

PAPER

Students' Perception towards Online Learning across Multiple Disciplinary Courses in India—A Qualitative Analysis

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ABSTRACT

Online learning has become essential to the teaching and learning approach during the pandemic. Due to its enormous benefits, online or e-learning can be sustained. The acceptability of online or e-learning depends on the student's perception and the availability of infrastructure. Data from various streams and age groups has been collected from students in different institutions. After collecting the data, this research incorporates descriptive statistics for a thorough analysis and utilizes the Chi-square test to provide scientific evidence. This study finds that the majority of final-year undergraduate and postgraduate students support online education. The student's economic status affects their preference for online or e-learning. Having a smart device and internet access also influence the decision to pursue online or e-learning. Gender is positively associated with access to Internet facilities and has a cascading effect on preferences for online or e-learning. Female students prefer online classes but require additional internet resources. Higher education institutions could enhance their online course offerings by targeting specific groups, such as female students for postgraduate programs, if they could better understand their preferences. Even though some existing studies in the literature have examined the Indian scenario to understand the factors influencing the adoption of online education, none of these studies have considered the fundamental need for online or e-learning. Moreover, the preferences were not studied based on different demographics. This research work has collected and utilized data from various educational disciplines across multiple institutes, marking the first endeavor of its kind in the literature.

KEYWORDS

online education, online learning perception, e-learning, students' perception, students' preferences on online or e-learning

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1 INTRODUCTION

The end of the year 2019, specifically December, marked an unforgettable moment in the lives of people all over the world. The COVID-19 pandemic started during this period in Wuhan, China, and by March 2020, it had spread to the entire world. Even developed countries cannot control the damage to human lives. Compared to other countries, Asian countries have been successful in handling the situation. The Indian government has implemented various measures to address this challenge, including a complete lockdown, a night curfew, and the closure of public places. Due to all the precautionary measures, people were in a safe condition. Many people lost their lives, their businesses, and so on. Advanced technologies, such as social media awareness, robots to assist patients, drones for spreading disinfectants, crowd surveillance, and public announcements, were effectively used during the pandemic. COVID-19 has devastated numerous businesses, leading to a global economic downturn that has impacted the financial stability of all nations. The COVID-19 pandemic has completely changed attitudes towards lifestyle, personal care, food habits, social norms, hygiene, etc. The COVID-19 pandemic has impacted various sectors, including business, education, and entertainment. All of these sectors are highly affected and are being forced to change their traditional working methods. Many companies have implemented work-from-home policies for their employees in order to prevent the spread of the virus and minimize social gatherings. Only essential services were functioning, and manufacturing plants were operating at 50% capacity with a reduced human workforce. People started using digital currency to minimize personal contact, and numerous newly developed mobile applications met this demand. E-commerce websites have gained tremendous popularity. Electronic items such as mobile phones, laptops, iPods, and tablets have captured the market due to their necessity in serving daily needs. The demand for sanitizers, hand gloves, face masks, and hand washing has increased tremendously.

The educational sector is the most affected by the pandemic. The entire world faced difficulties in operating educational institutions during the pandemic. Due to the global lockdown, all educational institutions were closed and switched to online teaching. The transition from face-to-face learning to online learning is still the same. The intention is for the teaching-learning process to remain calm and for students to maintain overall discipline during online classes. Students come to learn about new digital tools for learning during the pandemic. Schools and colleges conduct classes through various online video conferencing platforms such as Zoom, Google Meet, Hangout, Microsoft Teams, and Google Classrooms. Before the pandemic, digital media was primarily used for video conferencing between different geographic areas. Due to their immense usage, these digital platforms have started to offer a wide range of services, including evaluation, assignment, submission, and student performance monitoring. Due to the increasing demand for online media and courses, many start-ups have opened and provided job opportunities for technical graduates. Popular online course-providing platforms such as Coursera and Udemy have made their courses accessible to everyone, benefiting both students and teachers.

Online, or e-learning, played a vital role during the pandemic period. These e-learning platforms are free and easily accessible anytime and anywhere. The efficacy of online or e-learning depends on the user's motivation to use the available platform, as well as their perception and attitude [16]. Numerous students struggled to adapt to online classes, highlighting the need for improved internet facilities in rural areas. They felt bored in class due to the lack of physical interaction with the teacher and their peers.

This research aims to understand students' perceptions of adopting online or e-learning education in various disciplines in India in order to answer the following questions:

- Is online or e-learning suitable for students from different economic backgrounds?
- How do the affordability and availability of internet facilities affect people's preferences?
- Is the gender of students associated with having internet access to attend online classes?
- Is there any association between the area and having Internet access?
- Whether to continue with online or e-learning in a similar situation in the future?

Finding answers to these questions may help educational institutions understand learners' perceptions. Furthermore, it will be helpful for them to target appropriate learning groups when introducing an online program or course. Additionally, government educational bodies can focus on the infrastructure requirements needed in pandemic-like situations. This will help the entire student community to continue learning even in the worst situations.

2 LITERATURE SURVEY

Around 509 data points were collected from two universities in Botswana and South Africa. Using a structured equation model, the researchers studied how students' satisfaction influences their decision to continue with online education [17]. The factors influencing online adoption among Indian students using a structured equation model were studied in [24]. They have collected 402 responses from undergraduate and post-graduate students. They reveal that perceived ease-of-use (PEOU), perceived usefulness (PU), peer influence, and social influence noticeably affect attitude. Moreover, they found that attitude has a moderating effect on online adoption. Cultural orientation and self-directed learning (SDL) on students' online performance are studied in [27]. The data collected from China revealed that cultural orientation does not affect online performance, but SDL has a significant relationship with online performance. 418 sample responses were collected from students pursuing different disciplines in private institutions in Oman. Quantifiable methods were employed, and smart PLS was used for data analysis [8]. This study enhances one's understanding of student engagement, which is affected by the interaction during e-learning and teacher behavior in online classes.

The views and challenges faced in online or e-learning education by school students (8th to 12th grade) in Delhi are discussed in [19]. They analyzed the data using logistic regression to examine the influence of factors such as Internet quality, family income, and parents' education on the efficacy of online classes. The paper concluded that Internet quality and family income are critical factors for successful completion of online classes. So, most students prefer traditional classroom teaching to avoid these problems. The adoption of online education and the difficulties faced by students in Vietnam are discussed in [15]. They emphasized the importance of preparing scholars and educators for online or e-learning classes, as well as designing courses that promote interaction among students. The perception of online or e-learning and the challenges faced by students in agricultural universities are discussed in [22]. They analyzed the collected data and concluded that e-learning benefits most students, but they are happier with social interaction. They also suggested that students should be motivated by inspirational lectures in order to enhance their performance.

The perception of higher education students in Sri Lanka is discussed in a study [20]. She analyzed the data and concluded that some students enjoyed online education, which provides students with the flexibility to study from any location at any time. It helps the students enhance their abilities. The data collected from 804 Polish medical students was analyzed in [18], and it was concluded that while most students enjoy online classes, they are less effective than classroom learning. They also concluded that online education effectively translates theoretical concepts into practical knowledge, but students should also have hands-on experience and be able to learn from the feedback they receive. The faculty and student perceptions of online or e-learning during the pandemic in Jordan are discussed in [28]. They analyzed the data collected randomly from the faculty and students. Both sets of data were analyzed separately. From the faculty's perspective, their attitude towards online class preparation, computer literacy, and effectiveness were taken into consideration. The significance of online teaching and learning, as well as the challenges and advantages, were evaluated from the students' perspective. They concluded that classroom teaching is only adequate; students face many challenges in adapting to digital classes, and there is a lack of physical interaction in peer groups. One benefit of this is that it makes students more responsible.

The student perception of the pandemic at the Central University of Punjab is discussed in [11]. They analyzed the collected data using ten questions. They found that many students from higher socioeconomic backgrounds and economically privileged families have a favorable opinion of online education. The students preferred recording the course in order to refer to it multiple times. The perception of agriculture students in India is discussed in [25]. They analyzed the collected data on various aspects, such as the structure, duration, query response, technical facilities, and evaluation criteria of online classes. They also considered the students' viewpoints on e-learning or online classes, including the benefits and challenges associated with conducting courses online. They concluded that flexibility is the greatest advantage of online classes, and technical challenges should be addressed in advance for successful implementation. Certain practical-based subjects cannot be fully transitioned to an online mode, necessitating the use of a hybrid model in the future. In [1], the analysis focuses on the student perception of online or e-learning in specific regions, such as Dakshina Kannada and the Udupi district. They conducted a survey to gather students' opinions on attending online classes, as well as the support and guidance provided by their teachers. They concluded that this analysis would help colleges implement digital courses in the future. The student perception of using Microsoft Teams for online education is explored in a study conducted by university students from Indonesia [2]. He found that those students participating in the survey have a positive attitude towards online or e-learning and interaction among themselves. Mobile learning in Bangladesh is discussed in [5]. The analysis concluded that the majority of students are satisfied with mobile learning and wish to continue using it in the future to mitigate the learning gap caused by COVID-19. They conducted a survey consisting of three different parts. Part one focuses on basic details; part two explores the social media platforms frequently used for learning purposes; and part three examines student perception.

The student's perceptions regarding four aspects—student's perception, critical thinking, and the device used for the studies—are analyzed in [13] from Indonesia. They found that most of the students prefer video learning over audio. In a critical analysis, it was found that students enjoyed online education because it helped them gain a better understanding of the subject matter, and they expressed a desire to continue with it in the future. However, most students are unhappy with online or e-learning due to issues such as limited internet access and a lack of communication among their peers. Students' perceptions are analyzed in [12] using parameters

such as the learning environment, evaluation patterns for other courses, and technology used for teaching in the north-eastern United States. They concluded that social presence in learning helps to improve teaching methods and cognitive processes. Teaching presence is vital for designing subject content and the order of discussion. It is also helpful for conducting various activities in the course. He used a mixed-methods design to analyze the data. Management students' perceptions of Pune are discussed in [9]. They collected 75 samples from various management institutions and concluded that 63.5% of students are interested in a hybrid teaching mode for greater effectiveness, while 18% prefer face-to-face teaching exclusively.

The preferences and perceptions of students toward online education are discussed in [3]. They collected data from the city of Hyderabad to determine the attitudes of teachers and students towards the future prospects, advantages, and preferred methods of teaching in online education. The students' perception of e-learning in an Australian university is elaborated in [6], using various methods such as factor analysis, t-tests, and summary statistics. They concluded that there are two critical factors: flexibility in learning and improved learning outcomes. They also suggested that there may be a need for more suitable methods to motivate lonely students and help them feel comfortable. The study in [21] examines the impact of learner-learner and learner-teacher interaction on student satisfaction in online education across four universities in Dubai. The study examines the intention to continue distance learning using an extended technology acceptance model (TAM). Eight different hypotheses are considered, including computer anxiety, self-efficacy, experience, and enjoyment, along with other constructs used in the TAM model. The study was conducted at a university in Turkey with 92 respondents [23].

The University of Sciences and Humanities in Lima employed adequate strategies to ensure the endurance of the teaching and learning process through hybrid learning. It is concluded that hybrid classrooms engender student satisfaction with appropriate tutoring [7]. During the COVID-19 school closures, most educational institutions have adapted to online learning. It is essential to enhance teachers' digital skills, particularly in the areas of utilizing tools and developing content, in order to effectively implement digital education [14]. A study [26] has analyzed the effectiveness of online tutoring in distance education conducted by Morocco University. The results highlight the effectiveness of tutoring in enhancing the excellence of distance learning (DL). Specifically, they emphasize the importance of the tutor's responses and their readiness on the platform, platform, which ultimately contributes to the learner's success.

2.1 Research gap

Many researchers analyzed the students' perceptions using various methods. However, the existing literature collected data from students in a specific region (either within India or outside India), a particular university, or students enrolled in specific courses. In most of the literature, the survey only includes students from the medical and agriculture fields. Few or no researchers have analyzed the perceptions of technical students and the challenges they encounter as a result of the practical nature of different subjects.

However, this research examines the students' perceptions of different educational streams in various institutions across India, encompassing both rural and urban areas. The majority of the students are pursuing undergraduate and post-graduate studies.

3 METHODOLOGY

Online education has become the new normal in the wake of a global pandemic, and the educational sector was one of the most severely impacted industries during this time. In India, online education has been implemented nationwide during the pandemic to ensure continuous education for students. This paper primarily focuses on students' willingness to attend online classes and their ability to attend the classes consistently.

3.1 Data collection

This research utilizes primary data to analyze students' perceptions of online education, employing an online survey method to collect the data. A well-designed questionnaire is created and distributed to students from various locations in India using Google Forms. Students from various age groups and educational backgrounds were included in the study. The questionnaire consists of approximately 15 questions to conduct a more in-depth analysis of the students' perceptions. Table 1 describes the questions asked in the survey. The convenience sampling method collects data from students of diverse backgrounds and cultures. This research considered students currently studying at multiple levels of education for data collection. The number of data samples collected is 228. Descriptive analysis using Excel Pivot Table and the Chi-square test (for scientific hypothesis testing) was employed to comprehend the students' overall perception of online or e-learning.

Table 1. Questionnaire included in the research work

Q. No.	Question
1.	Age Group: <input type="radio"/> 15 and below <input type="radio"/> 16–20 <input type="radio"/> 21 to 30 <input type="radio"/> Above 30
2.	Gender: <input type="radio"/> Male <input type="radio"/> Female
3.	Education: <input type="radio"/> School <input type="radio"/> HSc or Junior College <input type="radio"/> UG <input type="radio"/> PG <input type="radio"/> Ph.D. <input type="radio"/> Diploma
4.	Family Income: <input type="radio"/> Below 1 lakh <input type="radio"/> 1–3 Lakhs <input type="radio"/> 3–5 lakhs <input type="radio"/> 5–10 lakhs <input type="radio"/> Above 10 lakhs
5.	Area: <input type="radio"/> Rural <input type="radio"/> Urban
6.	Do you prefer online education or e-learning? <input type="radio"/> Yes <input type="radio"/> No
7.	Do you have a smart device to attend classes? <input type="radio"/> Yes <input type="radio"/> No
8.	Do you have sufficient Internet facilities to attend classes? <input type="radio"/> Yes <input type="radio"/> No
9.	Which is your Native State? _____
10.	It is easy to understand online classes. *
11.	It is easy to clarify doubts in online classes. *
12.	There are fewer disturbances than in traditional classes. *
13.	It is convenient to attend classes from home. *
14.	Prefer online education or e-learning in the future? *
15.	Willing to attend online classes in the future? *

Note: *Strongly Disagree to Strongly Agree (5 scales) is used from Q10 to Q15.

The demographic details of the collected data are presented in Table 2. Comparatively, more female students answered the questionnaire. More high school, junior college, and undergraduate (UG) students participated in the survey. Three Ph.D. students over 30 have filled out the questionnaire.

Table 2. Demographic details of the data collected

Gender*	Age Group*	Family Income*	Educational Level*	Area*
Male – 104	<=15 – 11	Below 1 lakh – 111	School – 11	Rural – 12
Female – 124	16 to 20 – 160	1–3 Lakhs – 49	Junior College – 40	Urban – 12
	21 to 30 – 54	3–5 lakhs – 21	UG – 150	
	Above 30 – 3	5–10 lakhs – 27	PG – 11	
		Above 10 lakhs – 20	Ph.D. – 3	
			Diploma – 13	

Note: *Number of data collected are shown with category.

3.2 Hypothesis

The following hypotheses were formulated to examine the relationships between various variables and determine their significance in the adoption of online or e-learning. The study considered various associations, such as the relationship between gender and preference, gender and access to internet facilities, possession of a smartphone and preference for online or e-learning, possession of internet facilities and preference for online or e-learning, family income and access to internet facilities, and family income and preference for online or e-learning.

Hypothesis 1: Family income is an essential source for children’s studies, including some scholarships provided by the government or educational institutions [10]. Apart from paying school fees, providing infrastructure for e-learning may not be possible for parents, especially those from rural areas and below the poverty line. Based on this, a hypothesis is formulated.

There is a strong association (directly or indirectly) between the student’s family income (economic status) and their preference for online or e-learning.

Hypothesis 2: Since online learning classes are conducted from remote places, having excellent internet connectivity is essential for attending online classes. With proper internet connectivity, it is possible to continue with online classes is possible. A smart device is essential for attending online classes. Even though the prices of smart devices have decreased these days, it is still impossible for every parent to afford to buy one. Parents with only one child can afford to provide their child with a smart device. However, parents with multiple children could not afford to provide individual devices for each of their children. Based on these criteria, the following hypotheses are formulated:

2A: There is a strong association between having good Internet facilities and a preference for online or e-learning.

2B: There is a strong association between having a smart device and a preference for online or e-learning.

Hypothesis 3: Gender inequality is observed in almost all households. The girl child is treated differently from the boy child. The male child is given more preference than the female child in most traditional families [4]. So, whatever facilities are available will be offered to the boy child first, and occasionally the girl child can also utilize them. Based on this practice, the following hypothesis is formulated:

There is a strong association between gender and having Internet access.

Hypothesis 4: Getting Internet connectivity everywhere is not possible. Rural and remote areas need access to reliable Internet services. Students from rural and remote areas need help accessing online or e-learning facilities. Based on that, the following hypothesis is formulated:

There is a strong association between the area and having Internet facilities.

3.3 Methodology used

Descriptive statistics are used for in-depth data analysis, while the Chi-square test is used to determine the association between variables such as family income, gender, preference for online or e-learning, and ownership of a smart device, among others, in order to answer research questions.

Here H₀: There is no association between variable 1 and variable 2

H_a: There is an association between variable 1 and variable 2.

The p-value is used as the deciding criteria for the association. H₀ is rejected if the p-value < 0.05, and H_a is accepted. Otherwise, H₀ is accepted.

The interplay between the variables was also taken into consideration in order to generalize the results.

4 RESULT AND DISCUSSION

This research reveals several interesting facts. Even though all the students were required to attend online classes and have experience with online courses, only 58% of them prefer online education in the future. Overall, 42% still prefer traditional face-to-face educational methods (Table 3).

Table 3. Preference details according to gender

Gender	Preference		Grand Total
	No	Yes	
Female	48	76 (61%)	124
Male	47	57 (55%)	104
Grand Total	95 (42%)	133 (58%)	228

Gender preferences are shown in Table 3. Surprisingly, a higher percentage of female students (61%) prefer online classes compared to males (55%). There might be various reasons behind this. Some individuals may choose to study from home in order to balance their household responsibilities and pursue their education. The preferences of students at different educational levels are presented in Table 4.

Table 4. Preference details according to educational levels

Educational Level	Preference		Grand Total
	No	Yes	
Diploma	5	8 (62%)	13
Junior College	17	23 (58%)	40
PG	3	8 (73%)	11
PhD	2	1 (33%)	3
School	3	8 (63%)	11
UG	65	85 (56%)	150
Grand Total	95	133	228

The preference percentage for the family income criterion varies across different income levels. The preference for online education according to family income level is shown in Table 5. Students with a family income above Rs. 10 lakhs (55%) prefer online education less. Similar preferences are indicated by the following Rs. 1 lakh students from low-income families, however, the reasons may vary among them.

Table 5. Preference details according to family income

Family Income	Preference		Grand Total
	No	Yes	
1–3 lakhs	18	31 (63%)	49
3–5 lakhs	8	13 (62%)	21
5–10 lakhs	12	15 (56%)	27
Above 10 lakhs	9	11 (55%)	20
Below 1 lakh	48	63 (57%)	111
Grand Total	95	133	228

In the rural and urban criteria, the percentage of preference slightly differs. Preference for online education according to area (rural vs. urban) is shown in Table 6. It has been observed that 57% of students from rural areas prefer online education, while 60% of students from urban areas have the same preference.

Table 6. Preference details according to area

Area	Preference		Grand Total
	No	Yes	
Rural	39	51 (57%)	90
Urban	56	82 (60%)	138
Grand Total	95	133	228

Age-group-wise preferences for online education are shown in Table 7. 43% ($20 + 19 = 39/90 = 0.43$) of rural students do not prefer online education, while only ($28 + 28 = 56/138 = 0.40$) 40% of urban students do not like online education. Gender-wise preferences are similar, with not much difference.

Table 7. Students' preference for online education in all age groups under area and gender level

Age	Online Education Preference														
	Female						Female Total	Male						Male Total	Grand Total
	Rural		Rural Total	Urban		Urban Total		Rural		Rural Total	Urban		Urban Total		
	No	Yes		No	Yes		No	Yes		No	Yes				
15 and Below							2	5	7	1	3	4	11	11	
16–20	17	28	45	26	32	58	103	11	10	21	18	18	36	57	160
21–30	3	5	8	2	11	13	21	6	3	9	7	17	24	33	54
30 and Above											2	1	3	3	3
Grand Total	20	33	53	28	43	71	124	19	18	37	28	39	67	104	228

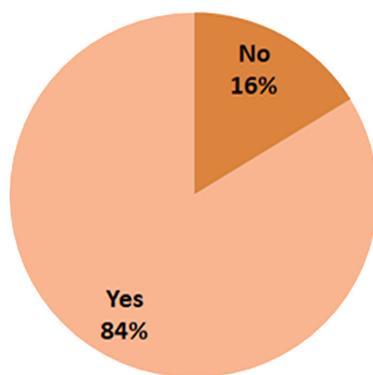


Fig. 1. Smart device holders

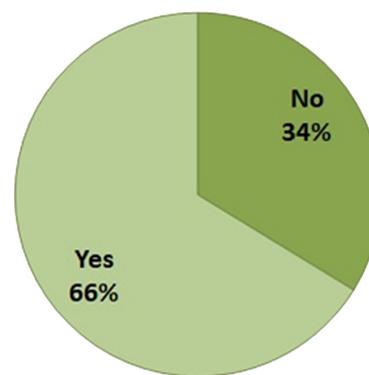


Fig. 2. Students having reliable Internet facility

Moreover, other key factors for online education include owning a smart device and having access to reliable Internet facilities (see Figures 1 and 2). With that, students can attend online classes. Around 84% of the students have smart devices and may have shared them with their family members in rural areas. Due to the decrease in the price of smart devices, even students from rural areas can now afford them. Some smart devices are enough to attend the class. Most of the students could afford it that way. Even 16% of the students still need smart devices overall.

Moreover, 19% ($7 + 10 = 17/90 = 0.19$) of the rural students do not have access to smart devices, while only 14% ($15 + 5 = 20/138 = 0.14$) of the urban students do not. Also, female students still require smart devices, just like their male counterparts (Table 8). This argument is also justified using the Chi-square test.

Table 8. Students having the smart device in all age groups under area and gender level

Age	Online Education Preference														
	Female						Female Total	Male						Male Total	Grand Total
	Rural		Rural Total	Urban		Urban Total		Rural		Rural Total	Urban		Urban Total		
	No	Yes		No	Yes		No	Yes		No	Yes				
15 and Below							2	5	7	1	3	4	11	11	
16–20	17	28	45	26	32	58	103	11	10	21	18	18	36	57	160
21–30	3	5	8	2	11	13	21	6	3	9	7	17	24	33	54
30 and Above											2	1	3	3	3
Grand Total	20	33	53	28	43	71	124	19	18	37	28	39	67	104	228

Age and education level-wise details of smart device holders are given in Table 9. In the 21–30 age group, the majority of students own smart devices (only 12% do

not, while the remaining 88% have smart devices). However, in the 16–20 age group, only 82% of students have smartphones. It shows that final-year undergraduate and postgraduate students possess smart devices and participate in online classes. Since students below the age of 15 and over the age of 30 represent a small sample size, it is challenging to make generalizations about them.

Table 9. Age-wise and overall smart device holder details

Age	Having Smart Device		Grand Total
	No	Yes	
15 and below	2	9	11
16–20	27	133	160
21–30	7	47	54
30 and above	1	2	3
Grand Total	37 (16%)	191 (84%)	228

Table 10. Internet facility availability details for different age groups

Age	Having Smart Device		Grand Total
	No	Yes	
15 and Below	3	8	11
16–20	57 (36%)	103 (64%)	160
21–30	16 (30%)	38 (70%)	54
30 and above	1	2	3
Grand Total	77 (34%)	151 (66%)	228

Only 66% of the students have access to adequate internet facilities (Table 10). Students in the final undergraduate and postgraduate age groups have 70% more access to internet facilities compared to intermediate and undergraduate-level students, who have 64% access. Internet facility availability for different age groups, categorized by area and gender, is depicted in Table 11. Among rural students, 43% ($24 + 15 = 39/90 = 0.43$) do not have internet facilities, while only 28% ($28 + 10 = 38/138 = 0.28$) of urban students lack internet access. Even so, female students are more affected.

Table 11. Students’ preference for online education in all age groups under area and gender level

Age	Internet Facility Availability														
	Female						Female Total	Male						Male Total	Grand Total
	Rural		Rural Total	Urban		Urban Total		Rural		Rural Total	Urban		Urban Total		
	No	Yes		No	Yes		No	Yes	No		Yes				
15 and Below							3	4	7			4	4	11	11
16–20	21	24	45	24	34	58	103	7	14	21	5	31	36	57	160
21–30	3	5	8	4	9	13	21	5	4	9	4	20	24	33	54
30 and Above											1	2	3	3	3
Grand Total	24	29	53	28	43	71	124	15	22	37	10	57	67	104	228

4.1 Results of chi-square statistics

Hypothesis 1: There is a strong association (directly/indirectly) between the family income (economic status) of the student and their preference for online or e-learning

H0: There is no strong association between having good Internet facilities and a preference for online or e-learning.

Ha: There is a significant association between having good Internet facilities and a preference for online or e-learning.

Chi-square test result:

Pearson's Chi-squared test

data: sdata\$Family.Income and sdata\$Preference

X-squared = 0.69532, df = 3, p-value = 0.8743

Here, the p-value is $> \alpha$ (0.05), so we accept H0. There is no strong direct association between family income and preference. However, the chi-square test reveals the chain effect of family income on a preference for online or e-learning.

Chi-square test result:

Pearson's Chi-squared test

data: sdata\$Family.Income and sdata\$Having.Smart.Device

X-squared = 9.7333, df = 3, p-value = 0.02097

Here p-value is $< \alpha$ ($=0.05$), so reject H0 and accept Ha. So, this implies there is a strong relationship between family income and having a smart device

Pearson's Chi-squared test

data: sdata\$Family.Income and sdata\$Having.internet.facility

X-squared = 12.097, df = 3, p-value = 0.00706

Here p-value is $< \alpha$ ($=0.05$), so reject H0 and accept Ha. So, this implies a strong relationship between family income and having an Internet facility. These results lead to the chain effect between family income and preference for online or e-learning.

Hypothesis 2a:

H0: There is no strong association between having good Internet facilities and a preference for online or e-learning.

Ha: There is a strong association between having good Internet facilities and a preference for online or e-learning

Chi-square test result:

Pearson's Chi-squared test with Yates' continuity correction

data: sdata\$Having.internet.facility and sdata\$Preference

X-squared = 84.781, df = 1, p-value $< 2.2e-16$

Here p-value is $< \alpha$ ($=0.05$), so reject H0 and accept Ha. So, this implies a strong relationship between having an Internet facility and a preference for online or e-learning.

Hypothesis 2b:

H0: There is no strong association between having a smart device and a preference for online or e-learning

Ha: There is a strong association between having a smart device and preferring online or e-learning

Chi-square test result:

Pearson's Chi-squared test with Yates' continuity correction

data: sdata\$Having.Smart.Device and sdata\$Preference

X-squared = 19.381, df = 1, p-value = 1.071e-05

Here p-value is $< \alpha$ ($= 0.05$), so reject H_0 and accept H_a . So, this implies a strong relationship between having a smart device and a preference for online or e-learning.

Hypothesis 3:

H_0 : There is no strong association between gender and having Internet facilities.

H_a : There is a strong association between gender and having Internet facilities.

Chi-square test result:

Pearson's Chi-squared test with Yates' continuity correction

data: sdata\$Gender and sdata\$Having.internet.facility

X-squared = 7.3196, df = 1, p-value = 0.006821

Here p-value is $< \alpha$ ($= 0.05$), so reject H_0 and accept H_a . So, this implies there is a strong relationship between gender and having Internet facilities. This ensures gender inequality among children in the family.

Hypothesis 4:

H_0 : There is no strong association between area and having Internet facilities.

H_a : There is a strong association between the area and having Internet facilities

Chi-square test result:

Pearson's Chi-squared test with Yates' continuity correction

data: sdata\$Area and sdata\$Having.internet.facility

X-squared = 5.392, df = 1, p-value = 0.02023

Here p-value is $< \alpha$ ($= 0.05$), so reject H_0 and accept H_a . So, this implies a strong relationship between area and having Internet facilities.

5 CONCLUSION

Even though students experienced online education from almost all educational institutes in India during the COVID-19 pandemic, only 58% of students prefer to continue with online or e-learning in the future. Reasons for not choosing online or e-learning include the lack of more Internet access and affordability, as well as the unavailability of smart devices, particularly for students residing in rural areas. Gender strongly influences access to Internet facilities and has a significant impact on the preference for online or e-learning. Mainly, girls in the families were getting fewer opportunities than boys. Similarly, the availability of internet facilities in rural and remote areas also impacts preferences for online or e-learning. From the descriptive, in-depth analysis, it is evident that educational institutions can target female students, particularly for postgraduate programs, if they want to establish online or e-learning platforms. This is because a majority of female students show a preference for adopting online or e-learning methods. Most of the final-year undergraduate and postgraduate students can somehow afford to acquire smart devices and Internet access in order to attend online classes. Government schools should enhance or provide facilities for

students from rural areas, particularly unprivileged female students, to ensure their access to online learning and to ensure that education reaches the majority of students.

6 REFERENCES

- [1] Abhinandan Kulal and Anupama Nayak, "A study on perception of teachers and students toward online classes in Dakshina Kannada and Udupi District," *Asian Association of Open Universities Journal*, vol. 15, no. 3, pp. 285–296, 2020. <https://doi.org/10.1108/AAOUJ-07-2020-0047>
- [2] Ahmad Ridho Rojabia, "Exploring EFL students' perception of online learning via micro-soft teams: University level in Indonesia," *English Language Teaching Educational Journal*, vol. 3, no. 2, pp. 163–173, 2020.
- [3] Anjum Pasha and Jarupla Gorya, "Student preference and perception towards online education in Hyderabad city," *International Journal of Trend in Scientific Research and Development*, vol. 3, no. 3, pp. 656–659, 2019. <https://doi.org/10.31142/ijtsrd22876>
- [4] P. Bharadwaj, G. B. Dahl, and K. Sheth, "Gender discrimination in the family," *The Economics of the Family: How the Household Affects Markets and Economic Growth*, vol. 2, pp. 237–266, 2014.
- [5] Bikram Biswas, Sajib Kumar Roy, and Falguni Roy, "Students perception of mobile learning during COVID-19 in Bangladesh: University student perspective," *Aquademia*, vol. 4, no. 2, 2020. <https://doi.org/10.29333/aquademia/8443>
- [6] Claire Loh, David H. Wong, Ali Quazi, and Russel Philip Kingshott, "Re-examining students' perception of e-learning: An Australian perspective," *International Journal of Educational Management*, vol. 30, no. 1, pp. 129–139, 2016. <https://doi.org/10.1108/IJEM-08-2014-0114>
- [7] J. Corzo-Zavaleta, R. Yon-Alva, J. Icho-Yacupoma, Y. Principe Somoza, L. Andrade-Arenas, and N. I. Vargas-Cuentas, "Hybrid learning in times of pandemic covid-19: An experience in a Lima university," *International Journal of Engineering Pedagogy (IJEP)*, vol. 13, no. 1, pp. 65–81, 2023. <https://doi.org/10.3991/ijep.v13i1.36393>
- [8] K. A. Dahleez, A. A., El-Saleh, A. M. Al Alawi, and F. Abdelmunim Abdelfattah, "Higher education student engagement in times of pandemic: The role of e-learning system usability and teacher behavior," *International Journal of Educational Management*, vol. 35, no. 6, pp. 1312–1329, 2021. <https://doi.org/10.1108/IJEM-04-2021-0120>
- [9] Dipak Umbarkar, Rowland V. Lopes, and Prashant Suryawanshi, "A study of perception and readiness of management students towards online teaching," *European Journal of Molecular & Clinical Medicine*, vol. 7, no. 8, 2020.
- [10] A. J. Drajeaa and C. O'Sullivan, "The influence of parental education and family income on children's education in Rural Uganda," *Global Education Review*, vol. 1, no. 3, 2014.
- [11] Felix Bast, "Perception of online learning among students from India set against the pandemic," *Frontiers in Education*, vol. 6, p. 705013, 2021. <https://doi.org/10.3389/educ.2021.705013>
- [12] M. Gonzalez and N. Moore, "A comparison of faculty and graduate students' perceptions of engaging online courses: A mixed-method study," *International Journal of Educational Methodology*, vol. 6, no. 1, pp. 223–236, 2020. <https://doi.org/10.12973/ijem.6.1.223>
- [13] Heni Rita Susila, Arief Qosim, and Tri Rositasari, "Students' perception of online learning in covid-19 pandemic: A preparation for developing a strategy for learning from home," *Universal Journal of Educational Research*, vol. 8, no. 11B, pp. 6042–6047, 2020. <https://doi.org/10.13189/ujer.2020.082240>

- [14] I. Holik, T. Kersánszki, G. Molnár, and I. D. Sanda, "Teachers' digital skills and methodological characteristics of online education," *International Journal of Engineering Pedagogy (ijEP)*, vol. 13, no. 4, pp. 50–65, 2023. <https://doi.org/10.3991/ijep.v13i4.37077>
- [15] M. Kang and A. Duong, "Student perceptions of first-time online learning during the COVID-19 pandemic in Vietnam," *Inquiry in Education*, vol. 13, no. 1, 2021.
- [16] A. Koohang and A. Durante, "Learners' perceptions toward the web-based distance learning activities/assignments portion of an undergraduate hybrid instructional model," *Journal of Information Technology Education*, vol. 2, pp. 105–113, 2003. <https://doi.org/10.28945/316>
- [17] E. E. Marandu, I. R. Mathew, T. D. Sivotwa, R. P. Machera, and O. Jaiyeoba, "Predicting students' intention to continue online learning post-COVID-19 pandemic: Extension of the unified theory of acceptance and usage technology," *Journal of Applied Research in Higher Education*, vol. 15, no. 3, pp. 681–697, 2022. <https://doi.org/10.1108/JARHE-02-2022-0061>
- [18] Michał Baczek, Michalina Zaganczyk-Baczek, Monika Szpringer, Andrzej Jaroszynski, and Beata Wozakowska-Kapłon, "Students' perception of online learning during the COVID-19 pandemic-A survey study of Polish medical students," *Medicine*, vol. 100, no. 7, 2021. <https://doi.org/10.1097/MD.00000000000024821>
- [19] Mohammed Arshad Khan, Tuba Kamal, Asherefilliyan, and Mohd Asif, "School students' perception and challenges towards online classes during COVID-19 pandemic in India: An Econometric Analysis," *Sustainability*, vol. 13, p. 4786, 2021. <https://doi.org/10.3390/su13094786>
- [20] Nishadi Galgewela, "Students' perception of online education during the covid-19 pandemic: An analysis of students of higher education sector in Sri Lanka," 2021.
- [21] S. U. Rehman, E. E. Elshareif, and K. H. A. N. Faisal, "New learners' satisfaction with online education: A longitudinal study," *Turkish Online Journal of Distance Education*, vol. 24, no. 2, pp. 272–283, 2023. <https://doi.org/10.17718/tojde.1010050>
- [22] R. Muthukrishnan, J. S. Janvi, S. Sourav, and G. Deepika, "A study on students' perception on online learning during Covid-19 pandemic," *Turkish Journal of Computer and Mathematics Education*, vol. 12, no. 11, pp. 138–144, 2021.
- [23] C. Sayginer, "Examining university students' behavioral intention to distance learning during covid-19: An extended TAM model," *Turkish Online Journal of Distance Education*, vol. 24, no. 2, pp. 325–336, 2023. <https://doi.org/10.17718/tojde.1123213>
- [24] R. Singh and A. Tewari, "Modeling factors affecting online learning adoption: Mediating role of attitude," *International Journal of Educational Management*, vol. 35, no. 7, pp. 1405–1420, 2021. <https://doi.org/10.1108/IJEM-05-2021-0198>
- [25] T. Muthuprasad, S. Aiswarya, K. S. Aditya, and Girish K. Jha, "Students' perception and preference for online education in India during COVID -19 pandemic," *Social Sciences & Humanities Open*, vol. 3, p. 100101, 2021. <https://doi.org/10.1016/j.ssaho.2020.100101>
- [26] A. Tahiri, A. Chikhaoui, J. Assermouh, M. Halim, and S. Benfares, "Contribution of online tutoring in promoting the quality of distance learning for Moroccan teachers," *International Journal of Engineering Pedagogy (ijEP)*, vol. 13, no. 5, pp. 104–120, 2023. <https://doi.org/10.3991/ijep.v13i5.34047>
- [27] Q. Wang, C. Xiong, and J. Liu, "Does culture or self-directed learning drive online performance?" *International Journal of Educational Management*, vol. 35, no. 6, pp. 1077–1098, 2021. <https://doi.org/10.1108/IJEM-06-2020-0327>
- [28] Zakaryia Almahasees, Khaled Mohsen, and Mohammad Omar Amin, "Faculty's and students' perceptions of online learning during COVID-19," *Frontiers in Education*, vol. 6, p. 638470, 2021. <https://doi.org/10.3389/feduc.2021.638470>

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