -19 has shifted the education from traditional to the virtual system. The concept of social distancing is more alarming - allows shift learning, distance learning, home learning. Students are on the front screen and teachers remain mentors now.



Both students and teachers have to understand the virtual system is inevitable, have to adjust to it. Though many problems are faced by both communities, it is the right time to experiment and minimize the problems and go ahead.

Suggestions

Lively and interesting and renew teacher enthusiasm as they learn new skills and techniques. The role of ICT in higher education is becoming more and more important and this importance will continue to grow after COVID-19. The use of ICT will not only enhance the learning environment but also prepare the next generation for future lives and careers. The following are the suggestions:

- 1) It is suggested that frequent training and workshops on the usage of ICT may boost the degree of integration of ICT in higher education.
- 2) During the virtual activity, a video of both teachers and students should be on so that teacher can engage the class effectively.
- 3) During the COVID-19 crisis, both teacher and student community should realize that ICT is the best option for teaching, learning, and research. Accordingly, it is strongly recommended that they have to change their mindset and improve digital literacy.
- 4) Powerpoint presentations with attractive animations are suggested to keep the students engaged throughout the class.
- 5) Students can join collaborative projects that involve students from different states, countries as ICT promotes fast communication.

Future scope for research

The upcoming research works may concentrate on the usage of ICT in rural areas. And also they can compare pre and post- COVID-19 situations. Further, research can be extended to consider data collection in person by selecting the bigger size of the sample and other creative methods employed to analyze the data. The research can be continued to find out which tools are most flexible in adopting ICT into education to bring uniformity in this teaching-learning process.

Conflict of interests

The author(s) declare no conflict of interest.

Funding

The author(s) received no financial support for this article's research, authorship, and/or publication.

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