Student Involvement in Online Learning: A Multifaceted Perspective

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Abstract

COVID-19 has impacted various sectors, including the field of education. The pandemic has led to a significant rise in online education, particularly in developing countries like Bangladesh. This study explores student attitudes towards online learning and the factors influencing their engagement in this emerging educational method. This study includes a comprehensive literature review and descriptive correlational analysis of 198 student participants. The literature review investigates variables affecting student attitudes toward online learning. Technological, educational, economic, and communication issues are involved. It also highlights online education's versatility, convenience, and effectiveness. Data is collected using online surveys that utilize convenience sampling. The poll examines student participation in online education, digital technology accessibility, instructor engagement, and the effects of online learning. Descriptive analysis and Pearson's correlation coefficient are used to test hypotheses. Student engagement positively correlates with digital resources, instructor interaction, and online education. Online learning is more probable for students with suitable gadgets, reliable internet connections, and tech-savvy instructors that deliver clear teaching. The research also investigates the perspectives of students regarding the adaptability, convenience, and efficacy of online education. The research emphasizes the importance of providing students with sufficient technological resources and ensuring teacher assistance in order to enhance their participation in online education. Enhancing the efficacy of online learning can be achieved through the consideration of various factors, including but not limited to technology accessibility, teacher professional development, course design, and assessment strategies. This study underscores the significance of online education in the context of worldwide technological advancements. The proposition posits that developing nations, exemplified by Bangladesh, ought to embrace the utilization of online learning as a means to mitigate the educational disparity and sustain competitiveness within the context of a globalized society.

1. Introduction

Throughout and after the Corona outbreak, there were profound changes in people's livelihoods, health, and education, just as in the economy, society, and other parts of the globe during the post-globalization era. The continuance of this transformation has prompted significant shifts in the educational system. Although online education was already in place, it was not popular in nations like Bangladesh. However, since the Corona pandemic shutdown, it has been a contentious issue. Online learning alludes to the adoption of internet technologies to provide an assortment of knowledge-and performance-enhancing approaches (Rosenberg & Foshay, 2002). E-learning transforms the educational norm by offering education accessible to everyone, anywhere (Khan, 2004). Even if the notion of online education is 170 years old, the technique employed in this endeavor has inevitably morphed over the years. Its inception may be traced back to a teacher who developed a correspondence course in Great Britain by emailing class content and tasks (The History of Online Education, 2019). Online learning has undoubtedly made significant progress over time. Prior to the onset of the COVID-19 pandemic, the field of education technology had already experienced significant expansion and acceptance. In 2019, worldwide investments in ed-tech reached US$18.66 billion (The Rise of Online Learning during the COVID-19 Pandemic, 2022). Despite being less prevalent in developing countries such as Bangladesh, the global surge in online education during the COVID-19 pandemic has also impacted Bangladesh. During the height of the COVID-19 pandemic, various educational institutions worldwide commenced a gradual closure, including Bangladesh, which closed all its educational establishments on March 17. Consequently, students were abruptly disengaged from their academic environments. The global implementation of online learning has commenced. Both economic and humanitarian considerations support ensuring the continuity of education through technology. According to Khan et al. (2021), an extended interruption in education or a prolonged segment of an academic year can result in a significant setback for economies in the advanced stages of development during a period of sluggish growth. Bangladesh sought to remain competitive in the global arena and adapt to the evolving demands of the contemporary era. Following this, some educational institutions are embracing online learning through various media. The transition from traditional classroom learning to virtual platforms has significantly and unprecedentedly impacted students' learning styles. Additionally, it has presented challenges in adopting these virtual platforms (Acharjya & Das,

2022). The primary challenges impeding the implementation of online education in Bangladesh encompass a dearth of technical resources, exorbitant expenses, inconsistent internet connectivity, financial constraints within families, and the psychological strain experienced by students (Al-Amin et al., 2021). However, Bangladesh does not have the luxury of boasting about these limitations. Instead, it must focus on identifying and diligently striving to eliminate or, at the very least, reduce them as expeditiously as feasible. With time, despite a significant decrease in prevalence, the indispensability of online education will remain unavoidable. In the contemporary era characterized by technological advancements, it has become evident that technology is consistently employed as a tool or instrument whenever the global community faces a crisis or obstacle (Al-Amin et al., 2021). Due to its cost-effectiveness and adaptability, online education is poised to emerge as the predominant form of education. The global impact of the COVID-19 pandemic has detrimentally affected traditional educational systems. At the same time, online education has played a pivotal role in enabling millions of individuals to pursue educational opportunities from the comfort of their homes. In recent years, there has been a notable demonstration of the significant impact of online education, which has effectively transformed the global education landscape through internet connectivity and advanced technological tools. It is widely recognized that online education is poised to expand its global reach in the foreseeable future, providing educational opportunities to individuals worldwide. Regrettably, there exists a scarcity of research conducted to assess students' perspectives on the implementation of remote-based teaching in a developing nation like Bangladesh. The objective of this study is to make a valuable contribution to the existing body of literature regarding students' perceptions. This research has the potential to offer valuable insights for other developing nations. According to Bhatia, Kaur, and Wahi (2022), Bangladesh should prioritize advancements in online education as the contemporary era of digitalization necessitates an irreversible shift towards remote learning. The objective of this study is to ascertain the factors that exert influence on this emerging educational paradigm. Furthermore, an additional opportunity exists to explore a comparative analysis between online and traditional learning.

2. Literature Review

Researchers have discovered that socioeconomic variables have presented challenges for students in online learning, particularly concerning their academic environment and access to necessary resources. Moreover, it is worth noting that students experience psychological distress from online learning. This was primarily attributed to the quality of instructor responses and the comprehensibility of curriculum planning (Yeung & Yau, 2022). The COVID-19 pandemic prompted educational institutions to transition their activities to online platforms (Eltayeb et al., 2020), highlighting the significance and extensive adoption

of information technology in contemporary society. In the twenty-first century, there has been a growing trend among students, both those residing on campus and those living off campus, to utilize online learning methods that enable distance learning and a combination of in-person and online instruction (Rodrigues et al., 2019). According to Ali et al. (2018), an alternative study discovered that the utilization of e-learning is conducive to enhancing participants' learning outcomes and offers advantages in terms of usability, cost-effectiveness, efficiency, and adaptability within the learning process. In a research endeavor aimed at exploring students' perceptions regarding online learning versus face-to-face learning, Bali and Liu (2018) found that students exhibited a more positive attitude towards face-to-face learning regarding public visibility, social interaction, and feelings of accomplishment. Despite the evident benefits to learners, many economically disadvantaged countries have been slow to embrace online-based learning. However, the COVID-19 pandemic is expected to expedite the adoption of more sustainable and innovative learning solutions by educational institutions (Li & Lalani, 2020). Gupta et al. (2020) have observed that students are encountering difficulties in adapting to online education due to insufficient access to internet connectivity and online learning resources. According to a study conducted by Oyediran et al. (2020), Nigerian students identified the exorbitant expenses associated with information and communication technology (ICT) equipment as a significant obstacle to the widespread adoption of e-learning. In a study conducted by Hurlbut (2018), it was found that students who effectively embraced an online course identified teacher feedback as a significant determinant of their adoption of the course. According to a study by Akter, Munira, and Amin (2017), using e-learning formats in Bangladesh is advantageous yet poses implementation challenges. This challenge can be addressed by providing students comprehensive training to improve their comprehension and skills. According to a study by Islam et al. (2015), implementing e-learning technology presents several difficulties for teachers. These challenges include cognitive style and cultural barriers, pedagogical issues related to e-learning, technical obstacles, limitations in technical education, and the complexities associated with managing time. According to a subsequent investigation conducted by Rana et al. (2014), the primary issues associated with online learning are Technological Impediments, Modernization of New Varieties of Teaching programs and Participatory Education, and Creating the Latest Cognitive Infrastructure for e-learning. According to a study by Xu and Jaggars (2013), the goal was to determine how well students could adapt to the online learning environment in terms of their capacity to persevere and earn high grades in online courses instead of conventional face-to-face courses. The study's findings indicate a significant negative correlation between the online format, course persistence, and course grades, suggesting that the average student encountered challenges adapting to online courses. The effectiveness and convenience of distance learning programs, the functionality of online learning, and students'

technological proficiency and expertise also impact learners' insights (Aixia & Wang, 2011). Prior findings suggest that several essential factors influence how engaged students are in online learning. These factors include a sense of belonging, active participation from mentors, personal life attributes and prior experiences, engagement levels, cognitive style, and the presence of encouragement. Additional research indicates that students' attitudes toward online learning should be positive for it to be widely accepted and utilized (Selim, 2007). According to the findings of Bozkurt and Sharma's (2020) systematic literature review on online education, it was determined that online learning exhibits comparable effectiveness to traditional face-to-face instruction in terms of student learning outcomes. Nevertheless, it has been discovered that certain variables can impact the efficacy of online learning, including the caliber of the course design, the instructor's pedagogical competence, and the student's level of motivation. In a study conducted by (Maddison et al., 2017), it was discovered that online instruction, particularly when combined with active learning strategies, can yield positive outcomes in enhancing student learning. However, the researchers also discovered that students must possess proficient time management and self-regulation abilities to succeed in virtual learning settings. The results show that students' behavioral intentions to embrace e-learning are affected by factors such as enabling condition, effort expectation, performance expectancy, and social impact, even in the wake of the Covid incident (Saleh, Islam, & Nor, 2022).

3. Methodology

Researchers attempted to investigate the demographic context of students who have taken online programs in this descriptive correlational study. On a five-point Likert scale, respondents were asked to assess how much they agreed with the various elements that are most likely to pique their interest in online learning. Henceforth, efforts were made to determine the correlation between student participation in online education and a variety of factors. Thirteen questions, divided into three categories; access to digital technologies (ADT), teacher involvement (TI), and the impacts of online learning (IOL), were posed to the participants (Figure 1). By using an online survey, information from 198 students have been collected, participants were selected using convenience sampling. The data was analyzed using SPSS 29. Descriptive studies were conducted to analyze the frequency distribution and percentage. The Pearson correlation coefficient was utilized to analyze the relationship between the various aspects of the Scale of Students' Involvement in e-Learning (r). The topic of discussion pertains to two-tailed tests. A detailed flowchart diagram is supplied to illustrate the research techniques. The flowchart below shows this research's progressive process (Figure 2). The perception of online learning by students holds significant importance. It is observed that students exhibit a higher propensity to enroll in and endorse online courses. There is a growing trend among students to enroll in
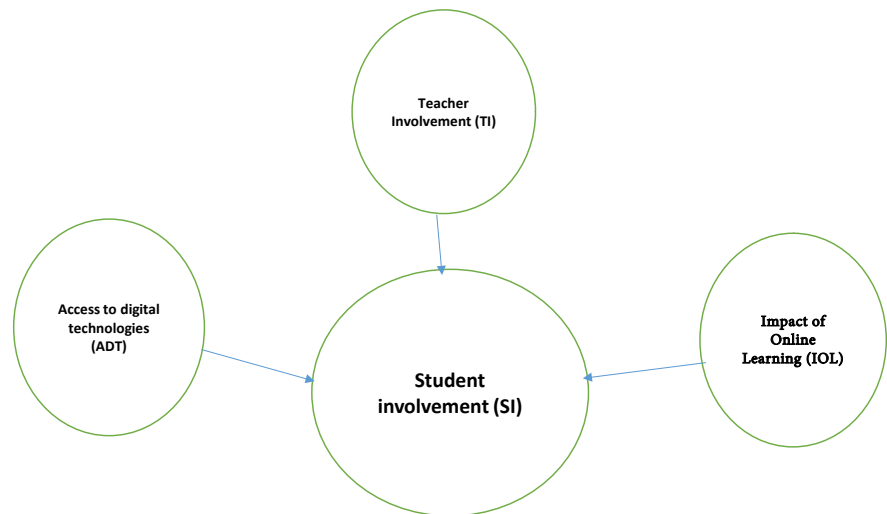
Figure 1. Factors affecting student's involvement towards online learning.
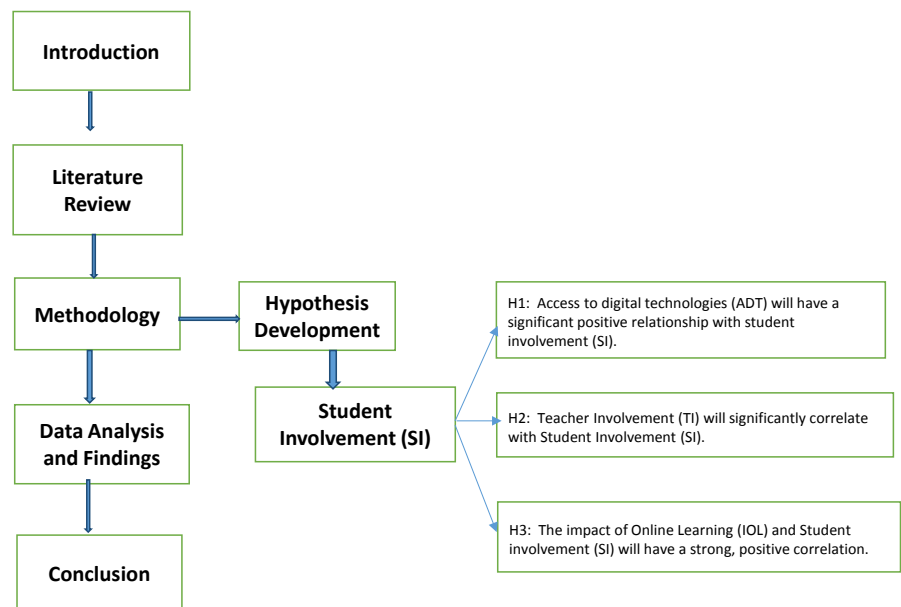
Figure 2. Flowchart.

online courses and programs. The utilization of online learning platforms offers various benefits; however, it is imperative to comprehend students' perceptions concerning this mode of education. This information may prove beneficial in aiding teachers in enhancing the quality of online learning. Despite the advantages of online learning, students hold diverse opinions on the matter. The study proposed the following three hypotheses to be analyzed based on the literature review.

H1: Access to digital technologies (ADT) will have a significant positive relationship with student involvement (SI).

H2: Teacher Involvement (TI) will significantly correlate with Student Involvement (SI).

H3: The impact of Online Learning (IOL) and Student involvement (SI) will have a strong, positive correlation.

4. Data Analysis and Findings

Convenience sampling was used to choose the people who took part in this study. Convenience sampling is a non-probability sample method in which people are chosen to take part based on how easily they can be reached. In this case, data have been collected with the help of google Forms from students who had taken online classes. It's important to keep in mind that convenience sampling can lead to some bias, since the people who answered the survey might not be a good representation of all online students as a whole. Because of this, the results of this study should be taken with the limitations of the sampling method in mind. Even though it might have some problems, convenience sampling was chosen because it was the best way to reach a large number of people with limited time and resources. The selected group of 198 students gave useful information about how they felt and thought about online learning, which helped to achieve the study goals and test the hypotheses.

4.1. Descriptive Analysis

4.1.1. Demographic Segmentation (Table 1-7)

Table 1. Age of respondents.

Age of respondents	Frequency	Percent
18 - 20 years	43	21.72
20 - 22 years	126	63.64
above 22 years	29	14.65
Total	198	100.00

Table 2. Gender of respondents.

Gender of respondents	Frequency	Percent
Female	79	39.90%
Male	119	60.10%
Total	198	100.00%

Table 3. Living area.

Living area	Frequency	Percent
Urban Area	120	60.61%
Rural Area	59	29.80%
Others	19	9.60%
Total	198	100.00%

Table 4. Education.

Education	Frequency	Percent
H.S.C	11	5.56%
Undergraduate	171	86.36%
Graduate	16	8.08%
Total	198	100.00%

Table 5. Educational institution

Educational Institution	Frequency	Percent
Private	186	93.94%
Public	12	6.06%
Total	198	100.00%

Table 6. Device used.

Device Used	Frequency	Percent
Smart phone	161	81.31%
Laptop	26	13.13%
Desktop	8	4.04%
others	3	1.52%
Total	198	100.00%

Table 7. Monthly expenditure for online classes.

Device Used	Frequency	Percent
Less than Tk 300	9	4.55%
Tk 300 to Tk 500	50	25.25%
Tk 500 to Tk 700	63	31.82%
Tk 700 to Tk 1000	44	22.22%
More than Tk 1000	32	16.16%
Total	198	100.00%

4.1.2. Level of Agreement

To assess student's involvement towards online learning, respondents have been asked to indicate their level of agreement with the various elements like access to digital technology, teacher's involvement, advantages of online learning and also their level of agreement to the factors affecting their involvement with online learning.

1) Access to Digital Technology

The respondents were asked four questions regarding the access to digital technology which shape their involvement towards online learning. The findings are shown in the following tables.

These tables highlight how digital technology—devices, the internet, user-friendly platforms, and advanced learning tools—affects students' online learning engagement and experiences. Table 8 demonstrates participants' perspectives on understanding online courses without devices. 83.84% of respondents said online learning needs appropriate devices (Table 8). Table 9 indicates how inadequate internet availability impacts virtual class attentiveness. Virtual education requires a solid internet connection, as 63.64% of participants strongly believed that poor internet connections impeded their concentration (Table 9). Complex online systems inhibit virtual class attendance (Table 10). Online platforms' complexity frightened 52.53%. Thus, intuitive interfaces may stimulate online learning. PowerPoint and media motivate online students. 62.63% preferred interactive and multimedia online instructional resources (Table 11).

Table 8. ADT item 1: It is difficult to understand online classes without having appropriate electronic devices.

	Frequency	Percent
Strongly Agree	85	42.93%
Agree	81	40.91%
Neutral	12	6.06%
Disagree	13	6.57%
Strongly Disagree	7	3.54%
Total	198	100.00%

Table 9. ADT item 2: Poor internet connections hamper the attention in online classes.

	Frequency	Percent
Strongly Agree	126	63.64%
Agree	54	27.27%
Neutral	4	2.02%
Disagree	5	2.53%
Strongly Disagree	9	4.55%
Total	198	100.00%

Table 10. ADT item 3: Complex online platform makes students reluctant for online class.

	Frequency	Percent
Strongly Agree	30	15.15%
Agree	104	52.53%
Neutral	40	20.20%
Disagree	17	8.59%
Strongly Disagree	7	3.54%
Total	198	100.00%

Table 11. ADT item 4: Usage of advanced learning tools like ppt, media etc. encourage students in online learning.

	Frequency	Percent
Strongly Agree	26	13.13%
Agree	124	62.63%
Neutral	32	16.16%
Disagree	14	7.07%
Strongly Disagree	2	1.01%
Total	198	100.00%

2) Role of Teacher's Involvement

The respondents were asked five questions regarding the role of teacher involvement which shape student's involvement towards online learning. The findings are shown in the following tables.

Tables display a student-centered investigation of e-learning. Table 12 shows that 61.62% of participants perceive that the technical experience of professors facilitates the acceptance of online education by students (Table 12). Table 13 shows that 58.08% of respondents perceive that teacher motivation contributes to a positive online learning atmosphere (Table 13). 50% of students find online programs challenging without teacher assistance (Table 14). Table 15 shows that over half of the participants (54.55%) perceive a positive correlation between a well-designed course and increased confidence in online learning (Table 15). Table 16 shows that 49.49% of participants find a clear and simple assessment system to enhance the enjoyment of online learning, while 14.65% hold a contrary view (Table 16). Instructors' knowledge, motivation, supervision, course design, and assessment processes are key factors for effective online learning.

3) Impact of Online Learning

The respondents were asked five questions regarding the impact of online learning in influencing students' involvement towards online learning. The findings are shown in the following table.

Online learning opinions are in the tables. Table 17 shows online learning's temporal flexibility. 46.97% agreed and 16.67% strongly agreed that online learning is adaptive whereas 12.63% disagreed, 17.68% neutral, and 6.06% strongly disagreed (Table 17). Table 18 explores online learning location flexibility. 55.05% and 12.63% agreed that online learning is flexible and accessible. 14.14% disagreed, 8.08% strongly disagreed (Table 18). Table 19 analyzes online learning retention. 25.76% agreed, 18.69% were neutral, and 35.86% disputed that online learning improves memory (Table 19). Table 20 shows online learning feedback speed. 47.98% agreed and 20.71% disagreed. 15.1% were neutral (Table 20). Online learning's flexibility, knowledge retention, and feedback differ across responders.

Table 12. TI item 1: Teachers' expertise of technology helps students in adopting online classes.

	Frequency	Percent
Strongly Agree	40	20.20%
Agree	122	61.62%
Neutral	19	9.60%
Disagree	12	6.06%
Strongly Disagree	5	2.53%
Total	198	100.00%

Table 13. TI item 2: Motivation from teacher creates a positive online learning environment.

	Frequency	Percent
Strongly Agree	44	22.22%
Agree	115	58.08%
Neutral	18	9.09%
Disagree	13	6.57%
Strongly Disagree	8	4.04%
Total	198	100.00%

Table 14. TI item 3: It is difficult to understand online classes without having appropriate guidance from instructor.

	Frequency	Percent
Strongly Agree	66	33.33%
Agree	99	50.00%
Neutral	15	7.58%
Disagree	12	6.06%
Strongly Disagree	6	3.03%
Total	198	100.00%

Table 15. TI item 4: A well designed course makes students more confident in online learning.

	Frequency	Percent
Strongly Agree	57	28.79%
Agree	108	54.55%
Neutral	16	8.08%
Disagree	12	6.06%
Strongly Disagree	5	2.53%
Total	198	100.00%

Table 16. TI item 5: Students are more comfortable in online learning if evaluation procedure is clear and easily understood.

	Frequency	Percent
Strongly Agree	46	23.23%
Agree	98	49.49%
Neutral	16	8.08%
Disagree	29	14.65%
Strongly Disagree	9	4.55%
Total	198	100.00%

Table 17. IOL item 1: Online learning is more flexible method of learning as it can be done anytime.

	Frequency	Percent
Strongly Agree	33	16.67%
Agree	93	46.97%
Neutral	35	17.68%
Disagree	25	12.63%
Strongly Disagree	12	6.06%
Total	198	100.00%

Table 18. IOL item 2: Online learning is more flexible method of learning as it can be done anywhere.

	Frequency	Percent
Strongly Agree	25	12.63%
Agree	109	55.05%
Neutral	20	10.10%
Disagree	28	14.14%
Strongly Disagree	16	8.08%
Total	198	100.00%

Table 19. IOL item 3: Through online learning we can conserve the knowledge for a long time.

	Frequency	Percent
Strongly Agree	5	2.53%
Agree	51	25.76%
Neutral	37	18.69%
Disagree	71	35.86%
Strongly Disagree	34	17.17%
Total	198	100.00%

Table 20. IOL item 4: Quick feedback is possible through online learning.

	Frequency	Percent
Strongly Agree	20	10.10%
Agree	95	47.98%
Neutral	30	15.15%
Disagree	41	20.71%
Strongly Disagree	12	6.06%
Total	198	100.00%

Table 21. Pearson's correlation scale between student involvement to online learning and access to digital technologies.

		Total Score SI	Total score ADT
Total Score SI	Pearson Correlation	1.00	0.474**
	Sig. (2-tailed)		0.00
	N	195.00	195.00
Total score ADT	Pearson Correlation	0.47**	1.00
	Sig. (2-tailed)	0.00	
	N	195.00	195.00

**. Correlation is significant at the 0.01 level (2-tailed).

Table 22. Pearson's correlation scale between student involvement to online learning (SI) and teacher's involvement (TI).

		Total Score SI	Total Score TI
Total Score SI	Pearson Correlation	1	0.452**
	Sig. (2-tailed)		0.000
	N	195	193
Total Score TI	Pearson Correlation	0.452**	1
	Sig. (2-tailed)	0.000	
	N	193	193

**. Correlation is significant at the 0.01 level (2-tailed).

In order to evaluate the magnitude and direction of the linear association between the scores of Student Involvement in Online Learning (Table 21) and Teacher's Involvement (Table 22), a bivariate Pearson's product-moment correlation coefficient (r) was computed. The bivariate correlation between these two variables exhibited a moderate positive relationship, which was found to be statistically significant (r = 0.452, $p < 0.001$).

In order to evaluate the magnitude and orientation of the linear association between the scores of Student Involvement to Online Learning and Impact of Online Learning (Table 23), a bivariate Pearson's product-moment correlation

Table 23. Pearson's correlation scale between student involvement to online learning (SI) and impact of online learning (IOL).

		Total Score SI	Total IOL Score
	Pearson Correlation	1	0.172*
Total Score SI	Sig. (2-tailed)		0.017
	N	195	193
	Pearson Correlation	0.172*	1
Total IOL Score	Sig. (2-tailed)	0.017	
	N	193	193

*. Correlation is significant at the 0.05 level (2-tailed).

coefficient (r) was computed. The bivariate correlation between the two variables under investigation exhibited a modest positive association, albeit statistically significant ($r = 0.172$, $p < 0.05$).

5. Conclusion

The progression of information technology has led to a continued shift toward digitalization. Consumers, particularly those belonging to the Millennial, Generation Z, and Alpha cohorts, exhibit a heightened level of interest and comfort in embracing contemporary technological trends, owing to their upbringing in the digital technology era. These generations are actively influencing the development of new marketing trends that will impact both the present and the future. Hence, it is imperative for service providers and manufacturers to comprehend the future virtual market's consumer behavior when utilizing technology. Based on the demographic table provided, (see Table 1) it is evident that the participants of this study were classified as belonging to the Generation Z cohort. The majority of individuals, precisely 63.1%, fall within the age range of 20 to 22 years. In contemporary society, technology serves as a multifaceted entity that concurrently fulfills the roles of information dissemination, entertainment provision, and distraction induction. Consequently, these various functions exert a discernible impact on the developmental trajectory of the younger generation. Examining individuals' engagement in online learning is significant due to the contemporary recognition of technology as a necessity rather than a luxury. Technology plays a pivotal role in our daily lives, serving as an indispensable component. In contemporary times, a significant portion of the nation has experienced substantial progress due to the effective utilization of technology. Nevertheless, educational technology encounters various obstacles, specifically with the execution and utilization of its tools and strategies. The primary aim of this research endeavor was to thoroughly investigate the multitude of factors that wield a significant impact on the level of student engagement within the context of online learning. The empirical evidence derived from the study indicates that the availability of digital technology (see Tables 8-11) and the active involvement of teachers (see Tables 12-16) exert a substantial influence on student en-

gagement within the realm of online education. The propensity for students to actively participate in online learning is heightened when they possess appropriate technological devices (Table 8), reliable internet access (Table 9), and user-friendly digital platforms (Table 10). The positive engagement of students in online learning is significantly influenced by their perception of their teachers' expertise in technology (Table 12), motivation (Table 13), and proficiency in delivering concise and prompt feedback. Online learning is seen as a flexible, convenient, and effective method of education (Table 17). Some students express concerns regarding limited social interaction and challenges in comprehending online material. This study found a correlation between digital technology availability, instructor engagement, and student performance in online learning environments (see Table 21 & Table 22). The perceived advantages of online learning, such as flexibility, convenience, and effectiveness, may impact its adoption (Table 23). Developing nations must utilize technological advancements, like online education, to remain competitive in the globalized world. In the current era of globalization, where knowledge and information play a crucial role in promoting economic and social development, online education can help economically disadvantaged nations make progress. Online education enables countries to offer equitable educational opportunities and resources to their citizens, akin to those available in more prosperous nations. This initiative enhances workforce skills, technological adaptation, and global competitiveness. Online education is essential for promoting creativity, entrepreneurship, and digital literacy, all of which are critical for the development of a knowledge-driven economy. Developing nations can adopt technology to engage in global competition, collaboration, and participation. Failure to acknowledge and embrace these technological advancements poses a substantial risk of marginalization and impedes their capacity to thrive in a globally interconnected and competitive setting. Developing nations should prioritize equipping students with essential devices, dependable internet connectivity, and user-friendly online platforms to augment student engagement in remote education. Training teachers in effective technology use and providing timely feedback can enhance student outcomes. Finally, designing online learning courses in a way that promotes social interaction and facilitates student understanding of the content can also be beneficial. The current investigation possesses the capacity to yield a constructive impact on the realm of online education through the comprehensive delineation of diverse factors. The utilization of this particular tool holds significant promise in offering valuable insights to educational administrators, educators, and researchers. It enables a comprehensive understanding of prevailing challenges and facilitates the development of efficacious strategies for future problem-solving endeavors. Therefore, the implementation of online education is expected to optimize its efficacy and yield significant societal advantages.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

Acharjya, B., & Das, S. (2022). Adoption of E-Learning during the COVID-19 Pandemic: The Moderating Role of Age and Gender. *International Journal of Web-Based Learning and Teaching Technologies, 17,* 1-14.
https://doi.org/10.4018/IJWLTT.20220301.oa4

Aixia, D., & Wang, D. (2011). Factors Influencing Learner Attitudes toward Online Learning and Development of Online Learning Environment Based on the Integrated Online Learning Platform. *International Journal of E-Education, E-Business, E-Management and Online Learning, 1,* 264-268. https://doi.org/10.7763/IJEEEE.2011.V1.43

Akter, A., Munira, S., & Amin, K. (2017). Key Influencing Factors for Adopting E-Learning Platforms of Private University Students' in Bangladesh. *Journal of Business and Economic Development, 2,* 94-98.

Al-Amin, M., Zubayer, A. A., Deb, B., & Hasan, M. (2021). Status of Tertiary Level Online Class in Bangladesh: Students' Response on Preparedness, Participation and Classroom Activities. *Heliyon, 7,* e05943. https://doi.org/10.1016/j.heliyon.2021.e05943

Ali, M., Hossain, S. M. K., & Ahmed, T. (2018). Effectiveness of E-Learning for University Students: Evidence from Bangladesh. *Asian Journal of Empirical Research, 8,* 352-360.
https://doi.org/10.18488/journal.1007/2018.8.10/1007.10.352.360

Bali, S., & Liu, M. C. (2018). Students' Perceptions toward Online Learning and Face-to-Face Learning Courses. *Journal of Physics: Conference Series, 1108,* Article ID: 012094.
https://doi.org/10.1088/1742-6596/1108/1/012094

Bhatia, M. K., Kaur, M., & Wahi, J. K. (2022). Future of Online Education. *EPRA International Journal of Multidisciplinary Research, 8,* 255-261.
https://doi.org/10.36713/epra11233

Bozkurt, A., & Sharma, R. C. (2020). Emergency Remote Teaching in a Time of Global Crisis due to CoronaVirus Pandemic. *Asian Journal of Distance Education, 15,* 1-6.

Eltayeb, L. B., Alharthi, N. S., Elmosaad, Y. M., & Waggiallah, H. A. (2020). Students' Perception on E. Learning and Remote Exams during COVID 19 Outbreak 2020. *International Journal of Pharmaceutical and Phytopharmacological Research, 10,* 142-148.

Gupta, M., Jankie, S., Pancholi, S., Talukdar, D., Sahu, P., & Sa, B. (2020). Asynchronous Environment Assessment: A Pertinent Option for Medical and Allied Health Profession Education during the COVID-19 Pandemic. *Education Sciences, 10,* Article No. 352. https://doi.org/10.3390/educsci10120352

Hurlbut, A. R. (2018). Online vs. Traditional Learning in Teacher Education: A Comparison of Student Progress. *American Journal of Distance Education, 32,* 248-266.
https://doi.org/10.1080/08923647.2018.1509265

Islam, N., Beer, M., & Slack, F. (2015). E-Learning Challenges Faced by Academics in Higher Education: A Literature Review. *Journal of Education and Training Studies, 3,* 102-112. https://doi.org/10.11114/jets.v3i5.947

Khan, B. H. (2004) The People-Process-Product Continuum in E-Learning: The E-Learning P3 Model. *Educational Technology, 44,* 33-40.

Khan, M. M., Rahman, S. M. T., & Islam, S. T. A. (2021). Online Education System in Bangladesh during COVID-19 Pandemic. *Creative Education, 12,* 441-452.
https://doi.org/10.4236/ce.2021.122031

Li, C., & Lalani, F. (2020). *The COVID-19 Pandemic Has Changed Education Forever. This Is How.*

Maddison, T., Doi, C., Lucky, S., & Kumaran, M. (2017). Literature Review of Online Learning in Academic Libraries. In T. Maddison, & M. Kumaran (Eds.), *Distributed*

Learning (pp. 13-46). Chandos Publishing.
https://doi.org/10.1016/B978-0-08-100598-9.00002-7

Oyediran, W., Omoare, A., Owoyemi, M., Adejobi, A., & Fasasi, R. (2020). Prospects and Limitations of E-Learning Application in Private Tertiary Institutions amidst COVID-19 Lockdown in Nigeria. *Heliyon, 6,* e05457.
https://doi.org/10.1016/j.heliyon.2020.e05457

Rana, H., Rajiv, R., & Lal, M. (2014). E-Learning: Issues and Challenges. *International Journal of Computer Applications, 97,* 20-24. https://doi.org/10.5120/17004-7154

Rodrigues, H., Almeida, F., Figueiredo, V., & Lopes, S. L. (2019). Tracking E-Learning through Published Papers: A Systematic Review. *Computers & Education, 136,* 87-98.
https://doi.org/10.1016/j.compedu.2019.03.007

Rosenberg, M. J., & Foshay, R. (2002). E-Learning: Strategies for Delivering Knowledge in the Digital Age. *Performance Improvement, 41,* 50-51.
https://doi.org/10.1002/pfi.4140410512

Saleh, R. A., Islam, M. T., & Nor, R. N. H. (2022). Factors Influencing University Students' E-Learning Adoption in Bangladesh during COVID-19: An Empirical Study with Machine Learning. In V. Skala, T. P. Singh, T. Choudhury, R. Tomar, & M. Abul Bashar (Eds.), *Machine Intelligence and Data Science Applications: Proceedings of MIDAS 2021* (pp. 695-706). Springer. https://doi.org/10.1007/978-981-19-2347-0_54

Selim, H. M. (2007). Critical Success Factors for Online Learning Acceptance: Confirmatory Factor Models. *Computers and Education, 49,* 396-413.
https://doi.org/10.1016/j.compedu.2005.09.004

The History of Online Education (2019). Peterson's.
https://www.petersons.com/blog/the-history-of-online-education/

The Rise of Online Learning during the COVID-19 Pandemic (2022). World Economic Forum.

Xu, D., & Jaggars, S. S. (2013). *Adaptability to Online Learning: Differences across Types of Students and Academic Subject Areas.* Community College Research Center.
https://ccrc.tc.columbia.edu/publications/adaptability-to-online-learning.html

Yeung, M. W., & Yau, A. H. (2022). A Thematic Analysis of Higher Education Students' Perceptions of Online Learning in Hong Kong under COVID-19: Challenges, Strategies and Support. *Education and Information Technologies, 27,* 181-208.
https://doi.org/10.1007/s10639-021-10656-3