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An in-depth analysis of undergraduate students experiences in the transition from F2F learning to online learning

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Abstract

Purpose – This research aimed to capture undergraduate students' experiences in the transition from face-to-face (F2F) learning to online learning. This study explored their perceptions regarding the effectiveness of online learning in their academic lives, challenges encountered and suggestions for enhancing online learning in the post-COVID-19 era.

Design/methodology/approach – This study employed a concurrent mixed-methods research design and selected 118 undergraduate students using a multistage random sampling technique from four colleges in Assam. Standardized questionnaires and open-ended interview schedules were used.

Findings – Undergraduate students reported a positive attitude and satisfaction with online learning, valuing its adaptability to their schedules, its role as a motivating factor for self-learning, its effect on making them more technically proficient and enhancing their communication skills to articulate their thoughts. However, the challenges identified by the students have the potential to overshadow the promises of online learning. This research provided more constructive suggestions under the themes of "content delivery", "systemic and infrastructural issues", "pedagogy" and "capacity building" to enhance their experiences with online learning.

Practical implications – Our research findings would assist educational institutions in adopting innovative approaches for simpler and more efficient online learning experiences post-COVID-19 pandemic. Institutions should prepare themselves and design dual-mode courses for F2F and online learning.

Originality/value – The paper addressed a relevant topic in this era of online learning by examining undergraduate students' viewpoints that added complementary information to the current body of literature on online learning in rural India. The insights gleaned from their experiences would be beneficial for the development of best practices for online learning in the coming decades.

Keywords Online learning, Undergraduate students' attitude, Undergraduate students' satisfaction, Undergraduate students' perception

Paper type Research paper

Introduction

The worldwide community is in serious jeopardy because of the alarming increase in the number of COVID-19 cases. Due to this, the educational landscape has undergone a drastic transformation. The UNESCO 2020 report estimated that 90% of the world's student population was seriously affected by the pandemic (Tari and Amonkar, 2021). The global

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pandemic has forced the education sector to shift from face-to-face (F2F) to virtual and hybrid learning via online platforms and adopt new pedagogical methods (Sharma, 2021), resulting in a digital revolution. Due to the risk of transmission of the coronavirus through interpersonal contact, UNESCO and the Ministries of Education have advocated for the implementation of online learning (UNESCO, 2020). Subsequently, the Government of India and India's higher education regulatory body, i.e. the University Grants Commission (UGC), urged higher educational institutions to shift from F2F learning to online learning (Singh and Quraishi, 2021) as their primary mode of delivering instruction. The online mode of delivering instruction has emerged as the "New Normal" or the most viable alternative. Presently, online learning has become a core component that will help us achieve the United Nations SDG-4, ensuring access to quality education. Considering that the concept of online delivery of instruction has never been tried at such a level in India, it is more likely to function as a large social experiment (Muthuprasad *et al.*, 2021). In this context, the current study tried to understand undergraduate attitudes and satisfaction towards online learning and identify the challenges students face across disciplines.

Attitude and satisfaction, two intertwined yet distinct psychological constructs, play a significant role in shaping a student's learning experience. The trend towards online education has resulted in a wide range of viewpoints, attitudes and responses from students. The root of these responses is "attitude", a multifaceted combination of emotional, cognitive and behavioural components that students express about their online learning experiences. The attitude of a student often serves as a predictor of their behaviour. Academic literature exhibits how students' attitudes and behaviours towards online learning affect its acceptability and implementation (Ismaili, 2021). According to Liaw *et al.* (2007), "no matter how advanced or capable the technology is, its effective implementation depends upon users having a positive attitude toward it".

How undergraduate students approach online learning depends on their attitude, but satisfaction is the ensuing emotion after students have engaged in online learning. For instance, a student can have a favourable attitude towards online learning because of how society is shifting and because of the positive experiences of their peers. On the other hand, the same student may wind up dissatisfied with a specific course if it fails to meet her expectations in terms of the quality of the content or level of interactivity. Satisfaction refers to the level of fulfilment or pleasure that students gain from their online educational experiences. It's a measure of the extent to which students' expectations and needs regarding the online course were met. This includes various aspects, such as the quality of the content, the effectiveness of the teaching methods, the user-friendliness of the platform, the promptness of teacher feedback and interactions and the overall value gained from the course (Gopal *et al.*, 2021). Students' satisfaction is a key indicator of success in learning environments, particularly in online settings. Previous research on online learning has demonstrated that student satisfaction is a crucial sign of learning success and the adoption of an online learning system (Ke and Kwak, 2013).

However, the transition to online learning was never free from drawbacks. As the pandemic has forced us to depend wholly on the Internet, this has led to a new crisis in the education system by widening the digital divide in India, posing a threat to the "loss in human capital accumulation and economic development" (Khan *et al.*, 2021). Online learning witnesses challenges such as technology limitations, disruptions at home, incompetent teachers, learners' inefficacy and health concerns (Muthuprasad *et al.*, 2021; Pandit and Agrawal, 2021). Students' unease with online learning is brought to light by Dhawan (2020), which exacerbates their frustration. The lack of compatibility and customization in learning processes further disrupts the balance between teaching and learning. Thus, the transition from F2F to online learning has brought to light the issues regarding how students perceived

online learning, their level of satisfaction and the challenges they faced: a more complex inquiry about how to enhance online learning from the student's perspective.

Theoretical framework

As institutions moved online, maintaining high standards in education became the top priority. However, due to the urgency of the pandemic, teachers found themselves prioritizing the delivery of content rather than developing a comprehensive online teaching ecosystem. The Community of Inquiry (CoI) framework has been used in this study as a guiding model for online learning research (shown in Figure 1). It is based on the theory put forth by Garrison *et al.* (2000) that an effective educational experience, particularly in online situations, results from the interaction of three key elements or "presences".

In an online learning environment, social presence refers to how well individuals can establish genuine connections and present themselves as "real" people. The term cognitive presence refers to the "extent to which students can create and verify meaning through continuous reflection and discussion in online environments" and the term teaching presence refers to the "design, facilitation, and guidance of cognitive and social processes to achieve significant and valuable learning outcomes". In the context of attitude and satisfaction, each element of the CoI plays a pivotal role. Students' attitudes towards online learning improve and their level of satisfaction rises when they experience social integration, cognitive engagement and a strong teaching presence. This emphasizes how crucial it is to guarantee that each of the three presences is thoroughly integrated into the online learning environment.

Research objectives and hypotheses

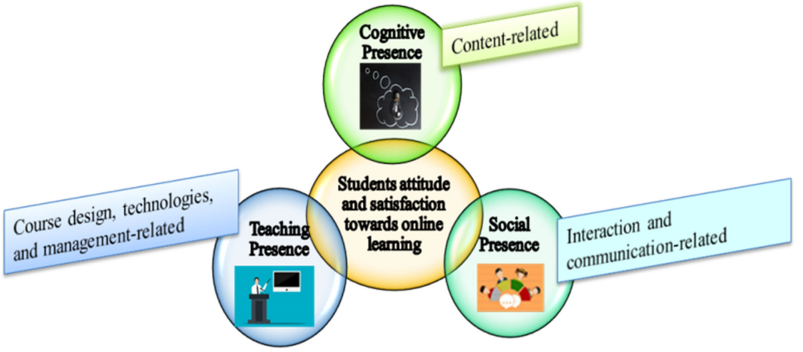
Researchers thought it worthwhile to answer the question, "What is the overall experience of undergraduate students in online learning?"

From this broad question, the following objectives emerged:

(1) To study the attitude of undergraduate students towards online learning.

(2) To measure the satisfaction level of undergraduate students with online learning.

(3) To explore the perception of undergraduate students towards online learning in terms of:



Source(s): Figure adapted from Garrison *et al.* (2000); Authors' own work

Figure 1.
Online learning framework

(4) Effectiveness of online learning in their academic lives,

(5) Challenges encountered during online learning and

(6) Suggestions for improving online learning.

Assumptions on online learning and related variables-gender, locality, types of course, discipline and academic stage

This study looked precisely at how the five demographic parameters – gender, location, course type, academic stage and discipline, were related to attitudes and satisfaction with online learning.

Online learning has become a silver lining for the education system ever since technological development and the COVID-19 pandemic. However, the influence of demographic characteristics on the success or failure of online learning was evident (Islam *et al.*, 2011). Margolis and Fisher (2002) claimed that the online learning environment is gender-neutral, offering a democratic and equal environment for all. Ramírez-Correa *et al.* (2015) and Thakur (2019) have also demonstrated that there is no gender disparity in satisfaction levels with online learning. The present research focuses on how gender differences, generally classified as male and female, influence attitudes and satisfaction with online learning. Therefore, the following null hypotheses have been framed:

H1. There is no significant difference in the attitude of male and female undergraduate students towards online learning.

H2. There is no significant difference in the satisfaction level of male and female undergraduate students with online learning.

Likewise, Gorain and Pal (2021) and Das Mahaptra (2021) found locality not to be an influential factor affecting online learning. Similarly, Ofori Atakorah *et al.* (2023) showed that the geographical location of students did not exert a major influence on their satisfaction with online learning. This observation is quite relevant, particularly in the context of our contemporary interconnected society, where digital educational platforms strive to mitigate the disparities between urban and rural areas as well as between metropolitan and suburban areas. As a result, the following hypotheses are formulated:

H3. There is no significant difference in the attitude of rural and urban undergraduate students towards online learning.

H4. There is no significant difference in the satisfaction level of male and female undergraduate students with online learning.

Gboyega *et al.* (2023) determined that the type of course taken by students does not significantly impact their attitude towards online learning. The widespread use of digital technologies and online platforms in education has resulted in students from all types of courses, whether they are major, minor or elective, being uniformly exposed to online learning. This led to the formulation of hypotheses that:

H5. There is no significant difference in the attitude of major and non-major course undergraduate students towards online learning.

H6. There is no significant difference in the satisfaction level of major and non-major course undergraduate students with online learning.

Empirical evidence from the studies conducted by Gupta (2019) and Das Mahapatra (2021) indicated that the influence of academic stream or discipline did not play a significant role in determining students' attitudes towards online learning. Students in all fields of study have become increasingly familiar with digital tools and platforms as a result of the growing integration of technology into the educational process. This resulted in the formulation of hypotheses, which stated that.

H7. There is no significant difference in the attitude of arts, science and commerce undergraduate students towards online learning.

H8. There is no significant difference in the satisfaction level of arts, science and commerce undergraduate students with online learning.

Online learning platforms offer a uniform experience for users of all academic stages, ranging from first-year undergraduates to final-year postgraduate students. This consistency is evident in the interface, resources and teaching methods provided by these platforms. Such a flexible nature could reduce the variability in satisfaction and attitude across academic stages. This has also been supported by previous literature studies by Ofori Atakorah *et al.* (2023) and Cole *et al.* (2014). Hence, based on this, the following hypotheses were framed:

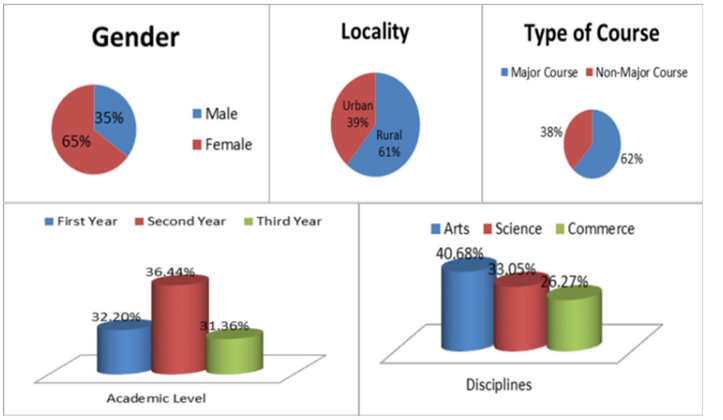
H9. There is no significant difference in the attitude of first-, second- and third-year undergraduate students towards online learning.

H10. There is no significant difference in the satisfaction level of first-, second- and third-year undergraduate students with online learning.

Methods and materials

The researchers employed a concurrent mixed-methods research design with data collected from a total sample of 118 undergraduates from four colleges located in different districts of Assam through Google Form. Through multistage random sampling, the districts were selected randomly from four administrative divisions of Assam: Upper Assam (nine districts), Lower Assam (13 districts), North Assam (four districts) and Central Assam (six districts). From every four divisions, one district and one college were selected based on the feasibility of the researchers representing each division of Assam. Figure 2 displays the demographic characteristics of the participants in the sample group. A purposive sample of 24 students participated in four focus group discussions (FGD), and each group had six participants, with 1st, 2nd and 3rd-year students representing the disciplines of arts, science and commerce. The standardized questionnaire developed by Law (2021) was used in this study. However, permission to use it was obtained through email before using it in the present study. The mean scores of the attitude and satisfaction questionnaires towards online learning were divided into three categories for interpreting the overall level of attitude and satisfaction towards online learning. A mean score of 2.56 or higher indicated positive, a 1.28–2.55 average and a mean score lower than 1.27 indicated a negative attitude or satisfaction towards online learning. An open-ended interview schedule was prepared for a better understanding of students' perceptions of online learning. Descriptive analysis, independent sample *t*-test and one-way ANOVA were used for quantitative data, while thematic analysis was applied to qualitative data.

Demographic profile of the respondents



Source(s): Figure by authors'

Figure 2. Demographic characteristics of the samples

Findings of the study

First, the data were screened to identify extreme outliers and to ensure that the data were normal. Box plots, histograms and Q-Q plots were used for detecting univariate outliers, as recommended by Field (2009). Box plots, histograms with NPCs and Q-Q plots show that online learning attitude and satisfaction have no extreme outliers [see Figure 3 (a), (b) and (c) and Figure 4 (a), (b) and (c)].

The Kolmogorov–Smirnova test was conducted to ascertain whether the data are normally distributed and the results are shown in Table 1. The Kolmogorov–Smirnova test statistic has a p-value greater than 0.05, indicating that the data are normal (Field, 2009). Therefore, this research is suitable for the parametric test, which assumes normal data.

Objective 1. To study the attitude of undergraduate students towards online learning.

Table 2 presents the overall attitude of students towards online learning. It is clear from the data that the mean (M = 3.08) and standard deviation (SD = 2.75) show students' positive attitudes towards online learning.

Objective 2. To study the satisfaction level of undergraduate students towards online learning.

Table 3 shows the overall satisfaction of students with online learning. The data show that the mean (M = 2.86) and standard deviation (SD = 2.57) show that students are positively satisfied with online learning.

Hypotheses testing

H1: There is no significant difference in the attitude of male and female undergraduate students towards online learning.

H2: There is no significant difference in the satisfaction level of male and female undergraduate students with online learning.

The result in Table 4 presents Levene's test having similar variances for male and female undergraduate students in both attitude (p = 0.66) and satisfaction (p = 0.63) towards online

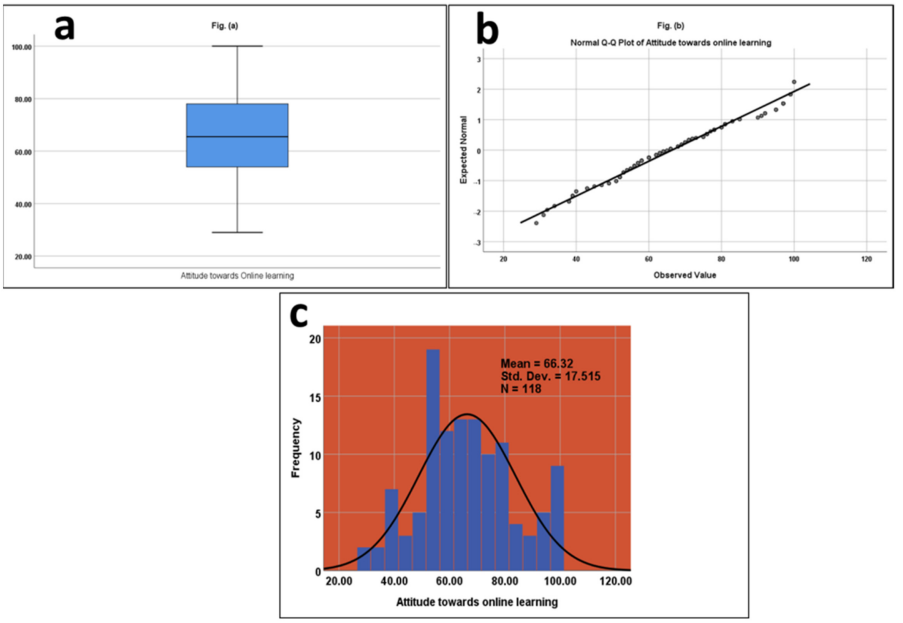


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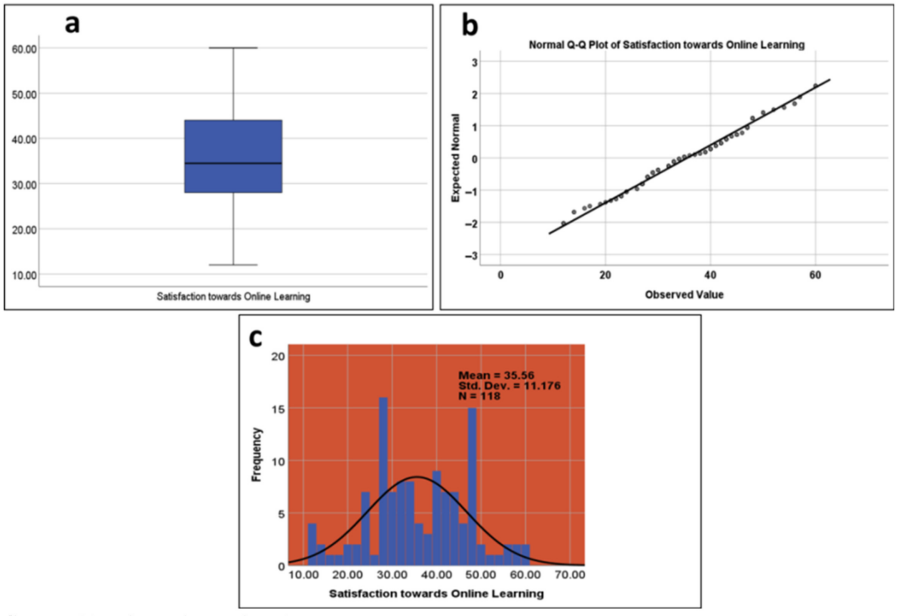
Figure 3.
Shows (a) Box plots, (b) Normal Q-Q plot and (c) Histogram with the NPC of attitude towards online learning



Source(s): Figure by authors'

Figure 4.
Shows (a) Box plots, (b) a normal Q-Q plot and (c) a histogram with the NPC of satisfaction towards online learning

learning, which is greater than 0.05. As seen in Table 4, it is found that there is no significant difference between male (M = 61.37, SD = 14.30) and female (M = 61.80, SD = 13.77) undergraduate students' attitudes towards online learning [$t_{(116)} = 1.60, p = 0.87 > 0.05$]. Also, there is no significant difference between male (M = 33.70, SD = 11.45) and female

Table 1.
Showing normality test of the variables

Variables	Statistics	df	Sig
Attitude towards online learning	0.075	118	0.153
Satisfaction towards online learning	0.080	118	0.062

Source(s): Table by authors'

Table 2.
Distribution of mean scores of undergraduate students' attitude towards online learning

Percentages (%) Dimensions	SA	A	*N*	D	SD	M	SD	Interpretation
Attitude towards learning materials	6%	37%	31%	17%	9%	3.15	2.80	Positive
Attitude towards online assessments	9%	34%	30%	20%	7%	3.18	2.83	Positive
Attitude towards online communication	9%	25%	24%	27%	15%	2.85	2.58	Positive
Attitude towards technological tools and technical support	7%	32%	37%	18%	7%	3.14	2.78	Positive
Overall attitude towards online learning	8%	32%	30%	21%	9%	3.08	2.75	Positive

Note(s): SA = strongly agree, A = Agree, N=Neutral, D = disagree, SD = strongly disagree, M = mean and SD=Standard deviation

Source(s): Table by authors'

Table 3.
Distribution of mean scores on the undergraduate students' satisfaction towards online learning

Percent (%) Statements	SA	A	*N*	D	SD	M	SD	Interpretation
Satisfied with course materials	9%	22%	29%	35%	5%	3.04	2.71	Positive
Satisfied with course activities	9%	18%	28%	40%	5%	3.14	2.80	Positive
Satisfied with the workload assigned	6%	22%	29%	38%	5%	3.14	2.79	Positive
Satisfied with assessment methods	9%	19%	25%	42%	4%	3.14	2.80	Positive
Satisfied with the interaction between the instructors	19%	36%	25%	13%	7%	2.52	2.26	Average
Satisfied with the online communication with classmates	34%	22%	19%	21%	3%	2.38	2.18	Average
Satisfied with the technologies being used	10%	22%	21%	35%	12%	3.16	2.87	Positive
Satisfied with the course management system	9%	21%	27%	36%	6%	3.08	2.76	Positive
Satisfied with the technical support provided	17%	13%	35%	30%	6%	2.95	2.66	Positive
Prefer online learning over face-to-face classes	33%	29%	17%	15%	6%	2.32	2.15	Average
Effective presentation of the desired learning outcome	14%	27%	26%	27%	5%	2.81	2.53	Positive
Satisfied with the online learning course	26%	19%	25%	24%	6%	2.64	2.43	Positive
Overall satisfaction with online learning	16%	23%	26%	30%	6%	2.86	2.57	Positive

Source(s): Table by authors'

(M = 36.32, SD = 10.55) undergraduate students' satisfaction with online learning [t (116) = 1.26, $p = 0.21 > 0.05$]. Although statistically nonsignificant, a negligible mean score difference has been observed in male and female students' attitudes (0.43) and satisfaction (2.62), indicating that female students exhibit more positive attitudes and satisfaction than male students. However, statistically, it may be inferred that gender does not significantly impact undergraduate students' attitudes towards and satisfaction with online learning.

H3: There is no significant difference in the attitude of rural and urban undergraduate students towards online learning.

H4: There is no significant difference in the satisfaction level of male and female undergraduate students towards online learning.

The result in Table 5 presents Levene's test having similar variances for urban and rural undergraduate students in both attitude ($p = 0.62$) and satisfaction ($p = 0.69$) towards online learning, which is greater than 0.05. As seen in Table 5, it is found that there is a significant statistical difference between rural (M = 59.31, SD = 14.02) and urban (M = 65.28, SD = 13.05) undergraduate students' attitude towards online learning [t (116) = 2.31, $p = 0.02 < 0.05$]. Also, there is a significant statistical difference between urban (M = 38.10, SD = 8.51) and rural (M = 33.54, SD = 12.02) undergraduate students' satisfaction with online learning [t (116) = 2.24, $p = 0.02 < 0.05$]. Furthermore, the mean score difference of 5.96 in attitude and 4.56 in satisfaction levels between rural and urban students suggests that urban students tend to have a more favourable attitude and higher satisfaction with online learning than their rural counterparts. Therefore, it can be inferred that the geographical location or locality significantly impacts the attitude and satisfaction levels of undergraduate students about online learning.

	Gender	*N*	Mean	SD	df	Levene's test for equality of variances *F*	Sig	SE mean	Mean diff	*t*	Sig
Attitude towards online learning	Male	43	61.37	14.30	116	0.19	0.66	2.18	0.43	1.60	0.87
	Female	75	61.80	13.77				1.59			
Satisfaction towards online learning	Male	43	33.70	11.45	116	0.22	0.63	1.75	2.62	1.26	0.21
	Female	75	36.32	10.55				1.22			

Source(s): Table by authors'

Table 4. Descriptive statistics, Levene's test and an independent sample *t*-test on gender-based differences in attitude and satisfaction towards online learning

	Locality	*N*	Mean	SD	df	Levene's test for equality of variances *F*	Sig	SE mean	Mean diff	*t*	Sig
Attitude towards online learning	Urban	46	65.28	13.05	116	0.23	0.62	1.92	5.96	2.31	0.02
	Rural	72	59.31	14.02				1.65			
Satisfaction towards online learning	Urban	46	38.10	8.51	116	0.27	0.69	1.25	4.56	2.24	0.02
	Rural	72	33.54	12.02				1.41			

Source(s): Table by authors'

Table 5. Descriptive statistics, Levene's test and an independent sample *t*-test on locality-based differences in attitude and satisfaction towards online learning

H5**:** There is no significant difference in the attitude of major and non-major course undergraduate students towards online learning.

H6**:** There is no significant difference in the satisfaction level of major and non-major course undergraduate students towards online learning.

The result in Table 6 presents Levene's test having similar variances for major and non-major course undergraduate students in both attitude ($p = 0.91$) and satisfaction ($p = 0.64$) towards online learning, which is greater than 0.05. As shown in Table 6, it is found that there is no significant difference between major (M = 61.59, SD = 13.80) and non-major (M = 61.73, SD = 14.23) undergraduate students' attitudes towards online learning [t (116) = 0.05, $p = 0.95 > 0.05$]. Furthermore, there was no significant difference between major (M = 35.32, SD = 11.26) and non-major (M = 35.42, SD = 10.43) undergraduate students' satisfaction towards online learning [t (116) = 0.04, $p = 0.956 > 0.05$]. Although statistically nonsignificant, a negligible difference of 0.14 is observed in the mean scores of attitude and 0.09 in the mean scores of satisfaction towards online learning when comparing major and non-major course students. It can be concluded that the type of course does not significantly impact undergraduate students' attitudes and satisfaction towards online learning.

H7: There is no significant difference in the attitude of arts, science and commerce undergraduate students towards online learning.

H8: There is no significant difference in the satisfaction level of arts, science and commerce undergraduate students with online learning.

The results from the one-way ANOVA analysis presented in Table 7 show the differences in undergraduate students' attitudes and satisfaction towards online learning based on their discipline. The analysis yielded an F-statistic of $F(2,115) = 2.62$ with an associated p-value of 0.07 for attitude towards online learning and $F(2,115) = 0.05$ with an associated p-value of 0.95 for satisfaction towards online learning. The p-values of 0.07 and 0.95 are slightly above the threshold of the 0.05 significance level, which suggests that we fail to reject the null hypothesis. This implies that there is no statistically significant difference in the attitude and satisfaction of undergraduate students towards online learning across different disciplines.

H9: There is no significant difference in the attitude of first-, second- and third-year undergraduate students towards online learning.

H10: There is no significant difference in the satisfaction level of first-, second- and third-year undergraduate students with online learning.

Table 6. Descriptive statistics, Levene's test and an independent sample t-test on course-based differences in attitude and satisfaction towards online learning

	Type of course	N	Mean	SD	df	Levene's test for equality of variances F	Sig	SE mean	Mean diff	t	Sig
Attitude towards online learning	Major course	73	61.59	13.80	116	0.01	0.91	1.61	0.14	0.05	0.95
	Non-major course	45	61.73	14.23				2.12			
Satisfaction towards online learning	Major course	73	35.32	11.26	116	0.21	0.64	1.31	0.09	0.04	0.96
	Non-major course	45	35.42	10.43				1.55			

Source(s): Table by authors'

The results from the one-way ANOVA analysis presented in Table 8 demonstrate the differences in undergraduate students' attitudes and satisfaction towards online learning based on their academic stage. The analysis yielded an F-statistic of $F(2,115) = 0.65$ with an associated p-value of 0.52 for attitude towards online learning and an F-statistic of F(2,115) is 1.19 with an associated p-value of 0.30 for satisfaction towards online learning. The p-values of 0.52 and 0.30 are slightly above the threshold of the 0.05 significance level, which suggests that the null hypothesis is accepted. This implies that there is no statistically significant difference in the attitude and satisfaction of undergraduate students towards online learning across different academic stages.

Objective 3. To explore the perception of undergraduate students towards online learning in terms of – (a) Effectiveness of online learning in their academic life, (b) Challenges encountered during online learning and (c) Suggestions for improving online learning.

3a). To explore undergraduate students' perceptions of online learning in terms of the effectiveness of online learning in their academic lives

In response to an open-ended question about the overall effectiveness of online learning in their academic lives, participants reported that online learning allows them to learn at their

	Groups	*N*	M	S.D	Source of variations	Sum of squares	d.f.	Mean square	*F*	Sig
Attitude toward online learning	Science	39	57.58	13.29	Between Groups	988.08	2	494.04	2.62	0.07
	Commerce	31	64.41	15.17	Within Groups	21650.96	115	188.26		
	Arts	48	63.14	13.06	Total	22639.05	117			
Satisfaction towards online learning	Science	39	34.94	10.36	Between Groups	13.18	2	6.59	0.05	0.95
	Commerce	31	35.32	10.69	Within Groups	13916.15	115	121.01		
	Arts	48	35.72	11.66	Total	13929.33	117			

Source(s): Table by authors'

Table 7. One-way ANOVA comparison of the attitude and satisfaction of students towards online learning based on discipline

	Groups	*N*	M	S.D	Source of variations	Sum of squares	d.f.	Mean square	*F*	Sig
Attitude towards online learning	First-year	38	59.81	15.80	Between groups	252.38	2	126.19	0.65	0.52
	Second-year	43	63.34	14.38	Within groups	22386.66	115	194.66		
	Third-year	37	61.54	11.12	Total	22639.05	117			
Satisfaction towards online learning	First-year	38	33.13	10.34	Between groups	282.88	2	141.44	1.19	0.30
	Second-year	43	36.23	12.58	Within groups	13646.44	115	118.66		
	Third-year	37	36.64	9.18	Total	13929.33	117			

Source(s): Table by authors'

Table 8. One-way ANOVA comparison of the attitude and satisfaction of students towards online learning based on academic stage

own pace. Even students who were employed in small jobs were able to effectively manage both their work and studies. They seemed to favour the flexibility of online learning. One of the students explained that "*the pandemic has allowed us to use and know about different technological applications in learning. It has enhanced our technological capacity to some extent*". Others commented that the recorded videos and PowerPoints shared by the teachers helped them understand and master the content whenever needed. The recording of the online classes promotes students' self-learning abilities. Twelve students also remarked that "*the wave of online learning develops our communication skills*". They were able to articulate their thoughts in a distinct way to avoid any misunderstanding. However, eight students noted that online learning was attractive and encouraging compared with traditional classroom settings.

3b). To explore undergraduate students' perceptions of online learning in terms of challenges encountered during online learning

The interview data revealed many challenges the students faced during online learning, as shown in Figure 5. The majority of the students (19) said that one of the common hurdles they faced was the Internet issue. Students who were from rural areas experienced poor internet connection as one of the significant challenges in online learning. Seventeen participants said, *"Even though some students got constructive and immediate feedback from their teachers, for others, the online feedback mechanism was not so effective for them"*. Interviewees said there was no peer support in the online classes to finish their assignments or homework. Also, twelve students stated that *"I hesitate to speak up and participate in the online discussions"*. Also, students were anxious about asking questions or having doubts about their teachers. Again, students agreed that they were not comfortable enough to turn on their videos during the online classes. It is to be noted that another major drawback of online learning pointed out by the students is the unfairness of online assessments or examinations. One of the students conveyed that *"online examinations lead to cheating, as teachers are not able to keep an eye on them. Some of our friends take the help of the internet or other notes while writing for the online exam"*.

However, students taking practical courses complained that they were not able to do their practical classes, lab work or project work from home. They said that *"Theoretical classes can be carried out in online mode, but it is not beneficial for practical subjects"*. Six students remarked that *"Online classes are not like real teaching and learning; they are a formality. I feel the traditional classroom can be the only way through which education can be imparted, as it lacks interaction with teachers and friends"*. About 14 of the participants responded, *"I use my phone to connect to the online class, and so the other social media chats like WhatsApp, Instagram, and Facebook create rifts due to constant notifications. Some of my friends keep their audio and video on during the class, which creates problems with smooth online communication"*. Again, another participant from one focus group pointed out that *"Just like*

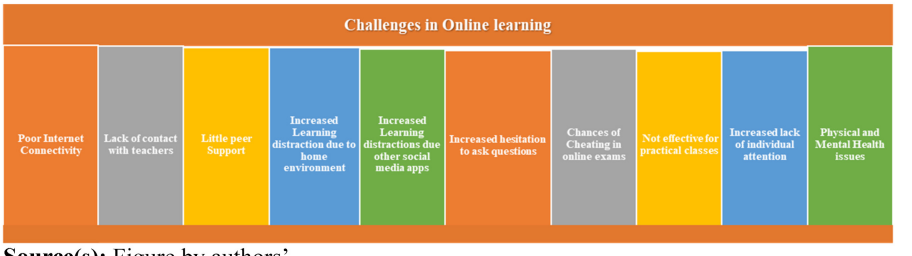


Figure 5.
Challenges in online learning

Source(s): Figure by authors'

in the face-to-face classroom, in the online classroom, individual attention is not provided". The participants have also raised some major health issues that they experienced during online learning during COVID-19. One of the students said, *"Looking at the screen for a long time has affected my eyesight"*. Another student said, *"Due to some unwanted noise disturbances (household noise, neighbours' activities, siblings fights and yelling, roadside vehicles, etc.), I continuously wear my headphones, and this has hampered my ears as it hurts a lot"*. Yet, ten students also commented that headaches, back pain, spondylitis, etc. were other health issues affected as a result of ongoing online classes. Mental health was also affected, as some students mentioned, *"I feel more tired and stressed doing online classes"*.

3c). To explore undergraduate students' perceptions of online learning in terms of their suggestions for improving online learning

From the thematic analysis of the FGD, four themes were identified: suggestions related to content delivery, suggestions related to systemic and infrastructural issues, suggestions related to pedagogy and suggestions related to capacity building of the students. Table 9 below outlines the primary themes, along with the criteria and exemplar interview excerpts.

Discussions

The results showed positive attitudes of undergraduate students towards online learning, as supported by the previous studies of Law (2021) and Muthuprasad *et al.* (2021). Possible reasons behind having a positive attitude towards online learning were time-saving, provision for personalized learning, use of attractive media and easy access to learning materials (Khan *et al.*, 2021; Sharma and Aggarwal, 2012). Similar to the studies of Obeidat (2020) and Nachimuthu (2020), statistical analysis indicated that gender, type of courses, discipline and academic stage have no significant effect on students' attitudes towards online learning. However, urban students exhibited a more positive attitude towards online learning than rural students (Singh, 2021). The study also revealed that undergraduate students were satisfied with online learning. According to Gopal *et al.* (2021) and Law (2021), illustration, enthusiasm, quality of instructors' teaching styles, course designs, fostering attention and flexibility in learning time and space led to increased student satisfaction. Previous literature supported the researcher's finding that there is no significant difference between gender, type of courses, discipline and academic stage in terms of satisfaction with online learning (Rahrouh and Ghanem, 2020). However, urban students demonstrated more satisfaction with online learning than rural undergraduate students, in support of Sarkar *et al.* (2021) and Sultana and Khan (2019), attributed to the better availability of internet services.

In terms of the effectiveness of online learning in students' academic lives, the majority of students stated that the nature of flexibility in learning is a benefit to them. Similar results by Almahasees *et al.* (2021) and Singh and Singh (2021) revealed that during the pandemic crisis, online learning emerged as an effective, flexible and valuable learning source. Students stated that the ability to access learning content at their leisure inspires them to self-learn (Almahasees *et al.*, 2021) and increases their skills and awareness of various technology applications (Dhawan, 2020; Muthuprasad *et al.*, 2021). Students stated that teacher recordings will make online learning more effective (Mishra *et al.*, 2020). Online learning can help students improve their communication skills by clearly communicating their thoughts and avoiding misunderstandings (Alshumaimeri and Alhumud, 2021). Students' online learning is a more appealing and encouraging learning environment than F2F learning (Muthuprasad *et al.*, 2021; Almahasees *et al.*, 2021).

Main themes	Criteria	Interview excerpts
Suggestions related to content delivery	Short duration videos Interactive content The practice of flipped classroom Increased access Discussion portal Virtual reality	*"I think the length of the content should be short at one session so that it doesn't create boredom or fatigue"* *"Content should be taught with some more interactive videos and presentations to avoid the mere art of lecturing or reading out the content. Few teachers present the content more attractively by using live quizzes, polls, etc. which makes me attentive throughout the class. So, I feel more such ways should be used in teaching other subjects too"* *The learning content should be delivered to us (students) before the online class so that teachers get time to interact with us"* *I feel teachers should upload the videos or PPTs on the college website so that we can access them whenever it is required or if someone missed out on something"* *"A Remedial class should be incorporated for those who are facing the problem"* *For teaching practical subjects online, some creative strategies should be adopted in designing or delivering the content"*
Suggestions related to systemic and infrastructural issues	Free/low-cost internet connectivity Power supply Free data supply Adequate technological devices	*"Government or College authorities should provide Internet package at low cost or free-of-cost to students"* *In remote areas, the internet connections or electricity problem should be solved; only then online learning would be meaningful"* *"I feel both students and teachers should join the online learning platform before 5–10 min. Sometimes it takes time to connect to the class from both ends. Sometimes teachers wait for other students to join. This wastes a lot of time"*
Suggestions related to pedagogy	Constructive immediate feedback Activity-based	*"There should be constructive and prompt feedback mechanism among us and teachers"*
Suggestions related to capacity building	ICT training	*"Just like teachers, we should also participate in ICT training programs".*

Table 9.
Suggestions of undergraduates for improving online learning

Source(s): Table by authors'

Since online learning is fully dependent on the Internet, teachers and students with poor internet connections may be denied access to online learning (Adedoyin and Soykan, 2020). Gustiani (2020) highlighted that students are easily distracted at home owing to noise from family members or neighbours or a lack of learning space. Furthermore, alerts and phone calls from other social media apps divert students' attention away from online classrooms (Opoku, 2021). Ferri *et al.* (2020) have stated that the lack of student involvement and motivation is related to the loss of human interaction among teachers, students as well as peers. Student–teacher interaction is the pinnacle of effective learning, and this absence impacts students' emotional intelligence and contentment and ultimately, academic performance (Khan *et al.*, 2021). Another important concern of online learning is the fairness of online assessment (Valizadeh, 2022) and the absence of peer support (Barrot *et al.*, 2021) for the students, which affects them emotionally and their physical and mental health

conditions as well (Sharma and Sharma, 2021). Concerning previous studies (Wut and Xu, 2021; Dhawan, 2020), the current study has complemented their findings on challenges such as hesitantness to ask questions, ineffectiveness for practical classes or courses and a lack of individual attention that students experience within the context of the COVID-19 pandemic.

Our research also identified strategies to improve the online learning environment from the perspective of students. Suggestions for future online learning practices have been categorized under the themes of learning material, connection, classroom management and online learning practices in the context of improving the online learning environment. First, students prefer that the content be thorough and exact, making it easier to learn and clear in a short period of time. As previously recommended (Muthuprasad *et al.*, 2021; Okada and Sheehy, 2020), they liked that the content presented with interactive videos, real-life examples, engaging quizzes and voting polls allowed them to stay motivated and attentive during the online class. Sharing pre-recorded movies or PowerPoints ahead of time will increase student engagement because they will know what will be taught. Students also reported that online learning can be helpful, provided remedial programmes are available and instructors provide fast feedback. The course designer and teachers should come up with some inventive and intriguing ways to include practical training in online learning. According to the findings of this study, government and college officials should consider offering low-cost or free internet services to students. Educational institutions should undertake and organize ICT training programmes for students, preparing them to deal with any technical or technological challenges. To ensure the success of the online learning trend in the future, it should be used in conjunction with F2F learning. These recommendations were also aligned with the literature reviews suggested by Almahasees *et al.* (2021).

Conclusion

The rapid shift to online learning due to the COVID-19 pandemic has necessitated a critical evaluation of student experiences. This study investigated undergraduate students' attitudes, satisfaction and perceptions towards online learning in India, employing the CoI framework to understand the influence of social, cognitive and teaching presence. According to the study, students exhibited diverse but generally positive attitudes towards online learning, appreciating its flexibility, convenience and personalized learning opportunities. The satisfaction levels varied and were influenced by perceived effectiveness, encountered challenges and individual expectations. While flexibility and accessibility were positively perceived, limitations like technological barriers, distractions at home and the quality of teaching delivery were reported. The nature of online learning was perceived as beneficial for academic life, facilitating self-learning, communication skills development and technology awareness. However, limitations regarding practical courses, student–teacher interaction and assessment fairness were highlighted. Moving forward, practitioners and researchers should start investigating the long-term impact of online learning on academic performance and learning outcomes. Future research should also explore the role of specific technologies and pedagogical approaches in enhancing online experiences while studying the impact of online learning on students' social and emotional well-being. By addressing these aspects, educators and institutions can create more effective and equitable online learning environments for all students, ensuring quality education even in the face of future challenges.

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