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Application of social justice theory in online learning: A comparison of rural and urban students on perceived learning effectiveness in pre and during COVID-19 era

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Abstract
The current study was conducted to identify the perceived effectiveness of online learning systems for urban and rural students of higher education institutions in Pakistan. A survey of 592 students from ten public and private sector institutions in Pakistan was conducted to obtain their opinions against eleven factors of perceived learning effectiveness including goal setting, time management, environmental structure, help-seeking, self-evaluation, attitude towards blended learning, technology quality, learning motivation, level of student interaction and grade average of students for two (online and face-to-face) semesters. Results indicated that there were significant differences between rural (292) and urban (300) students on the perceived effectiveness of online learning systems against all the variables including their grade performance, which were previously insignificant during online classes. The results have revalidated the social justice theory that equal opportunities and resources should be provided to all on an equitable basis to achieve the results of any social activity including online education, which is the contribution of the current research. The research has discussed several implications for policymakers, higher education institutions, and researchers in detail. Keywords, Higher education institutions, Goal setting, Attitude towards blended learning, Learning effectiveness, Technology quality.

Keywords Higher education institutions · Goal setting · Attitude towards blended learning · Learning effectiveness · Technology Quality

1 Introduction

The COVID-19 pandemic transformed the prevailing work patterns and work standards around the globe. Online modes of interaction and learning have become the new way of life since then and now schools, colleges, universities, and other

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educational institutions are using it quite frequently for all sorts of educational activities (Ali, 2020; Dhawan, 2020). Although, online teaching mode has been a part of the educational framework since 1989 (Babbar & Gupta, 2022; Mishra et al., 2020; Ndibalema, 2022), yet, an immediate transition from traditional to online mechanisms remained a major challenge for all countries during the COVID-19 crisis. Especially, in developing countries, access to the internet and technological resources was not conducive to total transition from conventional to online systems. Additionally, there was a need for training people to use the technology for educational purposes. Therefore, the perceived effectiveness of online systems was significantly less than those of developed countries with advanced technologies readily available for immediate transition (Bergdahl & Nouri, 2021; Nunez-canal et al., 2022; Taghizadeh & Hajhosseini, 2021). Researchers like The current study is conducted to identify the perceived effectiveness of the online learning system, introduced by Pakistan Higher Education Institutions (HEIs) during the pandemic. Furthermore, the study also focused on comparing the perceptions of students from hard-to-reach areas with that of students from urban areas of Pakistan on the effectiveness of online learning systems to identify specific issues being faced by students.

According to Shah et al. (2022), the scenario was different before COVID-19 as online mode was not a compulsion at that time. However, it has become a necessity of life since the pandemic, and developing countries are also compelled to adopt the system despite having limited technological resources. In the same backdrop Ferri et al. (2020) conducted a qualitative study based on opinions of policymakers, researchers, teachers about the technological, pedagogical and social challenges to online learning systems in Italy and recommended studying the effect of this rural–urban divide on student learning in other parts of the world. Particularly in the context developing countries researchers like Muthuprasad et al. (2021) suggested that the perception of students about effectiveness of online learning systems during COVID-19 from various disciplines should be studied. According to Adnan and Anwar. (2020), technology-based learning was not being used in education very commonly in Pakistan. However, the emergence of COVID-19 has changed the scenario. Government, institutions, teachers, and students had to adopt online mode to maintain the pace of the learning process intact. In order to ensure the smooth flow of the online system, Higher Education Commission (HEC) of Pakistan issued several guidelines in coordination with institutions (Ain, 2020). However, students and teachers were still facing multiple challenges and remained less satisfied (Anwar et al., 2020; Jiang et al., 2021). Therefore, it posed a question mark on the perceived effectiveness of the online delivery system, especially for students and teachers coming from hard-to-reach areas where accessibility of the internet and mobile technology is not up to the mark to facilitate the process. However, there are specific issues raised by the digital divide between students coming from such areas that need investigation (Akhter et al., 2022; Caskurlu et al., 2021; Li & Ranieri, 2013; Muthuprasad et al., 2021). Additionally, researchers (like Bordoloi et al., 2021; Wang et al., 2022a, 2022b) have pointed out that there could be differences in the perceived effectiveness of online learning among students coming from rural and urban backgrounds. However, we have not been able to find any such study in which

the difference between urban and rural students was assessed about the perceived effectiveness of online learning, especially in the Pakistani context.

Keeping in view the limitations of previous research, Wang et al., (2022a, 2022b) has recommended an in-depth investigation of issues being faced by students with online learning, especially in terms of achieving their academic goals during COVID-19 (Batdi et al., 2021). Similarly, Zhao et al. (2022) recommended empirical testing of the data to determine the difference among students coming from various backgrounds based on the digital divide, regarding the usefulness of the online mode of learning. Furthermore, Iqbal et al. (2022) reported the need for a detailed analysis to identify the perceived effectiveness of online learning systems in developing countries, especially keeping in view the resource differences among students from rural and urban backgrounds. In the same backdrop, the current study tends to analyze these differences in the perceived effectiveness of the online learning systems introduced by various higher education institutions in Pakistan since COVID-19. The research uncovers disparities and inequalities within a society based on regional and geographical differences. These differences create divide among students in access to internet connectivity, and digital literacy and therefore, put a question mark on effectiveness of online learning systems. This research recommends the policymakers to bridge the rural–urban educational divide, ensuring all students have equitable opportunities for academic success and therefore fosters a more inclusive educational landscape aligned with the principles of social justice theory.

1.1 Literature review

According to Das (2023), online learning is defined as "learning that takes place partially or entirely over the Internet". It comprises a wide array of applications and processes that include web-based learning, computer-based learning, virtual classrooms, and digital collaboration. The main features of the system emphasize the delivery of content via the intranet/extranet (LAN/WAN), audio and video tape, satellite broadcast, interactive TV, and CD-ROM. In other words, online learning is dependent on the availability of technological resources and the knowledge to use these for educational purposes. However, as indicated by (Zheng & Zheng, 2023), the technological resources are not equally accessible in all parts of the world. Especially in developing countries, access to the internet and related technology is still not 100%. In Pakistan, the hard-to-reach mountain areas pose serious challenges for the government and technological/communication service providers to ensure equitable signal strength. Additionally, people living in these areas belong to the lower income class with limited employment and earning opportunities. Therefore, in the majority of cases, they do not have the purchasing power to buy costly mobile and communication technologies like laptops or desktop computers. Under these circumstances, introducing an online learning system for students can be fairly risky and there is a possibility that students from hard-to-reach rural areas may not be able to get an equal chance of learning effectively. However, there is a need to assess the difference in line with the requirements of social justice theory in education.

The term social justice obligates society to ensure equal rights, opportunities, and treatments of education, employment, entrepreneurship, and housing for all members (Trivedi & Ray, 2024). The concept of social justice has been proclaimed for all educational policies in Pakistan, however, in the current scenario, there is a possibility that the policy implementation was not up to the mark due to several reasons. The effectiveness of online learning is linked with the assumption that technological resources are equitably distributed across the country, and people living in hard-to-reach areas can also benefit from it at par with the accessible urban areas. However, in the case of Pakistan, this assumption is violated as the communication technologies are disrupted by the geographical and income class distributions. Therefore, educators and students have been facing serious issues in this regard, which need to be tapped for effective redress.

The effectiveness of learning is perceived in multiple ways however, students' feedback is still considered the most effective tool in terms of assessing their level of satisfaction with the course design, support, interaction, learning experience and performance (Decoito & Estaiteyeh, 2022). YE et al. (2022) also highlighted that teachers need to focus on various facets such as; instructions, content, motivation, relationships, and mental health, especially while conducting online courses. Additionally, Masry-Herzalah, (2022) views competence to use online learning technology as another important factor for effective interaction among students, teachers, and technology (Sharaievska et al., 2022). Chang et al. (2022) add that learning can become effective when students set goals to accomplish the desired outcomes and evaluate performance regularly.

Online learning systems are considered more flexible and suitable to ensure time management however, poor quality internet service and family issues negatively impacted class effectiveness during COVID-19 (Sharaievski et al., 2022). Therefore, it is evident that the system may not work equally for all members of the society in developing countries. However, as recommended by Sankar et al. (2022), it can be improved in the future if a blended learning system is introduced in higher education institutions. Halili (2022) further elaborates that the online and e-learning platforms like Google Meet, TV schools, zoom, online portals Slack, etc. were fairly useful during COVID-19 and therefore should be continued as part of the learning system in the future. In the same backdrop, the current study is designed to assess the perceived effectiveness of online learning among rural and urban students and compare their responses to identify the differences between the two groups. In this regard, the main and sub-hypotheses were proposed as following:

H1: The perception of students from urban areas is significantly different from that of rural areas about the effectiveness of the online learning system in Higher Education Institutions of Pakistan.

The term blended learning was introduced by Christensen in the early 2000, however it was properly defined by Garrison and Kanuka (2004) as thoughtful integration of classroom face-to-face learning experience with online learning experience". Graham (2006) uses the term computer-mediated-interaction instead of online learning. The term gained more popularity during the last decade and now has become a routine process in HEIs across the world, especially in the new-normal era after

COVID-19 (Megahed & Ghoneim, 2022). As indicated by Cullinan et al. (2021), several key factors like the speed of the internet, technological infrastructure, and access to resources play important roles in developing positive attitudes towards blended learning in urban areas. In contrast, these features are completely or partially missing in rural areas and therefore, set bases for systematic inequalities in societies, specifically in developing countries. On the other hand, social justice theory (Dewey, 2024) postulates equal and equitable educational opportunities for all irrespective of their geographic location, creed, or cast. As indicated by Madni et al. (2022), E-learning is equally important for urban and rural students as it has become the need of the hour, especially in the post-COVID-19 era. Therefore, it has become imperative for contemporary higher education institutions to ensure blended learning systems to improve digital and technological literacy equitably (Kanwal & Rehman, 2017; Atique et al., 2024). Since people living in less developed or rural areas have a lesser approach to technological and internet facilities, therefore, it can be expected that their attitude towards online or blended learning may be different from that of students coming from urban areas (Alebaikan & Troudi, 2010; Gulati, 2008; Oweis, 2018; Poon, 2013). Based on the previous literature, we assume that the attitude of urban and rural students towards blended learning may differ in HEIs of Pakistan, which has implications for policymakers. Therefore, we submit the following proposition for testing in the current study:

H1a:Urban students have a more positive attitude towards blended learning in comparison with rural students of HEIs in Pakistan.

According to Zhao et al. (2022) the effectiveness of online learning can be determined from the extent to which students could set their learning goals and standards. Wang et al., (2022a, 2022b) add that online learning is dependent on the availability of technological resources and un interrupted internet facilities. From this perspective, students coming from urban or developed areas may have an advantage. Contrarily students from rural settlements face serious resource constraints, socio-economic and technological challenges and therefore may perceive the goal setting activity as difficulty in online learning systems (Muthuprasad et al., 2021). Ferri et al. (2020) maintain that the digital divide is more evident in global south where geographical structures drastically change from one area to another. In several cases rural settlements exist in the mountainous areas or across the desserts, where electricity and internet disruption is a matter of routine. Understanding these differences is crucial for policymakers and educators to develop targeted interventions that address the unique needs of rural students, ensuring equitable access to effective goal-setting strategies in online learning environments (Rahmat & Akbar, 2019). Keeping in view these facts we present the following hypothesis for testing in the present study:

H1b:Goal setting during online learning is perceived as more effective by urban students in comparison with rural students of HEIs in Pakistan.

Student interaction has been viewed in four different ways in the literature including student–student interaction, student-content interaction,

student- teacher interaction and student-environment interaction (Adnan & Anwar, 2020; Albayrak & Yilmaz, 2022; Prohorets & Plekhanova, 2015; Romero Archila, 2014). All these types are considered important determinants of student engagement in learning. Researchers have agreement that student interaction during online learning is not more effective than face to face classes (Anggrawan, 2021; Díaz & Entonado, 2009; Jaggars, 2014; Young & Duncan, 2014). This divide may widen for students coming from rural areas who generally have poor quality of access to technological resources and internet services. Especially for developing countries the digital divide between urban and rural areas is more evident. Therefore, it is quite possible that the student interaction may lack in these areas and may affect the learning outcomes for students coming from such areas. Based on the cited research, we propose the following hypothesis for testing:

H1c:Students' interactions during online learning are perceived as more effective by urban students in comparison with rural students of HEIs in Pakistan.

Online learning is purely dependent on technology including computers, mobiles, internet and other tools and therefore, the quality of these technologies is very important to ensure the effectiveness of online learning. Research indicates that the technology-quality is the enabler of online learning systems (Moges, 2013; Panackal et al., 2022). In developing countries, the availability of uninterrupted electricity is another important determinant of online learning effectiveness as frequent and long hour electricity breakdowns part of the daily routines (Saha et al., 2021; Quresh et al., 2012). Uninterrupted power supply is not an issue in developed countries (Madhuwanthi et al., 2021; Sun et al., 2008), while the same haunt the developing countries on almost daily basis. Especially in rural areas the electricity breakdowns are more frequent and therefore affect the learning outcomes more negatively on comparison with urban students (Reich, 2020; Simamora, 2020). Based on previous literature, we propose the following hypothesis for testing in the context of Pakistan.

H1e:The quality of technology during online learning is perceived as more effective by urban students in comparison with rural students of HEIs in Pakistan.

Time management is an effective determinant of learning effectiveness (Ahmad et al., 2019), however, students feel difficult to manage the time during online classes due to several reasons. Especially in developing countries the poor quality of technological resources, power failures and poor internet connectivity are critical elements that affect the learning outcomes of all students (Gautam & Gautam, 2021). This scenario goes worse in case of students with rural background as they have inbuilt technological, internet and power issues. In developing countries, these socio-economic disparities disproportionately affect the rural communities. Therefore, it is obvious that the students from rural background may have more negative perception about time management during online classes (Popa-Velea et al., 2021; Iqbal etal., 2022) and may consider it as important factor affecting their learning outcomes in Pakistani HEIs. Therefore, we propose the following hypothesis for testing in the present study:

H1f:Time management during online learning is perceived as more effective by urban students in comparison with rural students of HEIs in Pakistan.

Maehr and Stallings (1972) define the term self-evaluation the tendency among students to judge the quality of their own work using an evidence based approach and explicit criteria. According to them the primary purpose of self-evaluation is improvement of the academic performance. Therefore, self-evaluation is a powerful technique as it helps students improving their self-efficacy and intrinsic motivation. However, as maintained by Baartman et al. (2007) self-evaluation is dependent on availability of requisite tools, resources and criteria or benchmark. In other words, it is dependent on technology that may provide them with required resources for comparison and analysis during self-evaluation. According to Zhang et al. (2023), in urban settlements students have more opportunities to learn from various sources and therefore may be able to develop better analytical skills to evaluate their own performance. Contrarily, students coming from rural areas may not have access to these resources, especially during the online classes, and therefore their perception may be relatively less positive toward self-evaluation (Diep et al., 2017). Therefore, in the present study, we propose comparing the perception of students with urban and rural background and propose the following hypothesis for testing:

H1g:Self-evaluation during online learning is perceived as more effective by urban students in comparison with rural students of HEIs in Pakistan

Help-seeking is the extent to which students can seek help from their surroundings, teachers, family, friends, and classmates about their learning issues (Newman, 2013). Despite technological developments, students face challenges in seeking help from their family, teachers, friends, and classmates during online classes (Oliveira et al., 2021; Sumra et al., 2022). Rovai and Downey (2010) indicate that the digital divide among various social and regional entities affects the availability, intensity, quality, and learning help/support from different people. Therefore, in areas with lesser digital infrastructure and educational resources, it becomes serious challenge for them. Therefore, it is expected that students from rural areas may perceive the help-seeking component as the weakest component during online classes which affects their learning outcomes (Kizilcec et al., 2017). Based on these studies, we therefore put the following hypothesis for testing in the present study:

H1h:During online learning, help-seeking behavior is perceived as more effective by urban students in comparison with rural students of HEIs in Pakistan

Online learning environment could be synchronous, Asynchronous or hybrid. Asynchronous modes (like Allaire Forum) allow learner to participate on equitable basis and spend time in constructing or elaborating an argument (Joiner & Jones, 2003). On the other hand, synchronous modes of communication (like TC3, CONNECT) students work on common projects but heavily rely on students' conceptual abilities (Janssen et al., 2006). Hybrid systems provide a mix of both systems and therefore are considered more effective (Puspitasari, 2021). However, all these systems are dependent on quality of learning technology and therefore urban students have more opportunities to get benefit from these structures. Conversely rural

students may face challenges of limited internet access, technological resources, therefore may perceive the online learning as less useful for them (Demirtaş & Turk, 2022; Yang et al., 2019). Using the same premise, we put the following proposition for testing in the present research:

H1i:During online learning, environmental structure is perceived as more conducive by urban students in comparison with rural students of HEIs in Pakistan

Learning motivation is dependent on various factors including the mode of learning and availability of educational resources (Dhingra et al., 2021; Rehmat & Akbar, 2019; Singh & Singh, 2011). Researchers (Bast, 2021; Nehme, 2010; Oguz et al., 2015) have agreement that motivating students during online learning is a challenging task. The situation goes bad when the technological and educational resources are not adequate as in the case of students with rural background. Therefore, it can be assumed that students form rural areas may feel less motivated to learn through online learning systems in comparison with urban students (Singh & Singh 2011). Therefore, we out the following hypothesis for testing:

H1j:During online learning, students' learning motivation is more prevalent among urban students in comparison with rural students of HEIs in Pakistan

Students grade performance is dependent on all factors discussed in previous sections. Since the learning effectiveness becomes questionable in online learning due to technological, electricity and resource constraints in developing countries and specifically in rural areas, the learning outcomes will suffer (Muthuprasad et al., 2021). These sufferings become more visible in case of rural students who face immense socio-economic and technological challenges during their online classes (Chankseliani et al., 2021). Therefore, we propose the following proposition for testing in the current study:

H1l:During online learning, students' grades were better for urban students in comparison with rural students of HEIs in Pakistan

In order to test these hypotheses, we used survey technique. The next section describe the methodology adopted for this research.

1.2 Research methodology

Based on positivism philosophy we adopted deductive approach to conduct the cross sectional study. We used survey technique and collected data from students of 18 higher education institutions of Pakistan from various parts of the country. We used convenient sampling technique and ensured participation of four provinces (3 institutions from the capital cities of each from Punjab, Kayber Pakhtoon Khawa, Sindh, and Balochistan), two states (one institution each from Azad Jamun Kashmir & Gilgit Baltistan) and the federal capital (3 institutions from Islamabad). In compliance with ethical consideration, we obtained formal approval from the administration of each institution for data collection using online research questionnaires. Data

were collected against a 39-item instrument adapted from (Barnard et al., 2009; Kintu et al., 2016). Details of adapted instruments are provided in Tables 1 and 2.

Initially 920 online questionnaires were sent to these institutions, however only 607 completely/partially filled questionnaires (66% response rate) were received back during one month's data collection period. To ensure maximum response, we sent several reminders through email and mobile messages. After initial data scrutiny, we found 592 useable questionnaires for inclusion in the final data analysis. Demographic analysis indicate that 41% respondents were male and 59% female. Majority (89%) of them belonged to the age group between 20–25 years with 77% students have no job and 16% work part-time. The statistics on regional representation indicate that 37.3% students belonged to Punjab, 19.4% from Islamabad, 22.8% from KPK, 10% from Sindh, 4.9% from Balochistan, 4.4% from Gilgit Baltistan and 1.2% from Azad Kashmir. Since the study revolves around the comparison of opinions of students coming from rural and urban areas, therefore almost equal participation of both urban (51.7%) and rural (49.3%) students was ensured.

2 Results and interpretation

The data collected from urban and rural students of Pakistan were analyzed to compare the perceived effectiveness of online learning systems introduced during COVID-19 in various public and private sector HEIs of Pakistan and are still in use. For this purpose, students were asked to give their opinion about the effectiveness of the online system against selected tools. Moreover, their grades were also compared for the semester in which they were taught online during COVID-19. Results were compared for differences using an independent sample t-test in SPSS version 26.

In order to ascertain the significance of the difference between the two groups, t-statistics were obtained as reported in Table 3. Results indicate that Levine's test for homogeneity of variance was insignificant in some cases and significant in others (mentioned with asterisk). Therefore, we assumed equal variance in all those cases where test of homogeneity was insignificant and used "Equal variance not assumed" values for all cases showing significant homogeneity. The table further indicates that there is a significant difference in opinions of rural and urban students about the perceived effectiveness of online learning systems in terms of goal setting, time management, environmental structure, help-seeking, self-evaluation, their attitude towards blended learning, technology quality, learning motivation, and level of student interaction. In all these cases urban students perceived the online learning system more effective in comparison with rural students. The highest difference was found in the perceived means of time management (mean diff between urban and rural 1.128, $P<0.001$) and the least difference was found in help seeking (mean diff between urban and rural = 0. 0.8284, $P<0.05$). Interestingly in pre-COVID cases, rural students perceive the face-to-face classes more effective than urban students against several dimensions (like goal setting, environment structure, time management, student interaction, self-evaluation, and help seeking), however, it significantly went down during online classes. Similarly, the objective performance of urban and rural students, and their cumulative grade average (CGPA) they obtained

Table 1 Description of research instruments

Variable name (No. of items)	Source	Cronbach's Alpha	Sample Item
1. Goal setting (5)	**Barnard, Paton, & Lan (2008)**	0.857	I set goals to help me manage studying time for my courses
2. Time management (4)		0.684	Although we don't have to attend daily classes, I still try to distribute my studying time evenly across days
3. Environment structure (3)		0. 774	I choose a time with few distractions for studying for my courses
4. Help-seeking (7)		0.633	If needed, I try to meet with my classmates
5. Self-evaluation (3)		0.784	I communicate with my classmates to find out what I am learning that is different from what they are learning
6. Attitude towards blended learning (4)	Kintu and Zhu (2016)	0.849	The interface among various course activities is effective and satisfactory during my class
7. Technology quality(5)		0.730	The internet services available to me are reliable
8. Learning motivation (4)		0.672	I enjoy my learning experience during online class
9. Student-Interaction (4)		0.798	I am satisfied with the level of student-instructor interaction in my class

Table 2 Descriptive analysis

Variables	Urban/Rural	N	Mean	Std. Deviation	Std. Error Mean
Goal Setting BC	URBAN	292	3.819	.47527	.02781
	RURAL	300	3.840	.52986	.03059
Goal Setting DC	URBAN	292	3.709	.53501	.03131
	RURAL	300	2.824	.96247	.05557
Environment structure BC	URBAN	292	4.047	.65626	.03840
	RURAL	300	4.140	.65118	.03760
Environment structure DC	URBAN	292	3.272	.96708	.05659
	RURAL	300	2.363	.93580	.05403
Time Management BC	URBAN	292	3.787	.70711	.04138
	RURAL	300	3.830	.71844	.04148
Time Management DC	URBAN	292	3.359	.85425	.04999
	RURAL	300	2.237	.74044	.04275
Self-evaluation BC	URBAN	292	3.632	.77151	.04515
	RURAL	300	3.873	.79684	.04601
Self-evaluation DC	URBAN	292	3.361	.86307	.05051
	RURAL	300	2.476	1.10731	.06393
Student interaction BC	URBAN	292	4.050	.66304	.03880
	RURAL	300	4.096	.66660	.03849
Student interaction DC	URBAN	292	3.731	.92314	.05402
	RURAL	300	2.670	.96636	.05579
Technology Quality BC	URBAN	292	4.015	.65731	.03847
	RURAL	300	3.999	.70951	.04096
Technology Quality BC	URBAN	292	3.415	.84522	.04946
	RURAL	300	2.587	.89919	.05191
Attitude towards blended learning BC	URBAN	292	4.054	.61377	.03592
	RURAL	300	4.030	.69675	.04023
Attitude towards blended learning DC	URBAN	292	3.312	.90516	.05297
	RURAL	300	2.325	.67798	.03914
Learning Support BC	URBAN	292	3.941	.63614	.03723
	RURAL	300	3.947	.70619	.04077
Learning Support DC	URBAN	292	3.458	.83369	.04879
	RURAL	300	2.606	.88458	.05107
Motivation BC	URBAN	292	3.770	.59142	.03461
	RURAL	300	3.737	.66146	.03819
Motivation DC	URBAN	292	3.315	.77957	.04562
	RURAL	300	2.401	.71692	.04139
Grades BC	URBAN	292	3.023	.49752	.02912
	RURAL	300	3.016	.51395	.02967
Grades DC	URBAN	292	3.016	.49180	.02878

Table 3 Independent sample t-test for differences between urban and rural students

Variables (Before/During COVID-19)		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Goal setting (Before COVID-19)	Before	4.432	.036*	-.520	586.120	.603	-.02149	.04134	-.10269	.05971
	During	145.550	.000*	13.874	470.274	.000	.88492	.06378	.75959	1.01025
Environment structure	Before	.367	.545	-1.713	590	.087	-.09205	.05374	-.19760	.01349
	During	1.159	.282	11.629	590	.000	.90950	.07821	.75590	1.06310
Time management (Before COVID-19)	Before	.701	.403	-.722	590	.470	-.04233	.05860	-.15743	.07277
	During	9.628	.002*	17.088	590	.000	1.12181	.06565	.99287	1.25075
Self-evaluation (Before COVID-19)	Before	.629	.428	-3.736	590	.000	-.24091	.06449	-.36757	-.11426
	During	24.001	.000*	10.865	563.263	.000	.88521	.08147	.72517	1.04524
Student Interaction	Before	.532	.466	-.850	590	.396	-.04644	.05466	-.15378	.06090
	During	1.475	.225	13.663	590	.000	1.06174	.07771	.90911	1.21436
Technology	Before	1.118	.291	.292	590	.770	.01642	.05625	-.09406	.12690
	During	1.799	.180	11.543	590	.000	.82842	.07177	.68747	.96937
Attitude towards blended learning	Before	1.756	.186	.444	590	.658	.02396	.05402	-.08214	.13006
	During	27.704	.000*	14.993	539.123	.000	.98750	.06586	.85812	1.11688
Help-seeking (before COVID-19	Before	2.619	.106	-.103	590	.918	-.00572	.05529	-.11431	.10287
	During	3.222	.073	12.057	590	.000	.85224	.07069	.71341	.99106
Learning motivation (before COVID-19)	Before	.650	.421	.643	590	.520	.03321	.05162	-.06816	.13459
	During	.886	.347	14.861	590	.000	.91442	.06153	.79358	1.03526
Grades (before COVID-19)	Before	.297	.586	.167	590	.868	.00693	.04159	-.07475	.08861
	During	18.833	.000*	6.072	578.136	.000	.26915	.04432	.18209	.35621

* Levine test of homogeneity of variance is significant and therefore assumption is violated therefore, "EQUAL VARIANCE NOT ASSUMED: values are indicated in the table.

in the online learning system (fall 2020) and face-to-face learning (fall 2019) were compared. Results indicate that the mean CGPA of urban students was 3.0169 (SD: 0.49) and for rural students it was 2.747 (SD: 0.51) during online classes. There were significant differences (Mean diff=, 0.27, t=6.072, $p<0.001$) in their grade performance. Whereas this difference (Rural mean: 3.0167, SD: 0.49; Urban mean: 3.023, SD: 0.58; Mean diff=0.00693, $p>0.05$) was negligible in face-to-face classes before COVID-19. Therefore, we accept all the hypotheses as true. Overall, it was found that rural students perceive the effectiveness of online learning significantly less than that of urban students.

3 Discussion

The perceived effectiveness of online learning systems has remained a topic of hot debate in the past (Decoito & Estaiteyeh, 2022; Shah et al., 2022). Students in developing countries with limited resources, teaching–learning technologies, and frequent power breakdowns are facing serious issues in adopting this modern way of learning. However, it has become a necessity for educational institutions since the pandemic (Adnan & Anwar., 2020). Although, the Higher Education Commission (HEC) of Pakistan has significantly collaborated with institutions for adaptation of technology-based learning systems, however still a lot has to be done (Ain, 2020). The current study was initiated to investigate issues linked with the online learning system for urban and rural students of higher education institutions in Pakistan. As hypothesized, the rural respondents indicated serious concerns about the effectiveness of the online system, introduced as an impulsive strategy without proper planning during COVID-19. Their responses indicated that they perceive online learning as less effective in terms of goal setting, time management, environmental structure, help-seeking, self-evaluation, attitude towards blended learning, technology quality, learning motivation, and level of student interaction in comparison with the urban students during online learning systems. Consequently, their grade performance was also found significantly lesser than that of their urban classmates during the online semester, whereas there was a negligible difference between these groups before COVID-19. They indicated special concerns regarding the opportunities to seek help, the quality of technology available to them, to teachers, and the LMS, introduced by their respective institutions during online classes. These results are in line with the findings of previous research conducted (Al-Fraihat et al., 2020) in different contexts which found that the perceived effectiveness of online learning is dependent on the availability of resources.

The new normal after COVID-19, is very different from the one we had previously before the pandemic. Since institutions have equipped themselves with online teaching learning technologies, they can rely on mixed methods and blended learning systems in the future. Although, during the current study rural respondents have shown dissatisfied behavior toward blended learning, the new system is in vogue despite its limitations. It is expected that future institutions will utilize blended learning technologies and methods with more effective and advanced learning processes (Shakeel et al., 2023). These results endorse the findings of (Bergdah et al., 2021), where they emphasized on the need to address issues of geographic social exclusion of students from

remote areas during online learning. Understanding these differences can help identify disparities in access to technology and internet connectivity between urban and rural areas. Urban areas typically have better infrastructure and higher internet penetration rates compared to rural areas. Therefore, studying perceptions can shed light on how these disparities impact the adoption and effectiveness of online learning systems for students in different geographic locations. can inform policy decisions aimed at bridging the digital divide and promoting equitable access to education. By understanding the unique needs and challenges faced by students in different settings, policymakers can develop initiatives to expand broadband infrastructure, provide technology subsidies, and offer training programs to enhance digital literacy skills.

The results of the current study are also in line with the postulations of social justice theory in education (Mclntosh, 2023). The theory of social justice postulates that the outcomes or performance evaluation criteria should be linked with the resources and opportunities provided to the individual to perform. In other words, it was against the phenomenon of social justice to apply the same evaluation criteria for assessing the learning performance of rural and urban students without giving them equal learning opportunities and resources during online learning systems (Marongedza et al., 2023).

As suggested by (Zhao et al., 2022) the current study has also provided empirical evidence that students from rural areas are not less than urban students in terms of their academic grade performance in normal settings. That is why it was found that the difference in their grade performance during normal settings was negligible and not significant, however during online learning their performance went down significantly in comparison with urban students. These results raise serious questions on the inclusion policy of higher education institutions, where a significant population coming from rural areas is not satisfied with their online learning systems. In other words, they have to think and devise solutions to deal with these issues.

4 Research implications and conclusion

The current study is a useful knowledge contribution with important implications for multiple stakeholders including higher education institutions and policymakers. The higher education institutions are required to follow the social justice policy by providing quality education to all and the same was required in online learning systems. However, it was perceived as less effective by students from hard areas as they had fewer opportunities and resources to learn at par with urban students during online classes. Since in the majority of cases, students coming from hard areas belong to low-income strata of the society, they have limited access and resources to acquire ICT and use it for educational purposes. Therefore, such students should be provided resources (like laptops, easy loans, etc.) to acquire the requisite technology for educational use. Additionally, the strength of the internet signals poses serious concerns for students to get connected and join the classes. Therefore, mobile companies can be involved for collaboration in this regard. Also, mobile internet modems and WiFi technologies can be provided to such students to increase their accessibility.

Another important step can be the provision of hostel residence with ICT facilitation to ensure their active participation in the process. Blended learning systems should be made mandatory for all institutions (Brown et al., 2022) so that both students and teachers are comfortable with both systems and may utilize these to achieve optimal performance. Moreover, research and development-related activities in the field should be encouraged to find new indigenous solutions to such issues. Additionally, reliable and up-to-date ICT infrastructure and open/easy access to learning and digital tools, and online resources including online databases, e-journals, e-books, etc. may be ensured for teachers and students from urban and rural areas. Such systems are very important to ensure the fruits of the educational system reach people living in hard-to-reach areas with limited access to these resources.

The current study has special implications for the policy-makers and the government as well. Online learning system was introduced as a stop-gap solution for educational institutions to cope with the disruptions caused by the pandemic. However, it lacked proper planning and institutions were not physically and psychologically prepared for it. Therefore, in most cases, the student raised serious concerns about the perceived effectiveness of such a system. Moreover, infrastructure-related issues like the provision of uninterrupted electricity, speedy internet services with no distraction, and availability of requisite resources at affordable prices for all, created serious stress and anxiety among students and teachers. Therefore, in order to ensure the continuity of blended learning, the governments must ensure that regular and uninterrupted electricity is available to all, or at least a proper schedule should be provided for load-shedding. Moreover, the internet service is available to all at affordable prices. In addition to these, the policymaker may also do necessary legislation to make the blended learning system a part of the regular learning process for all in new-normal situations.

The current study has also provided several avenues for researchers to explore in future research. This study was conducted using online data collection techniques, which caused issues and limitations in sample size. Moreover, as indicated by Shurygin et al., (2022) teacher training and institutional support can enhance the effectiveness of the learning process. Therefore, the moderating mechanism of this variable can be explored in the future. The current study focused on comparing the responses of rural and urban students about the perceived effectiveness of online learning systems. Therefore, future research may include teachers' perceptions on issues in the adoption of ITC-based teaching/learning modes should also be considered, especially from the perspective of developing countries (D'agostino et al., 2022). Additionally, the perceived effectiveness of various online assessment methods can also be made part of future research. Online learning is an important mode of learning that can help educationists increase the effectiveness and outreach of knowledge to all on an equitable basis. Therefore, in future the institutions must incorporate online and blended learning systems as part of the regular processes. This will gradually improve the effectiveness of the online learning system. The current study was based on perceptions of students about online learning systems during COVID-19, however in the post COVID era, the online technologies and techniques have become a regular part of routine processes and institutions are increasingly adopting blended/hybrid learning systems. A new study is required to assess the effectiveness of hybrid systems in the post COVID-19 era.

Data availability Data is available with researchers and can be made available upon reasonable request.

Declarations

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