Received 13 September 2022
Revised 12 December 2022
16 December 2022
14 February 2023
26 March 2023
Accepted 8 May 2023

Determinants of students' satisfaction with digital classroom services: moderating effect of students' level of study

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Abstract

Purpose – Like every other sector, educational institutions have also been suffering immensely due to COVID-19 pandemic. Many educational institutions are now adopting digital classroom services. However, an online platform with the need for appropriate technology and infrastructure from the students' perspective poses a severe challenge to developing countries like Bangladesh. The paper aims to figure out the relevant factors that affect the extent of student satisfaction with digital classroom services at the school and tertiary levels.

Design/methodology/approach – It is a quantitative study of 450 students from Bangladesh who encountered online classes during the pandemic of COVID-19. An equal number of students from all levels, including schools, colleges and tertiary stages, participated in the survey. Exploratory and confirmatory factor analyses are used to interpret the data. Structural equation modeling using AMOS graphic software is incorporated to test the study's hypothesis.

Findings – Among all the four determinants of student satisfaction during this critical era, all levels look satisfied with the three underlying influences: technological, convenience and resource-related factors. However, school-level students found the digital classroom services abrasive with Internet connectivity and technical structures during online classes and exams.

Research limitations/implications – A comprehensive study can assess the difference between private and public university students in this regard. In addition, the impact of gender and/or location (rural/urban area) can be assessed by using the same model of the study.

Practical implications – Having the experience of the students' satisfaction level during this pandemic, the government, educational institutions and other stakeholders can take away the findings of the results to have a better plan for Internet-based education at every level.

Originality/value – The study is unique to see the readiness of developing nations such as Bangladesh to focus on the sudden uncertainty like a pandemic in introducing the digital education platform. The study can

Asian Association of Open Universities Journal
Vol. 18 No. 2, 2023
pp. 160-175
Emerald Publishing Limited
e-ISSN: 2414-6994
p-ISSN: 1858-3431
DOI 10.1108/AAOUJ-09-2022-0124

add value to achieving the country's sustainable development goal of becoming a digitally enabled regional education hub.

Keywords Digital classroom, Structural equation, Educational institutions, Bangladesh
Paper type Research paper

1. Introduction

The transformation of education from traditional physical classes to online virtual classes is evident on a larger scale during this COVID-19 pandemic (Shahriar *et al.*, 2021). With the rise of the life-threatening COVID-19 pandemic and its adversities worldwide, the education systems of different countries hit enormous turmoil. As most countries went through lockdown measures to avert further coronavirus breakouts, almost all educational institutes, including schools, colleges and universities, were bolted. However, existing educational programs or sessions were not adjourned in developed countries since most adopted and transformed toward virtual learning systems to continue educational activities amidst the grim pandemic.

Digital classrooms and distance learning, as substitute innovation-driven learning techniques, have been developing at a sensible pace. Advanced study halls have been explicitly used by all areas, including essential and advanced education, just like corporate learning. Schools, universities and educational cost communities are currently leading their classes on Zoom, Google Classroom or some other medium as discovered advantageous (Matzavela and Alepis, 2021). Digital classrooms have made education independent of time and place. Students and teachers both have access to course materials anytime they want. However, digital classrooms or online classes have never been so significant during COVID-19 than ever before due to the coronavirus. Everyone has adapted to a new form of education (Zheng *et al.*, 2020).

Over the last decade, digital classrooms have become popular, mostly in developed countries. School closures and other disruptions to daily life do not have to prevent students from learning. Online learning makes it convenient and straightforward to keep building vital skills for the future. However, recent studies from a developing country perspective revealed that doing classes from home during this pandemic is significantly more distressing and inconvenient in some cases (Shahriar *et al.*, 2021). Based on the circumstances mentioned above, the broad objective of the paper is to assess the level of student satisfaction with digital classroom services in a developing country like Bangladesh. In line with this, the paper assesses the answer to the research questions about the most influential factors that determine this satisfaction. With the help of existing literature and a body of knowledge related to digital and distance education, the study developed the hypothesis related to specific research questions and their relationship with the level of student satisfaction.

Although there has been much research on digital classroom services, most of it has been done in industrialized countries with more developed educational systems and access to technology. Research is required to focus specifically on students' experiences in underdeveloped countries, where introducing and utilizing technology in education may bring many opportunities and challenges. Additionally, comparing the levels of satisfaction among students at various academic levels can help us comprehend students' experiences with digital classroom services more nuancedly. This knowledge could help create interventions more specifically tailored to the requirements and preferences of students at various academic levels. In summary, this study can significantly contribute to the literature on digital classroom services and offers insightful information that could direct the design and implementation of these services in developing countries, specifically focusing on differences in satisfaction levels among students of various academic levels.

2. Background of the study

With the commencement of the COVID-19 pandemic, the global learning ecosystem is going through an unprecedented breakdown (Shahriar *et al.*, 2022a). According to UNESCO data, to control the devastating spread of COVID-19, more than 1 billion students are affected worldwide due to the pandemic (Hasan and Bao, 2020). At the same time, educational institutions are closed in 109 countries. In the global arena, due to the closure of educational institutions, students of all levels have lost their regular connection with the academic curriculum.

Though distance learning measures are adopted through television and the Internet, they have yet to be fruitful for all students. The effectiveness of the procedure remains a "burning question." There is not even a single cell phone or television in many households in remote areas of many developing nations, let alone Internet access (Chauhan *et al.*, 2021). Almost every nation has chosen the most popular e-learning strategies and is considered successful at times (Shahriar *et al.*, 2022b). Even though the e-learning boom is here to stay, the method indicates the growing division between the students living in remote rural areas with their urban counterparts receiving education through online platforms. Apart from all these challenges, the digital classroom also creates student opportunities. Students in developing countries such as Bangladesh are becoming more tech-savvy. The young generation from a different class of society is learning to use technology. In addition, the digital classroom has saved time and transportation costs (Khan *et al.*, 2021).

This study reports the findings of a thorough study through an online survey to establish the factors. The findings of the study can help the policymakers figure out the opportunities and challenges that the students have been facing to attend online education services during this pandemic and find solutions to solve different issues related to this. In line with developing the theoretical framework, the context of the study and possible determinants of student satisfaction related to digital classroom services are discussed below.

2.1 Digital classroom services in Bangladesh

Despite being a familiar worldwide term, the digital classroom is a relatively new concept for Bangladesh, where 46 public universities, 105 private universities and nearly 1,500 colleges allied with Bangladesh's national university offer higher education for their students (Hossain, 2021).

Nevertheless, digital classrooms became a fundamental activity for uninterrupted curriculum sessions when the COVID-19 pandemic broke out and affected nearly 6 million people globally by the end of May 2020. Bangladesh had one of the highest death rates caused by corona. To manage the rapid outspread of coronavirus, the Bangladesh government declared a public holiday followed by a lockdown on March 26, 2020 (Khan *et al.*, 2021). This lockdown continued for another two months, and every institution was shut down countrywide. After two months, some official organizations were open, but the lockdown continued till September 2020 for every educational institution in Bangladesh. After September, the government realized that the COVID-19 situation would not leave the country that easily, and educational institutions needed to be opened to continue the academic sessions. However, the physical or face-to-face classes could not ensure social distance or personal space among students and teachers to prevent the coronavirus from spreading (Hossain, 2021).

To resolve this issue, educational institutions proposed providing educational aid via several digital media and online platforms. Bangladesh's education administration gradually authorized this approach to the virtual education concept by considering the containment situation during COVID-19 (Hasan and Bao, 2020).

During this pandemic, universities started providing educational aid via Google Meet, Zoom, Audiobooks, YouTube and Facebook. Among these digital platforms, educators and students mostly use Google Meet and Zoom as they are broadly available and accessible to get access.

From then, digital classrooms became a valuable part of Bangladesh's education system and became familiar to everyone. It was like one step forward to achieving "Digital Bangladesh." The young generation of Bangladesh began to realize the effectiveness of digital media in receiving education, and new ideas began to generate about several ways to provide education in digital classrooms. There is no denying the essentiality of physical classrooms. However, also people began to realize that there are many ways to get an education that can be much more convenient for people.

Although, in the prior period, students and teachers struggled with digital media as it was a relatively new concept for them. They started to face technical difficulties, slow Internet speed, the availability of necessary devices to attend and conduct these digital sessions, application complexity, financial crisis and poor network (Hasan and Bao, 2020). Nearly half of the population needs the opportunity to have an education because of needing more logistics. This survey also reveals that only 45% of the population is privileged with proper mobile networks and Internet connections. As a result, 60% of students did not continue their curriculum and dropped their educational sessions (Khan *et al.*, 2021).

Later, students and faculty members gradually discovered different aspects of digital media and learned to use online platforms more efficiently. During this time, 63 universities out of 151 universities started to conduct digital classes when the other educational institutions hesitated to embrace this new concept as they were still determining if this approach could deliver the true purpose of education. Regarding school and college education, only institutions located in urban areas can initiate online classes effectively (Hossain, 2021).

To ease their struggle, some educational institutions took appreciable steps like providing necessary equipment and devices such as laptops or computers and reducing students' tuition fees to release their financial crisis pressure. By acknowledging this appreciable step taken by educational institutions, students become more interested in participating in digital classes. Soon they began to realize that it was less necessary to have physical class (Hasan and Bao, 2020).

Digital classes do not need to own large spaces. It also saves time. Now anyone can conduct or attend a class by being anywhere. They do not need to travel long routes, and there are few chances to miss online classes as long as they have an uninterrupted Internet connection and mobile network. Digital classes save time and transport costs. Now many students and teachers can attend a class by being in a rural area; it does not matter where the educational institution is situated. They can also save energy like electricity and power as the physical education institution is closed. They can learn and receive education when they can be with their family as many students need to leave their homes if they live in rural areas and want to take education from an institution originally located in an urban area or vice versa (Khan *et al.*, 2021).

By being familiar with digital classrooms, people now think about online education, and the theory of having a prominent place to receive education has disappeared. People are considering the possibility of continuing this virtual education system widely (Matzavela and Alepis, 2021). Perhaps digital classes can only partially replace and fulfill the absence of physical classes. However, digital education is the best alternative to manage the education system everywhere in this critical situation.

2.2 Theoretical underpinning and hypotheses development

Satisfaction is how a person feels when a performance or result lives up to expectations. Satisfaction depends on the level of expectations and how performance is seen (Keller, 2020).

The word "expectation" means that the management needs to figure out what the students want before, during and after the service (Teeroovengadum *et al.*, 2016). Student satisfaction is the students' feelings about how well their learning environment helps them do well in school (Momen *et al.*, 2020).

The study follows the disconfirmation theory of customer satisfaction. Disconfirmation theory says that when customers get a new service, they compare it to a standard they have set for themselves. Whether or not they think the service is reasonable depends on how well it meets this standard (Sinha *et al.*, 2020). Throughout the hypothesis development part, the study tries to theories the standard that students from different levels find relevant to their satisfaction while participating in digital classroom services.

2.2.1 Technological advancement and digital classroom services. Teacher–student interaction has been recognized as a crucial component of learning environment (Garrison and Cleveland-Innes, 2004). However, it is frequently believed to be absent from online courses (DeLacey and Leonard, 2002). Teachers can create increased student engagement, quality teacher–student connection and improved learning outcomes with proper technological integration. Accordingly, information and communication technologies in education play an imperative role in increasing overall student satisfaction (Kukreja *et al.*, 2021). Biasutti and EL-Deghaidy (2012) have investigated the magnitude of technology in the learning process to boost students' satisfaction. Their research revealed that communication technology in the education sector leads to outstanding student achievement by supporting the organization and offering enhanced resources and facilities (Matzavela and Alepis, 2021).

However, student satisfaction is at its highest level when technology promotes active engagement and real-world communication (Rios *et al.*, 2018). When voice chat is employed, students are more motivated to participate in class activities and feel more comfortable addressing delicate topics in a text-only environment (Blau and Barak, 2012). Video contact can help students and their online course instructors form an emotional connection (Borup *et al.*, 2012). Additionally, using mobile communication technologies in the online classroom fosters student connection and increases their intrinsic pleasure in online learning (Chaiprasurt and Esichaikul, 2013). Thus, in the digital classroom environment, advanced technologies have been considered a practical instructional approach to improve student academic performance, learning outcomes and course satisfaction (Chauhan *et al.*, 2021). Hence, this study posits the following hypothesis:

H1. Technological advancement has a positive impact on the satisfaction level of students related to digital classroom services.

2.2.2 Convenience and digital classroom services. Convenience is considered as a psychological summary statement an individual makes when he or she evaluates how much time and effort is needed to complete an entire task (Sanford *et al.*, 2017). High correlation between convenience and student expectations of quality education is evident in higher education (Harry *et al.*, 2010). Berry *et al.* (2002) characterize convenience in an online classroom environment as the degree of flexibility and ease a student is permitted to participate in online classes. More engaging learning experiences can be ensured if students have comfort and some flexibility (Collis, 1998). Because if the students are given enough time to think about the topics of discussions, particularly when critical thinking is needed, they can develop their ideas and communicate them more effectively (Garrison *et al.*, 1999). Moreover, the flexibility dimension substantially affected the learners' viewing times of the learning materials (Wei and Chou, 2019).

Ease of use and time requirement have been identified as crucial elements in the digital learning setting that might affect student satisfaction (Calli *et al.*, 2013). Kumar *et al.* (2020) studied the digital classroom experience of higher education students and teachers and

revealed that easiness and usefulness are the critical determinants of using Google Classroom. Besides, Chow and Shi (2014) have investigated the perceptions of e-learning and found that perceived flexibility and motivation have the most significant effect on satisfaction. Even students' course satisfaction can be improved if the students perceive that digital learning is beneficial and has the flexibility in knowledge-sharing and interpersonal communication. Thus, it can be inferred that convenience is a significant factor in student satisfaction (Matzavela and Alepis, 2021). Therefore, the following hypothesis is generated:

H2. Convenience has a positive impact on the satisfaction level of students.

2.2.3 Resources and digital classroom services. A few resources are compulsory to attend and facilitate digital classroom services, such as laptops, mobile phones and tablets with Internet connectivity (Zia, 2020). Due to the lack of access to these resources, many students need help joining the digital classroom (McMurtrie, 2020). Ramij and Sultana (2020) in their study reported that technical resources, consistent Internet connectivity and high cost are some of the key barriers to online education. Moreover, accessibility to appropriate technical resources in digital classroom services is a crucial determinant of students' satisfaction during their online education (Belanger and Jordan, 2000) and student satisfaction. Therefore, many educational institutions have equipped students with free laptops and tablets to participate in online courses (Zia, 2020).

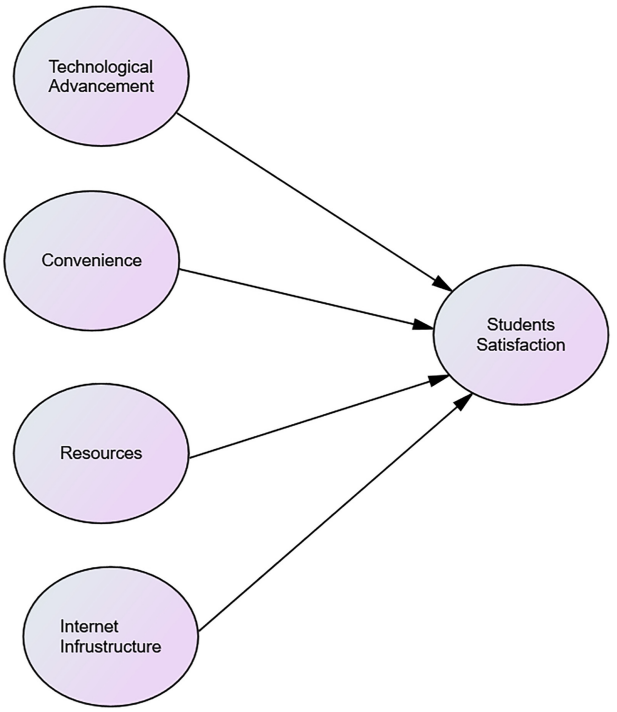
However, it is essential to address other aspects, such as technical efficiency in computer use and Internet navigation skills, before moving to online classes (Shahmoradi *et al.*, 2018; Wei and Chou, 2020). Additionally, if the students feel they have received requisite training, their satisfaction with their online classes is significantly higher. Therefore, the following hypothesis is formulated:

H3. Resources have a positive impact on the satisfaction level of students.

2.2.4 Internet facilities and digital classroom services. A poor Internet connection and inadequate broadband data have remained one of the biggest challenges concerning the online classroom environment (Baticulon *et al.*, 2021). The problem is even worse in the marginal areas as Internet network problems, along with troubleshooting of devices, frequently interrupt in the middle of the classes (Ramij and Sultana, 2020). This sort of experience with the Internet can significantly influence the online learning performance of students (Chung *et al.*, 2020). (Morris, 2011) Because the slow connection to the Internet can discourage students from participating and may reinforce their isolation (Dridi *et al.*, 2020). Moreover, poor network connectivity impedes learning and interferes with features such as video sharing, which requires a strong network (Alenezi, 2018). There is a strong relationship between connectivity issues and student satisfaction during digital classroom services. According to Chung *et al.* (2020), students who were at ease using Internet networks appeared to be happier with their online learning opportunities than those who were not. Students need access to a reliable Internet connection to likely see the online classroom as a disadvantage rather than an advantage, according to Li and Lalani (2020). Consequently, the following claim is made:

H4. Internet facilities have a positive impact on the satisfaction level of students.

While the relationship between four underlying factors related to student satisfaction with digital classroom services is evident, a comprehensive review of the literature does not find any single study that covers all these relationships in a single framework consistent with the disconfirmation theory. In addition, the study is unique to be evident with relating to the moderating effect of the level of studies. The study's conceptual framework (Figure 1), followed by the driven hypothesis, is given below.



Source(s): Authors

Figure 1.
Conceptual framework of the study

The hypothesis of the study.

(1) Due to immense technological advancement, students are satisfied with the digital classroom services (online classes).

(2) Because of convenience-related issues, students are satisfied with their digital classroom services (online classes).

(3) Sufficient resources make students satisfied with the digital classroom services (online classes).

(4) There is a significant relationship between Internet connectivity issues and students' satisfaction.

(5) Students from school and tertiary level have differences in receiving digital classroom services.

3. Methodology

To meet the purpose of this study, to figure out the acceptance of new standard digital classroom services among the different levels of students group, the study considers 450 students equally from different levels of students such as school, pre-university and tertiary level of education in Bangladesh. A random sampling technique is used in collecting the responses.

It uses the 5-point Likert scale technique to configure the extent of the responses. The Likert scale is treated as one of the finest techniques in survey-based data collection in social science studies (Malhotra, 2010). A total of around 30 questions were asked of the students. Firstly, demographic questions followed by satisfaction with the digital classroom and its determinants-related questions. The question paper has been attached in Appendix. In assessing the reliability of the items of the question, reliability statistics show the overall Cronbach's alpha value of more than 85%, which is far above the benchmark value of 0.70 (Malhotra, 2010). The study uses demographic analysis, factor analysis and structural equation modeling (SEM) approaches to analyze the survey data and test the drawn hypothesis. The details of the analysis are given in the next section.

4. Data analysis

To confirm the cluster, both exploratory and confirmatory factor analyses are used. Factor analysis works better to have desired coherence and transform extensive data into an organized set. The study also uses the SEM technique to test multiple relationships between and among the constructed variables. To see the difference between the responses of different groups, SEM also helped the study figure out the moderating effect of students' level of study in their given responses. SEM is a commonly used modern statistical tool in general social science research and educational research (Hair *et al.*, 2017b).

4.1 Factor analysis

As discussed earlier, factor analysis elects the exact item for the constituting constructs. In line with this analysis, reliability statistics and sample adequacy must be tested. As discussed earlier, factor analysis finds the satisfactory level of Cronbach's alpha value. In Table 1, Kaiser–Meyer–Olkin (KMO) also suggests that the number of respondents is adequate in the study. In exploratory factor analysis, Table 2 assures the most relevant items related to the specific variable.

In confirmatory factor analysis (CFA), overall goodness-of-fit indexes such as Normed Chi-Square, Comparative fit index (CFI) and root mean square error of approximation (RMSEA) value approve four independent variables with the constituting items (Figure 2). Higher loading of the items (above 0.5) also checks the higher association with the concerned variable.

4.2 Structural equation modeling approach

The study uses SEM to assess the hypothesis and examine the multiple relationships between and among the variables. In addition to confirming the items related to a specific variable, it also tests the hypothesis developed in the literature (Hair *et al.*, 2018). To validate the study, the similitude between the CFA and path model should be there.

The path model's overall fit is measured with absolute, incremental and parsimonious indices. Following the standard, the present study is reported with the standard value of

Table 1. KMO and Bartlett's test

KMO and Bartlett's test		
Kaiser–Meyer–Olkin measure of sampling adequacy		0.765
Bartlett's test of sphericity	Approx. Chi-Square	2083.000
	df	66
	Sig	0.000

Source(s): Authors'/survey data analysis

Rotated component matrix[a]				
	Component			
	1	2	3	4
TA1	0.811			
TA2	0.834			
TA3	0.923			
TA4	0.746			
C1				0.764
C4				0.836
R1		0.860		
R2		0.798		
R4		0.759		
IF2			0.758	
IF3			0.774	
IF4			0.784	

Note(s): [a]Rotation converged in five iterations
Source(s): Authors'/survey data analysis

Table 2.
Rotated component matrix

Normed Chi-Square, RMSEA and CFI. In Figure 3, normed Chi-Square below 5, RMSEA less than 0.08 and CFI more than 0.90 is reasonably satisfactory to meet the benchmark values (Hair, 2010; Hair *et al.*, 2017a).

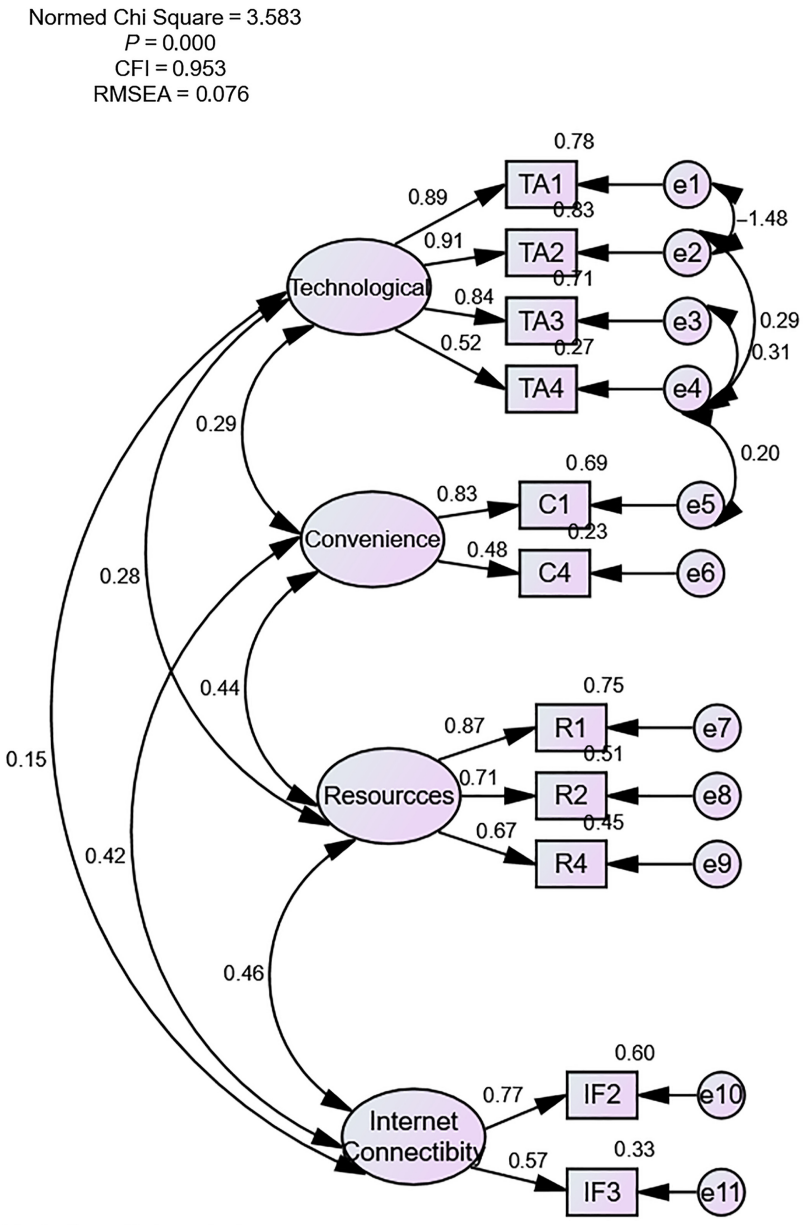
4.2.1 Confirmatory factor analysis (CFA) and validity testing. Reliability and validity analysis should be there to have an assured path model with the desired hypothesis testing results (Hair, 2010; Hair *et al.*, 2017a). The study goes with discriminant and convergent validity as the reflection of construct validity. If the set of measured items reflects the latent theoretical constructs, then construct validity is confirmed. In addition, it also ensures content validity. In contrast, Cronbach's alpha and construct reliability were also placed in the study.

4.2.1.1 Reliability and validity. Factor analysis states the reliability of the instruments. The expected value (more than 0.70) confirms the overall reliability of the scale here. To confirm the overall validity, the study must ensure convergent and discriminant validity. Convergent validity occurs when all the items that constitute a construct have the standard level of proportion variance. In contrast, discriminant validity refers to if items loaded in a construct differ from other items of the various constructs. In the study, convergent and discriminant validity are assured, with most cases of item loadings more than 0.60 (Figure 2). In addition, construct reliability and average variance explained are also satisfactory.

4.2.2 Hypothesis test. Using the baseline model, the critical ratio (CR) explains the results of the driven hypothesis. Here, the benchmark value of 1.96 or more represents the significant relationships between an independent and dependent variable (Hair *et al.*, 2017a; Hair, 2010).

Table 3 characterizes the results of the derived hypothesis: the relationships between technological, convenience, resources and Internet infrastructural-related factors (IVs) with student satisfaction (DV). Here in the first three hypotheses, students are satisfied with the issues such as technological, convenience and resource-related factors. However, students seem unhappy with the Internet infrastructure-related issues in receiving their lessons in the digital classroom. That means null hypotheses H1, H2 and H3 are rejected. However, as discussed earlier, the fourth null hypothesis is accepted with a CR value of just over 1.94.

4.2.3 Moderating effect of the types of educational institutions. As one of the purposes of the study was to see the difference in satisfaction levels of school and university students on the



Source(s): Authors, Data analysis

Figure 2.
Confirmatory factor analysis

different determinants, the study produces Table 4. Here, it is seen that they are different in two specific relationships based on the significant *z*-score values (Table 4). School students' satisfaction is different on technological and Internet infrastructure-related issues compared

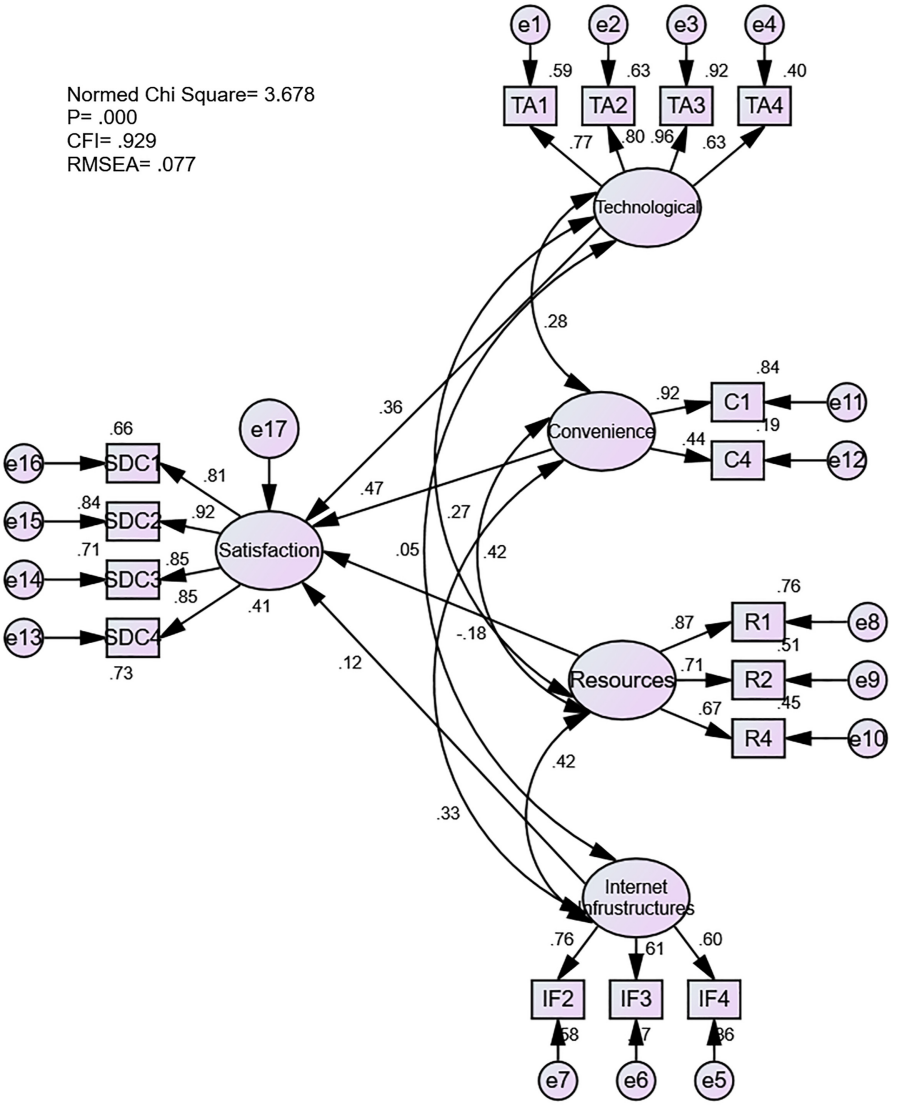


Figure 3.
Path model to test the hypothesis

Source(s): Authors, Data analysis

	Estimate	SE	CR	*P*	Label
Satisfaction ← Technological	0.536	0.075	7.139	***	Sig
Satisfaction ← Convenience	0.559	0.114	4.909	***	Sig
Satisfaction ← Resources	−0.259	0.091	−2.860	0.004	Sig
Satisfaction ← Internet_Infrastructures	0.214	0.110	1.956	0.051	Not Sig

Table 3.
Regression weight

Source(s): Authors, Data analysis

to university-level students. They remain consistent with the other two relationships, that is, on convenience and resource-related issues toward satisfaction.

It is also consistent with the previous literature discussion, where school students must become more familiar with the technology used in digital classroom services. Since they are unaware of alternative Internet connection sources, their sensitivity toward Internet infrastructure is also logical.

5. Implementation, recommendation and conclusion

While a few studies take place to present the current picture of the transformation of education due to COVID-19. The study is unique in drawing contemporary pictures of digital classroom services in a developing nation. More specifically, the causes determine satisfaction in two critical education levels: school and tertiary types. Since these two levels are different due to their age and atmosphere, it is crucial to know what satisfies specific groups. In line with the purpose of the study, it is found that out of four independent variables, respondents are satisfied with technological, convenience and resource-related factors. However, they need to look more pleased with the existing Internet infrastructure in receiving digital classroom services. In addition, regarding the difference between school and tertiary education, these two groups of respondents significantly differ in two factors. In technological and Internet infrastructure-related aspects, school students seem not entirely satisfied. As discussed earlier, it is logical as school-level students need to be better aware of alternative Internet connection sources. Moreover, their technological advancement for attaining digital classroom services could be better compared to their senior counterparts (tertiary-level students).

5.1 Implications

The study can assist policymakers and other stakeholders in presenting better digital classroom facilities and environments to students. During this pandemic of COVID-19, this is a compulsory move for policymakers of a particular level of education. Other stakeholders can also get benefits from the study's outcome in their respective roles. Additionally, this study may offer evaluation tools, models and instructions for conducting related research. It is also feasible that after the COVID-19 pandemic subsides, educational systems may continue to use online resources as study aids in a hybrid format in addition to conventional classes. Therefore, this study is worthy enough for revamping higher education to include elements that employ the online mode.

5.2 Recommendations

Although the government, the University Grants Commission, universities and many other institutions have made commendable efforts, this study reveals that their support and planning

			Estimate	*P*	Estimate	*P*	Label	Label	z-score
Satisfaction	←	Technological	0.075	0.411	0.624	***	par_17	par_54	3.485***
Satisfaction	←	Convenience	0.837	***	0.581	0.003	par_18	par_55	−1.002
Satisfaction	←	Resources	−0.256	0.019	−0.133	0.159	par_19	par_56	0.858
Satisfaction	←	Internet_ Infrastructures	0.164	0.17	1.194	0.015	par_20	par_57	2.034**

Note(s): The difference between the school and tertiary level's respondents
Source(s): Authors, Data analysis

Table 4.
Moderating effect

need to be revised to achieve the desired academic outcomes and overall student satisfaction. Considering this, authorities and policymakers should take the following actions.

There is a critical need to raise awareness of the implementation of digital initiatives by higher education institutions among learner groups. It is essential to explain to learners at their level why such actions have been taken and how they can change for the better. Next, specialized software can be set up in all universities and colleges to perform continuous learning functions, including running lectures, recording attendance, administering exams and evaluating students. Next, since most students who attend online classes do so from remote areas and rely on mobile Internet, the government should ensure more vigorous and more reliable Internet access at reasonable pricing. At all costs, academic institutions should assume responsibility for fostering such an atmosphere, along with UGC and other commercial sectors.

5.3 Future research directions

It is to be proposed that additional research be carried out in several developing countries in upcoming studies to generalize this study's findings. People are typically more likely to take the time to communicate their dissatisfaction than their satisfaction. The responses to the free-form inquiry might show evidence of this tendency. Thus, hybrid methodology research may be considered in the future. Additionally, since the results are solely based on student viewpoints, future studies incorporating faculty perspectives may better understand the difficulties teachers encounter in the digital classroom setting. The study can also be broadened to consider additional elements like instructor incompetence and distractions.

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Appendix
Survey questions

Table A1. Survey on the determinants of student satisfaction of digital classroom during COVID-19

Section A states the demographic issues such as age, gender and the level of the study
Section B: Technological Advancement (here Likert scale measures the response from 1–5)
1 Buying highly configured phones amplifies the opportunities in digital classroom during COVID-19
2 Know-how the usage of various software from trustworthy source helps me to get used to digital classroom
3 I suggest technological applications to others to make their life easier in digital classroom
4 Spending more time using technology during the pandemic period makes me efficient
Section C: Convenience
1 I get enough time to complete my online exams using the digital platform within the given time frame
2 Online classroom settings and patterns on different courses are comparatively easier than regular classes
3 I face no bandwidth disturbance when meeting deadlines in digital classroom
4 The allocated time is sufficient in digital classroom for conceptual or creative questions
Section D: Resources
1 I have sufficient equipment and facilities (computer/laptop/Internet/software) to participate in online classes
2 I have sufficient computer knowledge and IT skills to manage the digital-based learning
3 Guidelines are provided (e.g. how to use relevant online tools) before starting online lectures by your lecturer
4 Internet data is sufficient for doing online classes regularly
Section E: Internet facilities
1 Getting Internet connectivity is not a big challenge in web-based education
2 The Internet connection is well in my area to continue digital-based education regularly
3 I never faced difficulties to submit my exam scripts due to poor Internet connection
4 Weather changes do not affect the stability of my Internet connection while doing online classes
Section F: Satisfaction with digital classroom services
1 Digital-based education reduces student's pressure
2 I am satisfied with digital classroom
3 I can concentrate properly in online classes
Source(s): Authors

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