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Digital divide among college teachers: Assessing faculty's information and communication technology access

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Abstract

The study highlighted the digital divide as not only a technological divide but also a socio-cultural divide. In the present study, we examined the digital divide of college teachers through ICT access by taking demographic variables like gender, locality, age, teaching experience, academic streams, and type of colleges. We selected approximately 158 college teachers from the Bargarh district of Odisha, covering government, aided, and private colleges, as participants for the study. We collected primary data on ICT access among college teachers to study the digital divide. The digital divide among college teachers was examined with reference to ICT access, physical access, motivational access, skill access, and usage access. In the present study, about 43.67% of teachers had high ICT access, while about 56.33% of teachers had low ICT access. Physical access and usage access of urban college teachers were significantly higher than those of rural teachers. ICT access, physical access, skill access, and usage access among college teachers below the average age were significantly higher than among teachers above the average age. ICT access and skill access of college teachers with below-average teaching experience were significantly higher than the teachers having above-average teaching experience. College teachers in commerce streams had higher physical access to ICT. ICT access among private college teachers was significantly higher as compared to government and aided colleges. From the results, it can be inferred that demographic variables were responsible for the digital divide among college teachers to some extent.

Keywords

Digital divide, ICT access, motivational access, physical access, skill access.

INTRODUCTION

Information and Communication Technology (ICT) is a powerful tool for bringing qualitative improvement in education in the present context. It connects learning activities to real-life situations for the learners [1]. ICT also works as a supplement for instruction, learning, assessment, and evaluation [2]. ICT has potential for learners' academic growth in many ways as learning is a lifelong process [3]. ICT plays a vital role in expanding educational access as it can be used anytime, anywhere, and by anyone who has basic ICT skills. With the help of ICT online educational materials are prepared which can be accessed anytime for the learners. ICT is one of the most important instruments for both students and teachers. From the teacher's perspective, it helps to prepare multimedia reference materials for making the teaching-learning process interesting and joyful. Teachers also get access to updated information and reference materials by using the internet. It also helps teachers to gain an understanding of innovative teaching

methodologies and their implementation in the educational setting. As far as the importance of ICT in education is concerned it can be stated that ICT helps in accessing and promoting e-learning/online learning, bringing inclusion in education, developing literacy and capabilities of using ICT, enhancing subject learning, encouraging collaboration, motivating students for learning, integrating ICT in curriculum, etc. From the students' perspectives, it helps them to learn 21st-century skills, assists in developing their ICT capabilities and literacy, enhances their achievement levels, and fosters the notion of using ICT as a lifelong learning tool. So; it can be said that ICT has wide educational implications and, in this regard, ICT provides more educational affordances and possibilities [2]. In the present era of globalization and modernization [4], ICT is considered to be one of the most significant and powerful aspects of the development of a nation [5], [6].

In a general sense, the lag between people or demographics that have access to modern ICT usage and those that don't is called as digital divide. It encompasses technical abilities for the use of available ICT facilities. It is based on constantly shifting with the development of ICT-based interventions. It also refers to the divide in digital perspective in matters of material, non-material, social, educational, and other allied aspects [7]. In the past time, it was defined in a narrower sense with reference to access to digital technology access [8]. In the late 20th century, the term digital divide was used and it was described as a gap in terms of smartphone users and non-users. The digital divide is also based on the urban-rural divide, but nowadays, ICT-based facilities have reached most villages. As a result, the gap is being minimized to some extent. In this regard, it can be said that the digital divide is a complex phenomenon [9], which is multidimensional. It has gained its importance with the advent of the "World Wide Web" (WWW) across the globe [8]. Isolation is the most important consequence of the digital divide which leads to educational barriers and also influences mental health, so in this regard, positive assumptions are made for bridging the gaps of the digital divide for the development of the nation [10]. The digital divide is usually found in different developed countries too [11], [12] as it is affected by some sorts of demographic variables viz. gender, socio-economic status, age, ethnicity, etc. [4], [8], [13], [14]. Hohlfeld et al. [15] developed a framework for the digital divide from the school perspective in terms of components of ICT (software, hardware, etc.), technology usage (by students and teachers), and the empowerment of students. According to Hanafizadeh et al. [6], the "digital divide can be explained in terms of physical access, use of technology and purpose and quality of ICT". However, these models focused digital divide in terms of physical access, but except this aspect mental and motivational readiness also plays a vital role which was emphasized in the theoretical framework of van Dijk [8].

The model of van Dijk [8] rejects the narrower explanation of the digital divide and attempts to examine the digital divide in a multifaceted way based on a theoretical base. Van Dijk [8] defined four levels of ICT access viz. motivation attitude, physical access, digital skills, and usage with reference to technical design and properties. Van Dijk [8] also highlighted five important resources viz. temporal, material (income), mental (knowledge), social (relationships), and cultural. In the model of van Dijk [8], some of the demographic variables were taken into account i.e., age, gender, ethnicity, education, and nation for the explanation of the digital divide, and in this regard, two sides were formed i.e., the right side and wrong side. The model reflected male people, young people, people with higher education and higher occupation, urban people, and people from a developed country on the right side, and other people were included on the wrong side.

The digital divide is a universal in nature which is visible in almost all parts of the globe. So, from the analysis of related literature, it can be said that different factors influence the digital divide in different contexts. Blanchard et al. [16] investigated the digital divide among people and found that younger individuals have higher quality access to technology. The study also highlighted the use of ICT as a resource for the promotion of mental health. Bhattacharjee and Bhattacharjee [17] surveyed the status of the digital divide in Indian education with reference to locality and found a high digital divide in rural areas. However, the study made a comparative analysis of different regions of India and revealed different results in terms of locality. Sanders and Scanlon [18] surveyed the digital divide with reference to the human rights issue for the advancement of social inclusion in the American

context. The study attempted to examine the digital divide in terms of various demographic variables and revealed that people with low income, older age, and those living in rural areas had limited access to technology. The study recommended digital inclusion for people to reduce the digital divide. Drossel et al. [19] made an in-depth analysis of schools overcoming the digital divide and found that the schools located in socio-economically disadvantaged areas are engaged in facilitating the digital literacy of learners and encouraging ICT-based learning. Basu [20] studied the digital divide and inequalities in relation to school education during the COVID-19 period, taking into account both parents and teachers. The study revealed geographical disparities, technology deployment cost, and socioeconomic factors as significant predictors of the widening digital divide. The study also highlighted the digital divide as not only a technological divide but also a socio-cultural divide. The socio-cultural divide includes factors such as demographics, cultural practices, attitudes, geographical location, and learned social groups.

Considering fewer research studies in the context of Odisha, and inconsistent research findings, the investigators were keen to study the digital divide among college teachers using faculty ICT access, physical access, motivational access, skill access, and usage access.

Objectives of the study

The study's objective is: (1) to study the level of digital divide among college teachers through ICT access, focusing on motivational, physical, skill, and usage factors; and (2) to compare the digital divide among college teachers in terms of gender, locality, teaching experience, type of college, academic streams, and age.

Hypotheses of the study

Some hypotheses are: (H1) the male and female college teachers do not differ significantly in terms of ICT access, (H2) the urban and rural college teachers do not differ significantly in terms of ICT access, (H3) the college teachers having high and low teaching experience do not differ significantly in terms of ICT access, (H4) the government college teachers, aided college teachers, and private college teachers do not differ significantly in terms of ICT access, (H5) the college teachers of Arts, Science, and Commerce streams do not differ significantly in terms of ICT access, and (H6) the college teachers do not differ significantly in ICT access in terms of their age.

RESEARCH METHOD

In the present study, the investigators used the descriptive and comparative method of research to investigate ICT access among college teachers descriptively and compare in terms of demographic variables.

Participants

All the college teachers of Bargarh, Odisha affiliated with Sambalpur University were the population. Out of these, 158 college teachers were randomly selected for this study based on demographic variables. First of all, a list of government, government-aided and private colleges of Bargarh was prepared, and from which randomly colleges were selected through a lottery method. The final list of the sample was prepared to take into account demographic variables like gender, locality, teaching experience, type of college, and academic streams, in Table 1.

Table 1. Variable-wise distribution of sample with N and percentages

Variables	N	%	Variables	N	%
Gender			Academic streams		
Male	98	62.03%	Arts	89	56.33%
Female	60	37.97%	Science	47	29.75%
Locality			Commerce	22	13.92%
Urban	71	44.93%	Teaching experience		
Rural	87	55.06%	High experience	57	36.08%
Type of college			Low experience	101	63.92%
Government	36	22.78%	Age		
Government-Aided	71	44.94%	Below average	95	60.12%
Private	51	32.28%	Above average	62	39.24%

The age group of the participants ranged from 28-60 years. The response sheet was analysed in terms of the nature of the response given by the participants. Both exclusion and inclusion criteria were followed strictly. Respondents who provided an incomplete response, repeated response, or false response were excluded from the study, and other respondents were included. The Table-1 shows the variable-wise number of samples with percentage.

Instrument

The Faculty's Information and Communication Technology Access (FICTA) scale developed and standardized by Soomro et al. [21] was used in the present study with the permission of the authors. The original version of the scale consisted of 57 items, which was standardized on 322 faculty members having four important dimensions viz. "motivational, physical, skills, and usage access". In the present study, the original FICTA scale was modified and finally, 35 items were taken into account based on the views of experts. The validity of the scale was established by taking the opinion of subject experts and research scholars. The reliability of the modified scale was estimated by Cronbach's alpha reliability, which was found to be 0.72. Primary data was collected from the teachers of selected colleges by administering the scale with their prior permission. The obtained data were analysed following both descriptive and inferential statistics. As the obtained data fulfilled the assumption of normality, parametric tests were used for comparison purpose.

RESULT AND DISCUSSION

The level of ICT access among college teachers is the section dedicated to the first objective of this study. Besides that, it pertains to the second objective.

Level of ICT access among college teachers

In the present study, digital divide has been examined in terms of faculty's ICT access. First of all, a descriptive analysis was made to gain an understanding of the level of ICT access among college teachers in relation to physical access, motivational access, skill access, and usage access. For this, the percentage technique was used. the mean scores of ICT access, physical access, motivational access, skill access, and usage access were calculated, and based on the mean scores two groups were formed i.e., the number of faculty having high (above mean score) access and the number of faculty having low access (below mean score). The percentage of high and low ICT access has been mentioned in Table 2.

Table 2. Level of ICT Access in terms of N and percentage

Variables	Levels	N	Percentage
ICT Access	High	85	53.80%
	Low	73	46.20%
Physical Access to ICT	High	69	43.67%
	Low	89	56.33%
Motivational Access to ICT	High	100	63.29%
	Low	58	36.71%
Skill Access to ICT	High	111	70.25%
	Low	47	29.75%
Usage Access of ICT	High	107	67.72%
	Low	51	32.28%

Table 2 reveals the level of ICT access in percentage in relation to physical access, motivational access, skill access, and usage access. As shown in the table, approximately 53.80% of college teachers have high ICT access, while about 46.20% have low ICT access. Therefore, it can be concluded that the digital divide still exists in the colleges of Bargarh district. As far as the level of physical access is concerned about 43.67% of teachers were having high access and about 56.33% and teachers were having low access, so it can be said that ICT-based materials are not available to a great extent in colleges. About 63.29% of teachers were having a high level of motivational access, but about 36.71% of teachers were having low

motivational access, so it can be said that a smaller number of teachers were having low motivational access. Regarding the level of skill access, approximately 70.25% of teachers had high levels, while about 29.75% had low skill access. In terms of usage access, about 67.72% of teachers had high levels, and approximately 32.28% had low levels. Therefore, it can be concluded that the majority of teachers had a high level of usage access to ICT.

An attempt was made to analyse the level of ICT access descriptively by taking into account demographic variables like gender, locality, type of college, teaching experience, and age. For this level wise Mean, SD and N were calculated for ICT access as mentioned in Table 3.

Table 3. Descriptive Statistics of ICT access in terms of demographic variables

Variables	Mean	SD	Variables	Mean	SD
Gender			Academic streams		
Male	92.37	21.04	Arts	91.53	21.10
Female	95.83	18.52	Science	95.06	18.28
Locality			Commerce	99.45	19.28
Urban	97.07	17.11	Teaching experience		
Rural	90.92	22.00	High experience	86.58	21.99
Type of college			Low experience	97.69	17.89
Government	88.61	16.38	Age		
Government-Aided	89.54	22.57	Below average	99.15	17.44
Private	103.04	15.47	Above average	85.11	21.23

Table 3 reveals a descriptive comparison of ICT access among college teachers in terms of demographic variables to gain knowledge of the extent of the digital divide among them. As far as the mean scores of the demographic variables, it can be observed that in almost all levels, the mean scores are nearly the same with slight variations. However, in the case of private colleges, the mean score is the highest at 103.04. Therefore, it can be concluded that ICT access in private colleges is comparatively higher than in other colleges. Regarding the age of college teachers, it was found that those above the average age had the lowest ICT access. Additionally, urban college teachers had high access, while teachers with low teaching experience also had high access. In terms of academic streams, commerce teachers demonstrated high access to ICT. Based on the analysis of the descriptive results, it can be concluded that demographic variables contributed to the digital divide among college teachers to some extent. However, to gain a deeper understanding of the differences in ICT access among college teachers, inferential analysis was also conducted, as mentioned.

Comparative analysis of ICT access in terms of gender

In the present study, gender was taken as a demographic variable, in two levels (male and female). Therefore, an independent sample *t*-test was used. The comparative analysis results are shown in Table 4.

Table 4. Comparative Analysis in terms of Gender

Parameters	Gender	N	Mean	SD	*df*	*t*-value	*p*-value
ICT Access	Male	98	92.37	21.041	156	1.05	.295
	Female	60	95.83	18.522			
Physical access	Male	98	4.91	2.433	156	1.10	.275
	Female	60	5.33	2.252			
Motivational access	Male	98	14.93	4.087	156	0.331	.741
	Female	60	14.72	3.571			
Skill access	Male	98	36.48	7.773	156	0.698	.486
	Female	60	35.65	6.286			
Usage access	Male	98	44.04	11.324	156	1.24	.216
	Female	60	46.32	10.913			

Table 4 reveals a comparative analysis of ICT access among college teachers in terms of gender, where physical access, motivational access, skill access, and usage access were taken into account. From the table, it is seen that the *t*-value of ICT access, physical access, motivational access, skill access, and usage access in terms of gender was found to be 1.05, 1.10, 0.331, 0.698, and 1.24 respectively, but these values were found to be insignificant at 0.05 level (*p*-value>0.05). Thus, the null hypotheses that the male and female college teachers do not differ significantly in terms of ICT access, physical access, motivational access, skill access, and usage access are not rejected. Therefore, it can be concluded that ICT access between male and female college teachers in relation to physical access, motivational access, skill access, and usage access was found to be similar.

Comparative Analysis of ICT access in terms of Locality

In the present study, the locality was taken as a demographic variable. The locality was having two levels (urban and rural). Therefore, *t*-test was used. The results of the comparative analysis are presented in Table 5.

Table 5. Comparative Analysis in terms of locality

Parameters	Locality	N	Mean	SD	*df*	*t*-value	*p*-value
ICT Access	Urban	71	97.07	17.111	156	1.92	.056
	Rural	87	90.92	22.009			
Physical access	Urban	71	5.70	2.213	156	3.13	.002
	Rural	87	4.55	2.376			
Motivational access	Urban	71	14.76	3.635	156	0.255	.799
	Rural	87	14.92	4.104			
Skill access	Urban	71	36.48	5.667	156	.492	.623
	Rural	87	35.91	8.323			
Usage access	Urban	71	47.28	10.187	156	2.45	.015
	Rural	87	42.97	11.646			

Table 5 reveals a comparative analysis of ICT access among college teachers in terms of locality, where physical access, motivational access, skill access, and usage access were taken into account. From the table, it is seen that the *t*-value of physical access in terms of locality was found to be 3.13, which was significant at the 0.01 level (*p*-value<0.01), and the mean score was in favour of urban teachers (5.70>4.55), therefore it can be said that physical access of urban college teachers is significantly higher than the rural teachers. The *t*-value of usage access in terms of locality was found to be 2.45, which was significant at 0.05 level (*p*-value<0.05), and the mean score was in favour of urban teachers (47.28>42.97), therefore it can be said that usage access of urban college teachers is significantly higher than the rural teachers. The *t*-value of ICT access, motivational access, and skill access in terms of locality was found to be 1.92, 0.255, and 0.492 respectively, but these values were insignificant at 0.05 level (*p*-value>0.05). Thus, the null hypotheses that the urban and rural college teachers do not differ significantly in terms of ICT access, motivational access, and skill access are not rejected. Therefore, it can be concluded that ICT access between urban and rural college teachers in relation to motivational access and skill access is found to be similar.

Comparative analysis of ICT access in terms of age

In the present study, age was taken as a demographic variable. Age was having two levels i.e., above average age and below average age. Therefore, *t*-test was used to compare the ICT access between average age and below-average age college teachers.

Table 6 reveals a comparative analysis of ICT access among college teachers in terms of age, where physical access, motivational access, skill access, and usage access were taken into account. From the table, it is seen that the *t*-value of ICT access in terms of age was found to be 4.52, which was significant at 0.01 level (*p*-value<0.01), and the mean score was in favour of teachers having below-average age (99.15>85.11), therefore it can be said that ICT access of college teachers of below average age is significantly higher than the teachers having

above average age. The *t*-value of physical access in terms of age was found to be 3.31, which was significant at 0.01 level (*p*-value<0.01), and the mean score was in favour of teachers having below average age (5.55>4.31), therefore it can be said that physical access of college teachers of below average age is significantly higher than the teachers having above average age.

Table 6. Comparative Analysis in terms of age

Parameters	Age	N	Mean	SD	*df*	*t*-value	*p*-value
ICT Access	Above average	62	85.11	21.229	156	4.52	.000
	Below average	95	99.15	17.443			
Physical access	Above average	62	4.31	2.309	156	3.31	.001
	Below average	95	5.55	2.291			
Motivational access	Above average	62	14.77	3.994	156	0.222	.825
	Below average	95	14.92	3.856			
Skill access	Above average	62	34.50	8.535	156	2.31	.022
	Below average	95	37.19	6.075			
Usage access	Above average	62	41.69	12.074	156	2.93	.004
	Below average	95	46.94	10.156			

The *t*-value of skill access in terms of age was found to be 2.31, which was significant at 0.05 level (*p*-value<0.05), and the mean score was in favour of teachers having below average age (37.19>34.50), therefore it can be said that skill access of college teachers of below average age is significantly higher than the teachers having above average age. The *t*-value of usage access in terms of age was found to be 2.93, which was significant at 0.01 level (*p*-value<0.01), and the mean score was in favour of teachers having below average age (46.94>41.69), therefore it can be said that usage access of college teachers of below average age is significantly higher than the teachers having above average age. As far as motivational access to ICT in terms of age is concerned, the *t*-value was found to be insignificant.

Comparative analysis of ICT access in terms of teaching experience

In the present study, teaching experience was taken as a demographic variable. The teaching experience was having two levels i.e., above average and below average teaching experience. Therefore, *t*-test was used to compare the ICT access between college teachers having above-average and below-average teaching experience.

Table 7. Comparative Analysis in terms of teaching experience

Parameters	Teaching Experience	N	Mean	SD	*df*	*t*-value	*p*-value
ICT Access	Above average	57	86.58	21.997	156	3.45	.001
	Below average	101	97.69	17.898			
Physical access	Above average	57	4.72	2.426	156	1.40	.163
	Below average	101	5.27	2.323			
Motivational access	Above average	57	14.12	4.524	156	1.77	.078
	Below average	101	15.26	3.437			
Skill access	Above average	57	34.68	8.375	156	2.65	.009
	Below average	101	37.91	6.723			
Usage access	Above average	57	41.05	12.360	156	3.36	.001
	Below average	101	47.08	9.889			

Table 7 reveals a comparative analysis of ICT access among college teachers in terms of teaching experience, where physical access, motivational access, skill access, and usage access were taken into account. From the table, it is seen that the *t*-value of ICT access in terms of teaching experience was found to be 3.45, which was significant at 0.01 level (*p*-value<0.01), and the mean score was in favour of teachers having below-average teaching experience (97.69>86.58), therefore it can be said that ICT access of college teachers of below average teaching experience is significantly higher than the teachers having above average teaching

experience. The *t*-value of skill access in terms of teaching experience was found to be 2.65, which was significant at 0.05 level (*p*-value<0.05), and the mean score was in favour of teachers having below average teaching experience (37.91>34.68), therefore it can be said that skill access of college teachers of below average teaching experience is significantly higher than the teachers having above average teaching experience. The *t*-value of usage access in terms of teaching experience was found to be 3.36, which was significant at 0.01 level (*p*-value<0.01), and the mean score was in favour of teachers having below average teaching experience (47.08>41.05), therefore it can be said that skill access of college teachers of below average teaching experience is significantly higher than the teachers having above average teaching experience. As far as physical access and motivational access of college teachers in terms of teaching experience are concerned, the *t*-values were found to be insignificant.

Comparative analysis of ICT access in terms of streams

In the present study, the stream was taken as a demographic variable. The stream was having three levels i.e., arts, science, and commerce. Therefore, Analysis of Variance (ANOVA) was used to compare the ICT access among college teachers of the arts, science, and commerce streams.

Table 8. Descriptive Statistics of ICT access in terms of stream

Parameters	Streams	N	Mean	SD
Physical Access	Arts	89	4.61	2.534
	Science	47	5.51	1.999
	Commerce	22	6.00	2.000
	Total	158	5.07	2.368
Motivational Access	Arts	89	15.09	3.857
	Science	47	14.64	3.767
	Commerce	22	14.32	4.358
	Total	158	14.85	3.889
Skill Access	Arts	89	36.99	8.262
	Science	47	36.85	5.838
	Commerce	22	35.55	7.608
	Total	158	36.75	7.499
Usage Access	Arts	89	43.42	11.664
	Science	47	45.13	10.962
	Commerce	22	50.45	7.812
	Total	158	44.91	11.190
ICT Access	Arts	89	91.53	21.097
	Science	47	95.06	18.280
	Commerce	22	99.45	19.343
	Total	158	93.68	20.132

Table 8 shows descriptive data of ICT access among college teachers with reference to streams. As per the data, it can be found that the mean scores of ICT access, physical access, motivational access, skill access, and usage access of college teachers differ descriptively. But in order to gain an understanding of significant variations in the ICT access, *F*-test was run and the results are as follows.

Table 9 shows variations in the mean scores of ICT access, physical access, motivational access, skill access, and usage access among college teachers of arts, science, and commerce streams. The table above reveals the *F*-test score of physical access and usage access as 4.396 and 3.620 respectively, which were found to be significant at 0.05 level. Thus, the null hypotheses that the college teachers of the Arts, Science, and Commerce stream do not differ significantly in terms of physical access and usage access were rejected. As the *F*-values of physical and usage access were found as significant, so Post Hoc Test (Scheffe) was run to gain an understanding of the exact group difference. However, the *F*-values of motivational access, skill access, and ICT access

were found to be 0.442, 0.330, and 1.535, which were found to be insignificant at 0.05 level. Thus, the null hypotheses that the college teachers of the Arts, Science, and Commerce stream do not differ significantly in terms of motivational access, skill access, and ICT access were not rejected.

Table 9. ANOVA in terms of academic streams

Parameters	Groups	Sum of Squares	*df*	Mean Square	*F*	Sig.
Physical access	Between Groups	47.254	2	23.627	4.396	.014
	Within Groups	832.981	155	5.374		
	Total	880.234	157			
Motivational Access	Between Groups	13.450	2	6.725	.442	.644
	Within Groups	2360.905	155	15.232		
	Total	2374.354	157			
Skill access	Between Groups	37.473	2	18.736	.330	.719
	Within Groups	8790.401	155	56.712		
	Total	8827.873	157			
Usage access	Between Groups	877.269	2	438.635	3.620	.029
	Within Groups	18780.307	155	121.163		
	Total	19657.576	157			
ICT Access	Between Groups	1235.734	2	617.867	1.535	.219
	Within Groups	62396.443	155	402.558		
	Total	63632.177	157			

Table 10 shows the results of the post-hoc (Scheffe) test of physical access and usage access of ICT among college teachers. As per the table, it can be said that college teachers of arts, science, and commerce streams differ significantly in terms of physical access. In this regard, the result of the Scheffe test indicates a significant positive mean difference (1.393) between commerce streams as compared to the arts and science streams. Thus, it can be said that college teachers in commerce streams have higher physical access to ICT. As far as the results of usage access of ICT is concerned, it can be noticed that the mean difference (7.039) of college teachers of the commerce stream was again significant and positive as compared to the arts and science stream, so it can be stated that the usage access among commerce teachers was found to be higher as compared to arts and science teachers.

Table 10. Multiple Comparison (Scheffe) in terms of academic streams

Dependent Variable	(I) Stream	(J) Stream	Mean Difference (I-J)	Std. Error	Sig.
Physical access	Arts	Science	-.904	.418	.100
		Commerce	-1.393	.552	.044
	Science	Commerce	-.489	.599	.717
Usage access	Arts	Science	-1.712	1.985	.690
		Commerce	-7.039	2.621	.029
	Science	Commerce	-5.327	2.843	.176

Comparative analysis of ICT access in terms of type of college

In the present study, the type of college was taken as a demographic variable. The type of college was having three levels i.e., government, aided, and private. Therefore, ANOVA was used to compare the ICT access among college teachers of the arts, science, and commerce streams.

Table 11 shows descriptive data on ICT access among college teachers with reference to the type of college. As per the data, it can be found that the mean scores of ICT access, physical access, motivational access, skill access, and usage access of college teachers differ descriptively. But in order to study significant variations in the ICT access, *F*-test was run and the results are as follows.

Table 11. Descriptive statistics in terms of type of college

Parameters	Type of College	N	Mean	SD
Physical Access	Government	36	5.67	2.255
	Aided	71	4.58	2.388
	Private	51	5.33	2.321
	Total	158	5.07	2.368
Motivational Access	Government	36	13.89	4.432
	Aided	71	15.08	3.981
	Private	51	15.20	3.268
	Total	158	14.85	3.889
Skill Access	Government	36	34.75	6.859
	Aided	71	37.41	8.888
	Private	51	37.24	5.413
	Total	158	36.75	7.499
Usage Access	Government	36	43.72	9.133
	Aided	71	43.23	12.327
	Private	51	48.08	10.332
	Total	158	44.91	11.190
ICT Access	Government	36	88.61	16.382
	Aided	71	89.54	22.569
	Private	51	103.04	15.474
	Total	158	93.68	20.132

Table 12 shows variations in ICT access among govt. college teachers, aided, and private colleges in terms of physical access, motivational access, skill access, and usage access. As per the table, it is revealed that the ICT access among teachers of government, aided and private colleges were found to be significant at 0.01 level. Thus, the null hypothesis that the college teachers of government, aided, and private colleges do not differ significantly in terms of ICT access was rejected. Further, the posthoc test was used to gain an understanding of the exact group difference. The *F*-values of physical access, motivational access, skill access, and usage access were found to be 3.074, 1.438, 1.675, and 3.135 respectively, but these were found to be insignificant at 0.05 level, so null hypotheses were accepted in this regard.

Table 12. ANOVA in terms of college types

Parameters	Groups	Sum of Squares	*df*	Mean Square	*F*	Sig.
Physical access	Between Groups	33.577	2	16.788		
	Within Groups	846.657	155	5.462	3.074	.049
	Total	880.234	157			
Motivational access	Between Groups	43.267	2	21.633		
	Within Groups	2331.088	155	15.039	1.438	.240
	Total	2374.354	157			
Skill access	Between Groups	186.792	2	93.396		
	Within Groups	8641.081	155	55.749	1.675	.191
	Total	8827.873	157			
Usage access	Between Groups	764.273	2	382.137		
	Within Groups	18893.303	155	121.892	3.135	.046
	Total	19657.576	157			
ICT Access	Between Groups	6612.038	2	3306.019		
	Within Groups	57020.139	155	367.872	8.987	.000
	Total	63632.177	157			

Table 13 shows the results of the Scheffe test of ICT access among college teachers. As per the table, it can be said that college teachers of government, aided and private colleges differ significantly in terms of ICT access. In this regard, the result of the Scheffe test indicates a significant positive mean difference between private college teachers as compared to aided and government college teachers. Thus, it can be said that the ICT access among private college teachers was significantly higher as compared to government and aided colleges.

Table 13. Multiple Comparison (Scheffe) in terms of type of college

Dependent Variable	(I) College Type	(J) College Type	Mean Difference (I-J)	Std. Error	Sig.
ICT Access	Government	Aided	-.924	3.924	.973
		Private	-14.428	4.175	.003
	Aided	Private	-13.504	3.521	.001

Discussion of results

In the present study, approximately 43.67% of teachers had high access, while about 56.33% had low access. About 63.29% of teachers had a high level of motivational access, while about 36.71% had low motivational access. Regarding skill access, it was found that approximately 70.25% of teachers had high levels, while about 29.75% had low skill access. Additionally, about 67.72% of teachers had high levels of access, while about 32.28% had low levels. From the analysis of the descriptive results of ICT access, it can be inferred that some demographic variables have a direct influence on ICT access, as a result of which variations are seen in this regard. ICT access in a private college is comparatively higher as compared to other colleges. The possible factors may be developed infrastructure and availability of timely funding in private colleges. As far as the age of the college teachers is concerned, it was found that teachers above the average age had the lowest ICT access. In this case, the possible reason may be that young teachers are more acquainted with the use of technologies since their childhood, and older teachers are not getting the same opportunity. Additionally, regarding locality, urban college teachers had high access. In terms of teaching experience, teachers with low teaching experience had high access. For academic streams, commerce teachers had high access to ICT. Urban college teachers live in the city where the use of technological devices may be seen in almost all contexts. Similarly, younger teachers may have received training in using technology in educational settings and may be familiar with ICT from the very beginning. In this context, commerce teachers may be utilizing ICT to a great extent, as they engage in database-related work and gain an understanding of business plan design through ICT. ICT access between male and female college teachers in relation to physical access, motivational access, skill access, and usage access was found to be similar. No significant variations were noticed in ICT access with respect to gender. This finding was in contrast with the finding of Soomro et al. [21], who discovered higher ICT access in support of male teachers as compared with females.

The physical access of urban college teachers is significantly higher than that of rural teachers. Usage access of urban college teachers is significantly higher than that of rural teachers. These findings were similar to the findings of Bhattacharjee and Bhattacharjee [17], who found out high digital divide in the case of teachers of rural areas and indicated that the teachers of urban areas were having higher ICT access. ICT access between urban and rural college teachers in relation to motivational access and skill access is found to be similar. So, it can be inferred that the teachers of urban and rural areas are highly motivated to use ICT. ICT access, physical access, skill access, and usage access of college teachers of below-average age were significantly higher than the teachers having above average age. These findings are similar to the results of Blanchard et al. [16], Thunman and Persson [22], Soomro et al. [23], Soomro et al. [21], who indicated that young people use ICT more than elders. The possible reasons may be due to the rapid change of traditional society into technological society, as a result of which the young people are getting ICT-based opportunities to use their talents earn for livelihood. As far as motivational access to ICT in terms of age is concerned, the result was found to be insignificant. It may be due to the high interest of faculty members of different types of colleges. ICT access of college teachers with below-average teaching experience is significantly higher than the teachers having

above average teaching experience. Skill access of college teachers with below-average teaching experience is significantly higher than the teachers having above average teaching experience. These findings were found to be similar to the findings of Blanchard [16] and Soomro et al. [21]. As far as physical access and motivational access of college teachers in terms of teaching experience are concerned, the *t*-values were found to be insignificant. College teachers in commerce streams have higher physical access to ICT. The usage access among commerce teachers was found to be higher as compared to arts and science teachers. This finding is a new one, as no such earlier findings were found similar to this. The commerce teachers may use highly ICT-based materials as compared to aided and government colleges. The study also revealed that ICT access among private college teachers was significantly higher as compared to government and aided colleges, this finding is similar to the findings of Soomro et al. [21] and Burnip [24] who discovered empirical evidence in support of private universities significantly higher than public. It may be due to the lack of funds and competence of teachers in government and aided colleges.

CONCLUSION

The study also highlighted the digital divide as not only a technological divide but also a socio-cultural divide. The present study has wide implications for policymakers according to the main findings. The study high ICT access and low digital divide in favour of urban teachers, younger teachers, and teachers who have less teaching experience. This study implies the need to provide essential training for college teachers in rural areas, as well as for those with higher teaching experience and older age. The study has implications for teachers, principals, policymakers, and all the stakeholders of education as the digital divide is still an emerging challenge in the field of education. From the descriptive analysis of the digital divide among college teachers, it was found that the digital divide is revealed in ICT access, physical access, motivational access, skill access, and usage access too, therefore, it gives implications to the policymakers to arrange some sorts of training programs in different government and aided colleges about the effective use of ICT in the educational setting. ICT access was found to be significantly higher for private colleges than for government and aided, so in this regard, proper steps should be taken to improve ICT-based infrastructures in aided and government colleges to a great extent.

After the critical analysis of the results of the present study, it can be suggested that further research can be done in the same field enlarging the sample sizes, and changing the context to the school level. Similar studies may also be undertaken to study the impact of the digital divide on teacher effectiveness and student satisfaction. Similar kinds of studies may also be undertaken at different levels of education mostly secondary and university levels. In some of the colleges, physical access to ICT is very less compared to the private colleges, therefore, the government should provide adequate funding to increase physical access to ICT in government and aided colleges.

In the present study, the college teachers were found to have higher motivations for the adoption and utilization of technological pedagogies in the educational setting, but some of the faculty members lack the skills and usage to use ICT effectively. Variations were also found with respect to the availability of ICT-based infrastructures in government and aided colleges, which is an alarming issue in the Indian context. In this regard, it can be said that proper measures should be taken to prepare college teachers for creating an innovative teacher environment through the use of ICT-based pedagogies, for this, there is a need to develop competence and skills among college teachers for ICT. It was revealed from the present study that although ICT access is a universal phenomenon nowadays, still particularly at the college level it has not been universal yet in a real sense, therefore, the study recommends developing professional development of faculty members of government and aided colleges.

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