Technological Barriers in Online Education: Comparing Student Experiences at Allama Iqbal Open University and Anadolu University

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ABSTRACT

The current study deals with the problems of technology, known as 'technological noise,' faced by Allama Iqbal Open University (AIOU) students from Pakistan and Anadolu University (AU) students from Turkiye while studying online. The aims and objectives of the research were to find out whether there is a difference in the technological noise experienced by students of both institutions and the kind of technological noise faced by the students. A survey was conducted with 1400 students, equally divided between the two universities. The findings show that students at AIOU face significantly more technological noise than their counterparts at AU, and this difference is mainly due to discrepancies in the digital infrastructure and the support systems. The study suggests that techniques are further required to be applied to minimize technological challenges to increase the level of online education at AIOU and AU. The salient results indicate that AU's advanced technology and superior infrastructure produce a more seamless online learning experience. At the same time, AIOU students are interrupted more frequently by hardware, software, network, and learning management system issues. It is stressed that there is a need for continuous technology development and focused interventions to ameliorate technological noise and enhance online education quality.

Keywords: digital infrastructure, learning management system, network connectivity, comparative study

INTRODUCTION

Allama Iqbal Open University (AIOU) and Anadolu University (AU) are committed to addressing educational challenges in Pakistan and Turkiye. Relying on cutting-edge training equipment and solutions, these institutions use a wide range of programs, which deal with various requirements of their students– emphasizing on how flexibility as well as accessibility are vital in education. These two organizations are pioneer in open distance learning and propagate that flexible teaching modes can immensely increase understanding and bolster the sources of knowledge necessary to social development.

After COVID-19 on-line structures have emerged as the significant pillars of distance learning in both countries. AIOU and AU has rightly availed this amendment by offering

substantial range of on-line courses with robust online observation systems. These include online classes, multimedia sources and interactive material allowing educators and students to generously utilize digital sources, workshops, assignments and quizzes that harm ordinary constraints of education from being limited by geography.

AU, Turkiye utilizes online platforms as a mode of delivery for online lectures, online assessment, and online educational resources. The university has created an online learning environment that develops student involvement, teamwork, and synergy through digital resources, and this enables learners to obtain the required information in harmony with their needs. Technological advances aid both the institutions in their quest to advocate for education freedom and flexibility, thus enabling the students to fulfil their academic pursuit from the comfort of their home.

In the case of technology supporting distance learning, a disturbing factor has shown up that interferes with the normal conduct of online sessions. As this noise stems from technology, it is referred to as 'technological noise'. This noise also interrupts the proper education flow. It manifests itself through technical glitches of many kinds: slow internet connection or different user interfaces on various platforms which, in turn, form an obstacle for regular online learning experience. Hinderance created by technology is an outside force which interferes in the online educational environment and therefore we ought to consider its multifarious effect.

The presence of technological noise during online classes not only hinders knowledge absorption, but it also creates barriers between learners and teachers. This can lead to frustration, as the participants are unable to effectively interact due to obstacles resulting from the use of technology.

Context of Online Classes at Allama Iqbal Open University (AIOU) Pakistan:

At AIOU, the responsibility for scheduling and organizing semester wise workshops is jointly shared by the Directorate of Regional Services (DRS) and Information and Communication (ICT) Department. The allocation of groups for each course is determined in the scheduling based on the enrolment. The schedule and log-in details are thereafter provided to course coordinators for the allocation of resource persons for all the groups of the courses under their coordination. The course coordinators allocate the resources for their courses by utilizing the website dedicated to course allocation. At AIOU, course coordinators are the academicians in each faculty who manage the course offered by the university, whereas resource persons are the tutors appointed by the coordinators to teach multiple groups of the online course. These tutors are teachers from across the country who have been registered with the university after fulfilling the set criteria.

Every synchronous session is conducted using a learning management system called aaghi.aiou.edu.pk. Each course consists of three credit hours and includes a six-day workshop, excluding Sundays. There is a daily session that lasts for two hours, resulting in a total of 12 hours. The resource persons access their courses through the Aaghi portal. They are provided with login credentials by the ICT department to access their dashboard and join Microsoft Teams from Aaghi (LMS). The Aaghi and Teams login credentials are the same, which provides convenience for users.

Context of Online Classes at Anadolu University (AU) Turkiye:

AU utilizes the e-kampus platform to promote distant education and online classes, providing a unique approach to virtual learning. The classes are organized on a weekly basis, with a session lasting 45 minutes each week, following the framework of the semester. The online class schedule is carefully designed by the Learning Technologies Research and Development Unit and

the ICT team, and the course coordinators are responsible for strictly following this plan. Importantly, regardless of the number of students, all students registered in a course are placed together in a unified virtual classroom. Notably, attendance in these online classes is not mandatory for the students, as it does not count towards their final evaluation.

In order to facilitate efficient communication and engagement, both course coordinators and students are furnished with distinct login credentials, which are issued by the technical staff of e-Kampus. Live sessions facilitate real-time participation by utilizing a chat interface for discussion. The workshop schedule involves course coordinators creating unit presentations for the semester, which are subsequently forwarded to the e-Kampus technical team (moderators) responsible for uploading them during live sessions. A diligent moderator is available at the backend to promptly handle any technological issues that may occur during these sessions. Both course coordinators and students directly communicate any issues during the session to the moderator.

LITERATURE REVIEW

The digital revolution has transformed thinking, social habits, behavioural practices, and employment models. Technology has revolutionized education during this century, leading to numerous advances in learners and learning environments. Educators across the globe have significantly changed their approaches since the onset of the digital age, such as the transformation of pedagogy and the creation of curricula in the era of digitization. The transforming influence of information and communication technology on education is a well-recognized phenomenon. Innovative use of technology opens new ways to educate people as well as gain knowledge.

As such, it is important for administrators and classroom practitioners to understand how technology allows them to adapt and succeed in such a connected digital era. With the advancement of technology in the twenty-first century, academicians and students require fast and complete information from different sources. In the light of modern times, the authors believe that teacher competence should encompass the capacity to develop technology infused lessons and thereby establish a technology-driven learning environment.

Over the years, online education has gained popularity as it is more flexible, convenient, and readily available. There has been a considerable amount of money channeled by governments towards enhancing institutional capacity for using technology and making sure that academicians can get online, whereby it is expected that this will result in new and improved methods of teaching. Technological noise has also increased due to the transition from traditional classrooms to online courses, which could inhibit the entire teaching and learning process. This implies that due consideration has to be given to the many challenges that emanate from the use of technology in education.

A study conducted by Akram et al. (2022) in Pakistan explored academicians 'opinions on integrating technology into teaching and learning activities. The study indicated that academicians in Pakistan feel that technology integration is a positive thing. Although their efforts are effective, numerous obstacles prevent them from properly carrying out those efforts. These include slow Internet connections, frequent power failures, and a lack of infrastructure to support such work.
Another study conducted by Maulida, Rizky, and Mubaraq (2022) in English Language Education Study Program emphasized the need of analyzing the difficulties faced by students when using internet for online learning. The research identified three main challenges that students encounter in this process, i.e., an unstable internet connection and limited internet usage. In addition, there

are also problems with understanding the materials and communicating properly between the instructor as well as among their peers.

Gul, Ullah, and Aslam (2022) studied the influence of the COVID-19 Pandemic on web-based distance education on student learning in Pakistan, and their findings indicated that the challenges were unequal for male and female students and that students who belong to higher socioeconomic status have faced at least half of the challenges as compared to the others. This shows that traditional teaching style and methodology, which need to be converted into the online mode of delivery, require adaptation for more positive outcomes in educational institutions.

Naz, Wahab, and Raheem (2022) point out that online teaching is whole of acute problems, one of which is the variance in learners' expectations, preparedness, and level of engagement. In addition, teachers find it challenging to adapt to their new role and time management in an online environment; this requires support from institutions.

A similar argument is raised by Rehman (2020) in his article on the insurmountable challenges that higher education institutions in Pakistan have faced with the ongoing COVID- 19 crisis: unsupportive technological infrastructure and, most importantly, unpreparedness to affect a sudden transition to virtual learning. A few systematic solutions have been suggested for future crises that could guarantee a smooth transition.

Bilgiç and Tüzün (2020) discussed the challenges of Turkish higher education. They found out the issues related to web-based distance education with nine dominative cores like the launching process of a development program, the program's technique, and evaluation methods, in Turkish Higher Education.

A research study conducted by Owusu-Fordjour, Koomson, and Hanson (2020) on the impact of COVID-19 on Ghanaian students found that the primary factors contributing to technical disruptions for students during online learning were internet connectivity issues and distractions caused by social media and other digital devices. The authors highlighted the need of implementing interventions to address technological noise. These interventions include accessibility to reliable internet connection and establishing policies to reduce disturbances during online learning.

Rahiem (2020) carried out research in Indonesia for the use of ICT technological problems and challenges while using ICT technology for online study during covid-19. Many technological challenges related to the use of ICT were identified in this study. Problems from failings devices, unstable net connections and the monetary problems connected to the costs of innovation were only a few. The significant issue was limited ICT skills. In terms of access, many students faced a host of learning barriers: they possessed devices that were not the ‘right kind’; multiple family users on one device; poor or lack of internet connections at home and data limitations. The problem of increased data costs, purchase of new gadgets which are compatible for e-learning etc were some other available issues faced by the students.

Hertsch, Er, and Erçetin (2016) emphasize that Turkish universities lack trained staff and proper support for distance learning and are entangled in bureaucracy. Some of these challenges make the distance education program less effective, even with technological advancements in place and with the growing demand for the same thing. In 2019 Tarman, Kilinc, and Aydin conducted a study in social studies education in Turkiye regarding the barriers that prevent technology from being used effectively. The main problems they identified were lack of technological resources and internet access, along with insufficient administrative and technical support.

According to the above-mentioned research literature, technological noise can often be distressing during online courses. Only by acknowledging and minimizing these distractions will

educators be able to improve the quality of online learning, helping learners obtain better educational outcomes.

The changes that digitalization and technological progress have brought to human cognition, behaviour, socialization, and work cannot be discounted. With the rise of information technology, education at the turn of this century has undergone remarkable transformations that have greatly influenced not only learning environments but all types of students. The global digital revolution has had a major impact on teaching methods and the development of educational content. Information and communication technology is frequently seen as a powerful tool that can have profound effects on education through innovative methods of teaching and learning. Owing to its flexible, convenient nature and due to many such reasons, online education has been a big breakthrough in recent years. But, while the move toward online education should be acknowledged, we cannot ignore that this transition has also faced difficulties.

AIOU has problems such as poor tutor-student interaction, outdated contents of courses, and a prejudiced system of assessment, which create technological noise and impair the learning experience of all concerned (Shah et al., 2009; Hussain, 2018). It has indeed been paved in Hussain's (2018) discussion that MOOCs and the enhancement of online offerings are some suggestions which may transform AIOU into a technologically advanced university. At the same time, AU is technologically fluent, primarily through interdisciplinary applications that blend the arts and technology. For instance, in improving technological literacy through creative projects in digital media from its curriculum. Therefore, advancing the discussion regarding the bridge of arts and technology. While the universities have made much progress, some of the common challenges worked on currently are making it easier for learners to access, cost management, and the lack of expertise in the implementation of digital technology. The current initiatives at AIOU to enhance digital learning show, through these challenges, how vital regular technological innovations and needs assessment are for a better platform for service delivery to distance learners. Some of the obstacles that distance education institutions in Turkiye and Pakistan face while offering online programs have been identified by recent research.

Statement of the problem

The world is in the process of rapid transformation regarding online education, and the problem is prevalent across the globe. The COVID-19 outbreak has just accelerated this, proving a compelling problem in the online educational system and exposing the inadequate technological infrastructures and weak support systems among universities. Students at Allama Iqbal Open University (AIOU) in Pakistan and Anadolu University (AU) in Turkiye find themselves experiencing "technological noise," which refers to interference in the technology driven online education system caused by hardware, software, lack of network access, and issues with learning management systems. This phenomenon significantly hinders online learning, depriving students of knowledge absorption and proper communication between learners and instructors. Therefore, this comparative study aimed to assess the extent and nature of technological noise among the learners at AIOU and AU, identifying the underlying factors for these differences. Understanding these challenges is essential for developing targeted strategies to enhance the quality of online education at both institutions.

Objectives of the study

To assess the difference between the technological noise experienced by students at Allama Iqbal Open University, Pakistan, and Anadolu University, Turkiye during online courses.

METHODOLOGY

Research Design: This study employed a quantitative research design. Under this design, a survey questionnaire was used for collecting data. This study centred on students from both universities enrolled in online courses.

Target Population: Students studying at the undergraduate level in online courses at Allama Iqbal Open University, Pakistan, and Anadolu University, Turkiye, constituted the population of the study.The present study identified technical noise in online teaching-learning at AIOU and AU through purposeful sampling. In this regard, only such students were included who had already gained relevant experience. This focused approach allowed the researchers to gather detailed data on problems and alternatives without being diluted by responses from irrelevant or misinformed respondents. The sample of students was made up of 700 students from each institution. The sample of the study is shown in Table 1.

Table 1: *Sample of the study for the survey*

Institutions	Students
Allama Iqbal Open University, Pakistan	700
Anadolu University, Turkiye	700
Total	1400

Instrumentation

The instruments of the survey were two closed-ended questionnaires—one for each university. The questionnaires were designed on a 5-point Likert scale to gather quantitative information about the different constructs of technological noise that are experienced by students during online classes. The 5-point Likert scale ranged from Always = 1, Often = 2, Occasionally = 3, Rarely = 4, and Never = 5.

Validity

Validation Process at AIOU, Pakistan:

Validating the questionnaire developed to be administered at Allama Iqbal Open University (AIOU) was undertaken by two members of the Information Communication Department who were directly involved with the backend facilitation of LMS solutions for AIOU. Four academicians validated the questionnaire who were conducting online classes. After the analysis of the validated forms, some items were rephrased, and redundant ones were deleted. The observations of the validators were incorporated in true spirit. The six constructs of technological noise provided the basis for a 71-item questionnaire affirmed for the students.

Validation Process at AU, Turkiye:

The questionnaire for the study was translated into Turkish and rephrased according to the online system used at Anadolu University (AU) by a co researcher provided by the university. The validity of the questionnaire for students was ensured by personnel running the LMS (ekampus) at the university and four professors teaching online courses. The observations were incorporated, and tools were tailored for administration.

Reliability:

The 71-item questionnaire for students was tried out with a group of 54 students from AIOU and the same number from AU who were not a part of the sample. Cronbach alpha was used to analyze the responses of those students taking online classes at AIOU and AU for the pilot study. The construct wise reliability of the responses from students at both universities is given in Table 2:

Table 2: *Reliability of the questionnaire for students at AIOU and AU.*

Constructs	**No of items**	**Cronbach's Alpha (AIOU)**	**Cronbach's Alpha (AU)**
Hardware	11	0.925	0.948
Software	09	0.894	0.939
Online Environment	16	0.957	0.963
Network Connectivity	13	0.948	0.961
Learning Management System	15	0.931	0.965
User end issues & non-educational technology	07	0.905	0.869
Technological Noise (Overall)	71	0.973	0.983

Table 2 displays the reliability metrics, specifically Cronbach's alpha, for the questionnaire that was given to students at Allama Iqbal Open University (AIOU) and Anadolu University (AU). The questionnaire comprised of six constructs, each addressing different elements related to technology noise in the institutions.

Reliability:

The survey given to students at AIOU, comprising 71 questions, has proven to be highly reliable, as evidenced by a Cronbach's alpha coefficient of 0.973. This Cronbach's alpha shows strong inner consistency amongst the items of the tools highlighting the study's reliability. In a similar way the study for AU students shows exceptional dependability, with Cronbach's alpha coefficient of 0.983, showing an extremely high degree of interior consistency that efficiently stands for the students' viewpoints.

Criteria for Comparing Institutional Frameworks of AIOU and AU:

The aspects used for the comparison of both institutions were:

a) Scheduling and Coordination
b) LMS Implementation
c) Resource Allocation

d) Technological Infrastructure
e) Network Connectivity
f) Cultural Differences in Teaching
g) Cultural Adaptation to Technology

These selection criteria outlined some operational and cultural challenges that influenced the experience and management of technological noise and provided a sound framework for comparative analysis and actionable recommendations.

Data analysis

Survey results of perceptions of students at AIOU and AU:

The difference between the technological noise experienced by the students taking online courses at AIOU and AU was determined by applying an independent sample t-test to the average responses of each participant. The results are shown in table 3.

Table 3: *Construct a wise difference between technological noise experienced by students at AIOU and AU: N = 700 + 700 = 1400*

Constructs	Institution	Mean	Mdif.	df	t-value
Hardware	AIOU	3.23	-.74	1398	-13.29
	AU	3.97			p=.000
Software	AIOU	3.06	-.96	1398	-16.31
	AU	4.02			p=.000
Online Environment	AIOU	3.14	-.71	1398	-11.99
	AU	3.84			p=.000
Network Connectivity	AIOU	2.82	-.94	1398	-15.41
	AU	3.76			p=.000
Learning Management System	AIOU	3.17	-.78	1398	-12.99
	AU	3.96			p=.000
User end issues & non-educational technology	AIOU	3.29	-.72	1398	-11.70
	AU	4.01			p=.000
Technological Noise	AIOU	3.12	-.81	1398	-15.60
	AU	3.93			p=.000

The results are interpreted based on the assigned values for each number, with 1 indicating significant levels of technological noise. As the value increases to 2, 3, and 4, the technological noise reduces, and a value of 5 indicates the absence of technological noise. Consequently, a greater mean value indicates a decreased presence of the variable being studied (technological noise), and vice versa. Table 6 displays variations in technological noise experienced by the students at AIOU and AU across multiple constructs. The values include the mean (M), mean difference (Mdif), degree of freedom (df), and t-value:

- Hardware: The mean for AIOU is 3.23, and the mean for AU is 3.97. The difference in means is -0.74 and the t-value is -13.29 at p =.000. The t-value is statistically significant

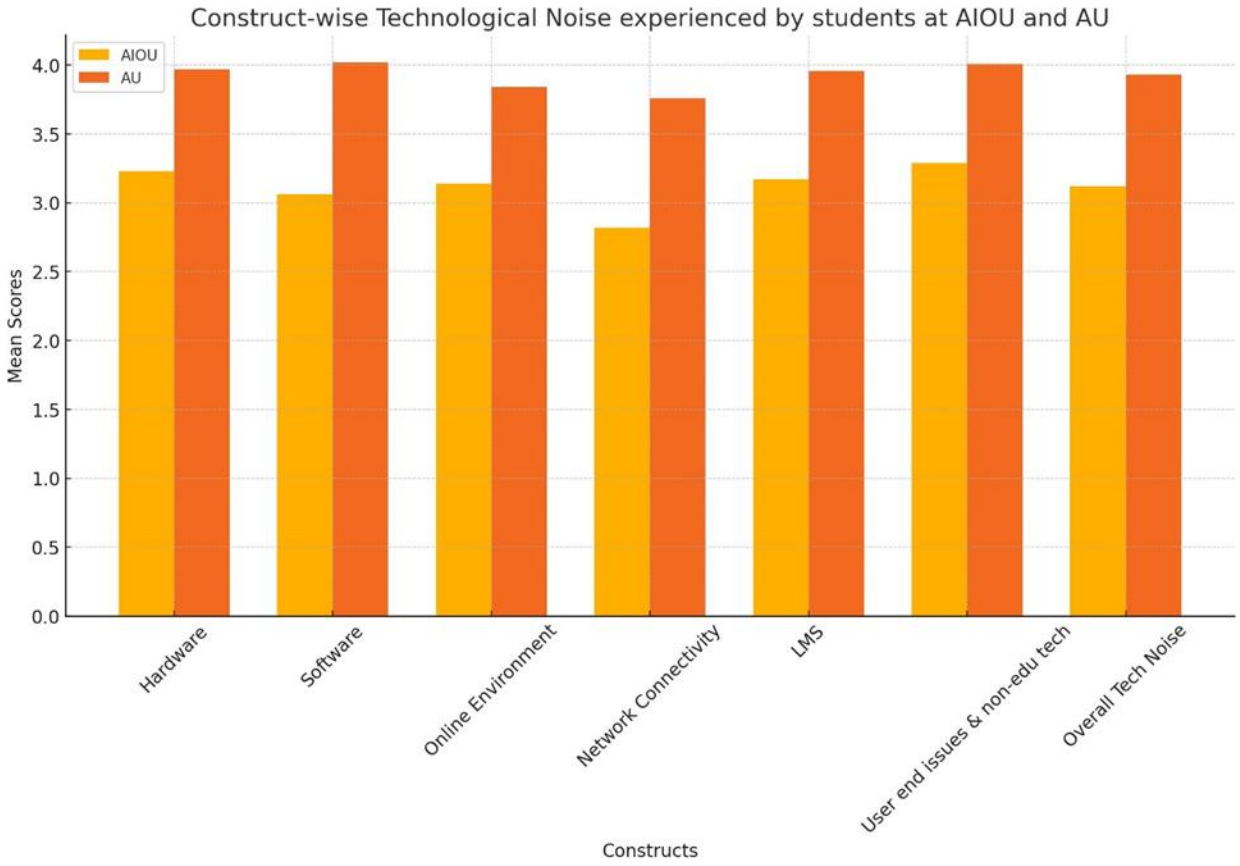
($p < 0.05$), indicating that students at AIOU experience more technological noise in hardware compared to AU.

- Software: The mean for AIOU is 3.06, whereas the mean for AU is 4.02. The difference in means is -0.96 and the t-value is -16.31 at p =.000. The t-value is statistically significant ($p < 0.05$), suggesting that students at AIOU face more technological noise in software compared to AU.
- Online Environment: The mean for AIOU is 3.14, while the mean for AU is 3.84. The difference in means is -0.71, and the t-value is -11.99 at p =.000. The t-value is statistically significant ($p < 0.05$), indicating that students at AIOU perceive more technological noise in the online environment compared to AU.
- Network Connectivity: The mean for AIOU is 2.82, whereas the mean for AU is 3.76. The difference in means is -0.94 and the t-value is -15.41 at p =.000. The t-value is statistically significant ($p < 0.05$), suggesting that students at AIOU deal with high technological noise in network connectivity compared to AU.
- Learning Management System: The mean for AIOU is 3.17 and the mean for AU is 3.96. The difference in means is -0.78, and the t-value is -12.99 at p =.000. The t-value is statistically significant ($p < 0.05$), indicating that students at AIOU face more technological noise associated with the learning management system compared to AU.
- Use End Issues and Non-Educational Technology: The mean for AIOU is 3.29 and the mean for AU is 4.01. The difference in means is -0.72, and the t-value is -11.70 at p =.000. The t-value is statistically significant ($p < 0.05$), suggesting that students at AIOU perceive greater technical noise associated with user end difficulties and non-educational technologies compared to AU.
- Technological noise: the mean of AIOU is 3.12, while the mean of AU is 3.93. The difference in means is -0.81, and the t-value is -15.60 at p =.000. The t-value is statistically significant ($p < 0.05$), indicating that students at AIOU experience more technological noise compared to AU.

In general, students at AIOU consistently report higher levels of technological noise during online courses compared to the students at AU, and these disparities are statistically significant.

Comparative findings of students from both universities

The viewpoints of students from both universities about each construct of technological noise according to the mean scores, where a higher mean score represents less perception of technological noise and vice versa:



Hardware:

AIOU: Students report a greater level of technology noise in hardware, with an average rating of 3.23.AU: The students' report shows a reduced level of technological noise in hardware, with a mean score of 3.97.*Software program:*AIOU: Students report a higher level of technological noise from software (M = 3.28 noise in software, with a mean score of 3.06).Students also report a lower level of technological noise in software, with an average rating of 4.02.*Online Environment:*AIOU: Students report a higher level of technology noise in the online environment, with a mean score of 3.14.AU: Students report a lower level of technological noise in the online environment, with an average rating of 3.84.*Network Connectivity:*AIOU: Students report a higher level of technological noise in network connectivity, with a mean score of 2.82.AU: Students report a lower level of technological noise in network connectivity, with an average rating of 3.76.*Learning Management System:*AIOU: Students report more frequent disruptions related to the learning management system, with an average score of 3.17.AU: At Anadolu University students experience less disturbances, reporting reduce technological noise in their understanding administration system with a mean of 3.96.

User-End Issues as well as Non-Educational Technology:

AIOU: Students at AIOU record much more constant issues with user-end difficulties as well as non-educational modern technologies with a mean of 3.29.AU: In comparison, Anadolu University students discover these concerns to be much less of an obstacle with a mean of 4.01.

Technological Noise:

Generally, AIOU students come across more technical disruptions, balancing a mean of 3.12. Students at AU experience less problems, with a mean of 3.93.

CONCLUSIONS

This research study presents a thorough understanding of how students at AIOU together with AU view technical noise in different locations, highlighting unique patterns within each organization. The research study focuses on technical disruptions dealt with by students in simultaneous on-line classes discloses intricacies throughout numerous measurements related to hardware, software application, on-line environment, network connection, Learning Management System (LMS), along with user-end problems.

- Hardware: AU students experience relatively less hardware-related disturbances compared to AIOU showing AU's expertise in innovation and technology. However, students at both the institutions encounter difficulties with-outdated equipment or compatibility problems, highlighting the demand for present day modern technology.
- Software: AU has a considerable benefit in lowering software-related interruptions, adding to a smoother educational experience for its students. The two institutions derive more benefits by using appropriate software that enhances the performance of students in online learning.
- Online Environment: AU has a better online environment than AIOU learners because the latter is accessible from various disturbances to which AIOU learners are subjected. AIOU learners suffer from web link issue disturbances, while AU learners face issues of voice distortion and blocked chat.
- Network Connection: AU has better network connectivity, which results in much lower technological noise compared to AIOU. Students at AIOU consistently deal with problems like buffering, automated disconnection, in addition to minimal internet access while AU students occasionally manage varying internet connections and disconnections.
- Learning Management System (LMS): AU pupils record less issues within the LMS providing AU a significant benefit over AIOU. AIOU students deal with technological break downs together with login issues whereas AU takes care of restrictions connected with the Big Blue Button system.
- User-Related Issues: Students at AU experience fewer user-related issues and non-educational technological barriers than AIOU students. At AIOU, a major user end problem is unstable internet connections, while at AU, exclusive reliance on chat and dependence on moderators for reconnection create barriers. Students at both institutions face lack of computer literacy.

In conclusion, when compared to Allama Iqbal Open University, Anadolu University has a general advantage in effectively managing technological noise. At Anadolu University, the level of technological noise was consistently lower than that at Allama Iqbal Open University across all the areas examined. This can be attributed to the years of experience Anadolu University has had in running online courses for distance education programs. Anadolu University embarked on the journey of online education in 2004, and since then it has covered multiple stages of evolution. Whereas AIOU is relatively new in this field, as the university went online on massive scale for distance education courses during COVID in 2020 and is still in its initial stages of evolution.

DISCUSSION

The digital revolution has dramatically changed educational practices, bringing unparalleled flexibility and accessibility to learning. While the changeover has not been smooth, experience demonstrates that it is possible to a certain extent. That, in essence, was the thrust of this comparative study on technological noise at Allama Iqbal Open University (AIOU) in Pakistan and Anadolu University in Turkiye. Findings extrapolated that despite the high technological wave and push for an e-learning approach, students in both institutions experience technological interruptions that interfere with the effectiveness of their study endeavors.

This is supported by many scholarly works that underline the intense nature of the influence that Information and Communication Technology is having on education, and the change is expected to be particularly relevant for institutions in their pedagogy and curriculum change in response to the pervasive adoption of these innovations. However, it is also accompanied by technological noise where hardware, software, connection, and LMS issues make the learning process hard. Findings by Akram et al. (2022) and those of Maulida, Rizky, and Mubaraq (2022), indicate similar challenges of poor internet connections by the teachers and students and lack of infrastructure that would otherwise support full integration of technology in learning. The current study also supported the concept that technology can enrich education; however, it prohibits infrastructure and technical barriers to its appropriate use.

In this regard, the level of technological noise depicted at AIOU is apparently above that at AU and more generally representative of systemic problems, including poor tutor-student interaction, outdated course content, and an unjust assessment scheme. The conclusion here supports Hussain's (2018) point of view that: "MOOCs and other such niche online products are the disruptive innovations that have the potential to transform the current technological state of AIOU into a technologically sound one." Alternatively, AU has lower levels of technological noise, the reason being its extensive experience in running online courses and interdisciplinary fusion of arts and technology, as emphasized by Hertsch, Er, and Erçetin (2016).

As research by Gul, Ullah, and Aslam (2022) and Owusu-Fordjour, Koomson, and Hanson (2020) indicates, the deterioration in situation by the COVID-19 pandemic. The research has particularly illustrated problems with technological infrastructure differences, and the most urgent has been the reliability of the internet and the strength of the support structures. The greatest challenge, as identified by Gul, Ullah, and Aslam (2022), is that accessibility to technology is of particular interest to students who originate from low-income family backgrounds. In consonance with these results, similar results were found at AIOU and AU, where the problems of connectivity and hardware failure emerged as important sources of technological noise. While these studies report a large proportion of students facing this problem, they also indicate a high demand for the availability of solid internet and contemporary technological infrastructure to avail effective online education.

According to Rehman (2020) and Rahiem (2020) the provision of preparedness and support is not enough to what is necessary for a smooth transition to online learning. This is exacerbated by the obvious lack of trained support staff and general administrative inefficiency, as observed by Tarman, Kilinc, and Aydin (2019), which complicates the practical usage of technology for education. There is one clear sub-theme running that online learning in many developing countries requires massive investment, primarily on technology and then on infrastructure. There is a call for support at administrative and technical levels to reduce technological noise to a minimum and access other online platforms quickly. Targeted interventions and substantial investment in

technological infrastructure are needed to minimize these disturbances for quality online education.

The results obtained from the study show that AU has comparative advantages in dealing with technological noise compared to AIOU. Still, both need to stay ahead in dealing with complex challenges emerging in digital learning. AIOU should evolve to improve its technological infrastructure, course content, and tutor-student interactions. AU must focus on maintaining its technological fluency and looking for more life-cycle-wise advances in digital literacy and other interdisciplinary applications.

Therefore, it is evident that if these institutions can address the noise of technology, then this hindering impedance will automatically be overcome to provide online education effectually. These technological infrastructures have to be invested in, support has to be provided, and there has to be a strategy for doing this assessment and change so that the students can truly benefit from the vast potential of any digital learning environment to improve educational outcome and, at the same time, prepare students for the digital age.

RECOMMENDATIONS

As the context of online classes is different in both institutions, separate recommendations are given for each institution pertaining to its setting and way forward.

Allama Iqbal Open University (AIOU)

Create a dedicated technical support team by hiring and training individuals with specialized skills. Create thorough documentation to address common hardware and software issues. Set up regular workshops and open communication channels to provide clear guidance on online behaviour and ethical standards. Work closely with IT experts to thoroughly assess the current network infrastructure. Secure funding for necessary upgrades and improvements. Partner with reputable Internet service providers to ensure a stable and fast internet connection. Explore alternative internet services to geographically remote students. Create a dedicated technical support team to promptly address and reduce technical distractions during online courses. Consult and collaborate with IT professionals to investigate and update the network infrastructures to guarantee constant and high-speed internet connectivity, especially for students in remote areas. Create teams dedicated to finding enhancements to the Learning Management System to ensure it permits more website traffic and creative performances. Develop an extensive electronic proficiency educational program making use of the LMS to host instructional sources and provide assistance for interactive digital understanding.

Anadolu University (AU)

The following suggestions are posited for improving online learning experiences of students at AU: Modernize equipment facilities to handle the rising number of online students and capacity in enhancing the customer's seamless experience. Advise the use of proper internet browsers and ensure regular updates for software applications to maintain smooth connectivity. Investigate some of the other choices for LMS that support a higher number of students and are capable of handling more advanced features. Provide extensive training to enhance the students' digital skills and develop a technological solid support team to manage technical difficulties competently. These strategies will significantly improve online course effectiveness at both AIOU and AU; significantly reducing associated technical disruptions, and ensuring a safe, efficient, and comprehensive digital learning experience for all stakeholders.

REFERENCES

Akram, H., Abdelrady, A. H., Al-Adwan, A. S., & Ramzan, M. (2022). Academicians' perceptions of technology integration in teaching-learning practices: *A systematic review.* Frontiers in psychology, 13, 920317.

Bilgiç, H. G., & Tüzün, H. (2020). Issues and Challenges with Web-Based Distance Education Programs in Turkish Higher Education Institutes. The Turkish Online Journal of Distance Education.

Brunvand, E. (2015). A noise-based curriculum for technological fluency. *International Conference on Computer Graphics and Interactive Techniques*

Gul, S., Ullah, I., & Aslam, S. (2022). Challenges of Online Learning in Developing Country under the Impact of the Pandemic Situation- A Case Study of Pakistan. International Journal of Research and Review.

Hertsch, M. F., Er, M., & Erçetin, Ş. Ş. (2016). Barriers and Challenges of Distance Learning in Turkiye and the Demand for Distance Education Centres (UEM). Springer.

Hussain, I. (2018). Information and Communication Technologies (ICTs)-Based Learner Support in Distance Education in Pakistan. *Springer*

Maulida, H., Rizky, L., & Mubaraq, Y. (2022). An Analysis of Students' Difficulties in Using Online Media during Online Learning Process of English Language Education Study Program. Lentera: Jurnal Ilmiah Kependidikan. https://doi.org/10.33654/iseta.v1i0.1854.

Naz, F., Wahab, A., & Raheem, A. (2022). Challenges & Suggestions of Online Teaching: Opinions of Public and Private Universities in Pakistan. Global Social Sciences Review.

Noreen, S., & Malik, M. A. (2020). Digital Technologies for Learning at Allama Iqbal Open University (AIOU): Investigating Needs and Challenges. *Open Praxis*

Owusu-Fordjour, C., Koomson, C. K., & Hanson, D. (2020). The impact of Covid-19 on learning-the perspective of the Ghanaian student. *European Journal of Education Studies, 7(3),* 88-102.

Rahiem, M. (2020). Technological barriers and challenges in the use of ICT during the COVID19 emergency remote learning. CQ University. *Journal contribution. 8(11B),* 6124-6133 https://hdl.handle.net/10779/cqu.20164424.v2

Rehman, A. U. (2020). Challenges to Online Education in Pakistan During COVID-19 & the Way Forward. Gomal University.

Shah, A., & Khan, S. (2009). Use of Information and Communication Technology (ICT) for Effective Open and Distant Learning (ODL). *Social Science Research Network*

Tarman, B., Kilinc, E., & Aydin, H. (2019). Barriers to the effective use of technology integration in social studies education. *Contemporary Issues in Technology and Teacher Education*, 19(4), 736-753.