



“Digital divide and institutional strategy: An analysis of learning challenges in online higher education”. A study undertaken in Assam

Rajashree Bhattacharyya¹, Dr. Rinalini Pathak Kakati²

¹ Assistant Professor and Research Scholar, Department of Business Administration, Gauhati University, Assam, India

² Associate professor, Department of Business Administration, Gauhati University, Assam, India

Abstract

"Digital Divide and Institutional Strategy: An Analysis of Learning Challenges in Online Higher Education". A study undertaken in Assam is rich and timely, particularly as digital transformation and education equality increasingly become top priorities.

The sudden digital revolution within higher education, particularly driven by the COVID-19 pandemic, threw a spotlight on the long-standing challenge of the digital divide — the disparity between those who have access to contemporary information and communication technologies and those who lack it. The digital divide is motivated by several factors including income, location, availability of infrastructure, and digital literacy. The objectives of our study are 1) To examine the challenges faced in online learning environments. 2) To examine the effect of the digital divide on students' learning experiences in online higher education. 3) To analyse if institutional strategies address or fail to address the challenges. 4) To examine the impact of student engagement and motivation on academic performance in online learning environments.

In online learning, students from deprived or rural areas experience huge hindrances, such as no access to steady internet connectivity, no digital devices available, and poor technical knowledge. These hinder their participation, academic outcomes, and general learning.

(Kaur Sampreet, - June 19, 2020 at 03:51 PM.)^[4]

Institutional strategies play a crucial role in addressing these challenges. Effective institutions adopt inclusive approaches, such as providing digital devices, offering internet subsidies, training faculty and students in digital literacy, and developing blended learning models. Institutions that fail to adapt strategically often exacerbate educational inequalities, leaving disadvantaged learners behind.

(Jafar K)

Keywords: Digital divide, institutional strategy, online learning, digital transformation

Introduction

Operational Definitions

- **Digital Divide:** Refers to the gap between those who have access to digital technologies (internet, devices, digital literacy) and those who do not. (Awati Rahul, 2024)
- **Institutional Strategy:** The deliberate plans and policies educational institutions adopt to deliver education effectively. (2025)
- **Online Learning:** Learning facilitated through digital platforms, often remotely.
- Student engagement strategies are techniques used to encourage active participation, interest, and motivation among learners. Effective strategies include interactive discussions, group projects, gamification, and personalized feedback. By incorporating these strategies into both online and traditional learning environments, educators can foster a deeper strategic fit between learning styles, delivery modes, and student needs.

Need of the study

The rapid shift to online learning during and after COVID-

19 has brought the digital divide into sharp focus. While online education offered flexibility, it also revealed deep inequities in students' access to devices, reliable internet, and digital skill. These disparities persist, especially in developing regions, making this study critically relevant.

Research indicates that online learning present distinct challenges—ranging from technology failures and lack of interactivity in online formats, to infrastructural and logistics issues offline. Many institutions have implemented interventions like laptop/hotspot loan programs, connectivity support, or alternative delivery methods such as printed materials or phone-based tutoring. Yet, effectiveness varies based on institutional capacity and strategy—illustrating the importance of comparative analysis.

Systematic reviews reveal that lack of adequate ICT infrastructure—including poor connectivity, outdated systems, and limited digital literacy—is a key barrier to effective online learning in many higher education institutions, particularly in resource-limited settings.

Studies report that online learning can increase feelings of isolation and require greater self-discipline, which impacts student motivation and academic performance differently than traditional settings. To design inclusive educational experiences, a comparative understanding of these psychosocial metrics is needed.

Existing research highlights effective solutions—hybrid learning models, public–private partnerships, community Wi-Fi hotspots, and digital literacy initiatives—but also emphasizes the need for tailored, context-sensitive policies. Our study can bridge this gap by offering evidence-based recommendations rooted in empirical comparisons.

(Jr., 2025) [3]

(Laufer Melissa, 2021) [5]

Research Objectives

1. To examine the challenges faced in online learning environments.
2. To examine the effect of the digital divide on students' learning experiences in online higher education.
3. To analyse if institutional strategies address or fail to address the challenges.
4. To examine if there is any positive impact of student engagement and motivation on academic performance in online learning environments.

Research Questions

1. What are the main challenges faced by students in online learning modes due to the digital divide?
2. How do institutional strategies mitigate or exacerbate the digital divide in online formats?
3. How does student engagement and motivation affect academic performance in online mode?

Research Hypothesis 1

Objective 2: To examine the effect of the digital divide on students' learning experiences in online higher education. (To assess digital divide, we used Digital skills and internet speed as parameters)

Hypothesis 1a

- **H₀ (Null Hypothesis):** Digital skills has no significant effect on students' learning experiences in online higher education.
- **H₁ (Alternative Hypothesis):** Digital Skills has a significant effect on students' learning experiences in online higher education

Hypothesis 1b

- **H₀ (Null Hypothesis):** Internet speed has no significant effect on students' learning experiences in online higher education.
- **H₁ (Alternative Hypothesis):** Internet speed has a significant effect on students' learning experiences in online higher education

Objective 3: To analyse if institutional strategies address or fail to address these challenges.

Hypothesis 2

- **H₀:** Institutional strategies have no significant effect on mitigating learning challenges in either online or traditional settings.
- **H₁:** Institutional strategies significantly affect the mitigation of learning challenges in online and traditional settings.

Objective 4: To examine the impact of student engagement and motivation on academic performance in online learning environments.

Hypothesis 3

H₀: There is no significant difference in student engagement and motivation on academic performance in a traditional classroom mode.

H₃: There is a significant difference in student engagement and motivation on academic performance in a traditional classroom mode.

Review of Literature

- **From Digital Divide to Education Sustainability:** A Scoping Review Learning has evolved to being online, and it is now considered a norm for learners to learn synchronously and asynchronously. Previous studies have proved that this type of learning has proven to provide higher learning outcomes. However, that is if learners perceive it as positive. Unfortunately, learners from low-income families have had difficulties coping with being online. Hence, this scoping review aims to distinguish the challenges learners from low-income families face when studying online. By understanding the challenges of learners from low-income families, educators can create an effective learning strategy that helps cater to these learners' needs. Guided by the Systematic reviews and Meta-Analysis extension for Scoping Reviews (PRISMA-ScR), this study has explored the Scopus and Web of Science (WoS) databases regarding the challenges learners from low-income families faced when studying online. The results report the temporal, geographical relationship, setting, design type, purpose, types of challenges, and summarising results of the past literature. Six themes of challenges were found from the results, which are 1) connectivity, 2) lack of appropriate devices, 3) unfitting learning environment, 4) lacking in digital skill, 5) lack of self-discipline, and lastly having 6) socio-economic issues.

(Woo Adelaide, Omar, & Mee Mee, 2022)

- **Disparities in Digital Education:** Socioeconomic Barriers to Accessing Online Learning Resources In this paper, the authors examined the policies and practices in nine UK institutions of further or higher education that had made a commitment to supporting students to develop their capabilities to learn in the digital age. This study examined the policies and practices in nine UK institutions of further or higher education that had made a commitment to supporting students to develop their capabilities to learn in the digital age. Data were collected over a six-month period through multiple interactions with case study sites. Analysis of these data captures institutional practices and the results are mapped onto a developmental framework for effective learning in a digital age. Recommendations are made to institutions considering how best to support their learners, including the need to: specify digital literacies in learning and teaching

strategies; prepare students for their experience of learning with technology; reconfigure campus spaces to enhance connectivity and support a range of social learning activities; and create a culture of engaging with students to inform decision-making. These institutional practices aim to support learners to make use of their digital skills and practices.

(Pettalongi Sagaf S, 3rd December 2023) [6]

- **Challenges of educational institutions in leveraging online capabilities:** The authors, in the present paper, identify the obstacles or challenges to schools and colleges in terms of maximizing their online capabilities in providing e-learning and other e-services broadly termed as online capabilities. The purpose of this research is to outline the challenges or obstacles that educational institutions face in utilizing their online capabilities to provide e-learning and other e-services more broadly known as online capabilities. This study adds to the body of knowledge concerning views of

practioners, system designers, learners, instructors and management. Through this research we learned that placed in a position to be a part of the integral component of education in today's world, Institutions are highly interested in utilizing their online potential notwithstanding significant challenges. And that the increasing demand for ICT in education sector is bound by the challenges falling into perception, Funding and policies and governance related constraints.

Hypothesis 1

The hypothesis below measures the impact of digital skills on learning experience.

Summary Output	
Regression Statistics	
Multiple R	0.919566
R Square	0.845601
Adjusted R Square	0.845197
Standard Error	0.520324
Observations	384

Anova	df	SS	MS	F	Significance F
Regression	1	566.4116	566.4116	2092.106	4.8E-157
Residual	382	103.4217	0.270737		
Total	383	669.8333			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.146321	0.072442	2.019844	0.044097	0.003886	0.288755	0.003886	0.288755
X Variable 1	0.950854	0.020788	45.73955	4.8E-157	0.90998	0.991728	0.90998	0.991728

Interpretation

This regression analysis examines the effect of digital skills (X) on learning experience (Y) among 384 respondents. The output demonstrates a strong and statistically significant positive relationship between the two variables. Multiple R = 0.9196: Indicates a very strong positive correlation between digital skills and learning experience.

R Square = 0.8456: About 84.6% of the variation in learning experience is explained by digital skills — suggesting a highly effective model. Adjusted R Square = 0.8452: Slightly lower, adjusted for sample size, still confirms the model's robustness. Standard Error = 0.5203: Low, indicating small average distance between actual and predicted values.

Anova Table

- **F-statistic = 2092.11 and Significance F = 4.76E-157:** Extremely small p-value indicates the overall model is highly significant, and the regression explains a significant portion of the variance in learning experience.
- **Interpretation of Slope (0.951):** For every unit increase in digital skills, learning experience increases by 0.95 units — a strong and significant positive effect.
- **P-value for X < 0.001:** Confirms statistical significance.
- Confidence Interval does not cross zero, reinforcing

reliability of results. This regression model shows a very strong, positive, and statistically significant relationship between digital skills and learning experience. Higher digital skills are consistently associated with higher learning experience scores. The high R² value suggests that digital skills are a major determinant of how effectively students engage and learn in online settings. This model is both statistically and practically significant.

Hypothesis 1

The hypothesis below measures the impact of internet use on learning experience.

Summary Output	
Regression Statistics	
Multiple R	0.9398
R Square	0.883223
Adjusted R Square	
Square	0.882918
Standard	
Error	0.417186
Observations	384

Anova					
	Df	Ss	Ms	F	Significance f
Regression	1	502.8485	502.8485	2889.202	3.2E-180
Residual	382	66.48484	0.174044		
Total	383	569.3333			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.151336	0.062181	2.433787	0.015399	0.029076	0.273597	0.029076	0.273597
X Variable 1	0.949517	0.017665	53.75129	3.2E-180	0.914784	0.98425	0.914784	0.98425

This regression analysis explores the relationship between internet use (independent variable) and learning experience (dependent variable) among 384 respondents. The findings show a very strong and statistically significant positive relationship between internet use and learning experience in the online education context.

Multiple R = 0.9398: Indicates a very strong positive correlation between internet use and learning experience.

R Square = 0.8832: Suggests that 88.3% of the variation in learning experience is explained by internet use — an excellent model fit.

Adjusted R Square = 0.8829: Confirms strong explanatory power even after adjusting for the sample size.

Standard Error = 0.4172: Indicates low variability of the residuals

Anova Table

F-statistic = 2889.20 with a p-value of 3.2E-180: Extremely low, indicating that the regression model is highly statistically significant overall. Internet use is a strong predictor of learning experience.

Interpretation of Intercept (0.151): When internet use is zero (hypothetically), the predicted learning experience is about 0.15.

Interpretation of Coefficient (0.950): For every unit

increase in internet use, learning experience increases by approximately 0.95 units, holding other factors constant. Statistical Significance: The p-value for both coefficients is < 0.05, confirming that the relationship is statistically significant.

The 95% confidence interval for the slope does not include zero, confirming reliability.

This regression model provides strong evidence of a positive and significant relationship between internet use and learning experience. Higher levels of internet use are closely associated with improved learning outcomes. With over 88% of the variance explained, the model is highly predictive and confirms that fostering greater access to and use of the internet can significantly enhance students' online learning experiences.

Hypothesis 2

Summary Output	
Regression Statistics	
Multiple R	0.974959
R Square	0.950546
Adjusted R Square	0.950416
Standard Error	0.289079
Observations	384

Anova					
	Df	Ss	Ms	F	Significance f
Regression	1	613.5749	613.5749	7342.341	1.6E-251
Residual	382	31.92247	0.083567		
Total	383	645.4974			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.038767	0.040247	0.963226	0.336044	-0.04037	0.1179	-0.04037	0.1179
X Variable 1	0.989649	0.01155	85.68746	1.6E-251	0.966941	1.012358	0.966941	1.012358

Interpretation

The regression analysis examines the impact of institutional support (independent variable) on online academic performance (dependent variable), based on data from 384 respondents.

The Multiple R value of 0.975 indicates a very strong positive linear correlation between institutional support and online academic performance. The R Square value of 0.951 reveals that approximately 95.1% of the variation in online academic performance is explained by institutional support, which is remarkably high. The ANOVA table confirms the model's significance, with an F-statistic of 7342.34 and a p-value of 1.6×10^{-251} , far below the 0.05 threshold. This strongly supports the rejection of the null hypothesis (H₀) and confirms that institutional strategies significantly affect the mitigation of learning challenges.

The coefficient for institutional support is 0.990, indicating that for every one-point increase in perceived institutional support (on a 5-point Likert scale), the online academic performance score increases by nearly one unit (also on a 5-point Likert scale). The p-value for the coefficient is extremely low, confirming that this relationship is statistically significant. The intercept is close to zero (0.039)

and not statistically significant, implying that academic performance is minimal in the absence of institutional support.

In conclusion, the regression results strongly support the alternative hypothesis (H₁) that institutional strategies have a significant and positive effect on online academic performance, and thus, play a crucial role in addressing learning challenges related to the digital divide.

Hypothesis 3

Summary Output	
Regression Statistics	
Multiple R	0.615848
R Square	0.379269
Adjusted R Square	0.376011
Standard Error	0.383935
Observations	384

Anova					
	df	SS	MS	F	Significance F
Regression	2	34.31496	17.15748	116.3962	3.53E-40
Residual	381	56.16161	0.147406		
Total	383	90.47656			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	1.187598	0.203324	5.840906	1.11E-08	0.78782	1.587376	0.78782	1.587376
X Variable 1	0.380895	0.031812	11.97338	2.93E-28	0.318346	0.443443	0.318346	0.443443
X Variable 2	0.343246	0.034645	9.907529	9.68E-21	0.275127	0.411366	0.275127	0.411366

Interpretation

Multiple R = 0.616 indicating a moderate to strong positive linear relationship between the predictors (engagement and motivation) and academic performance.

R Square = 0.379: This means that approximately 37.9% of the variance in academic performance is explained by engagement and motivation combined. The rest (~62.1%) is due to other unexplored factors.

Adjusted R Square = 0.376: Slightly lower than R², this adjusts for the number of predictors and confirms the model's reliability.

Anova (Model Significance)

- **F-value = 116.40, Significance F = 3.53E-40:** This very small p-value indicates that the regression model is highly statistically significant. The predictors (engagement and motivation) together significantly predict academic performance. The regression results indicate that student engagement and motivation are significant and positive predictors of academic performance in online classes. The model explains about 38% of the variance. Institutions aiming to improve online academic outcomes should focus on enhancing both engagement and motivation strategies for students.

Research Methodology

1. Type of research

A descriptive research design is used for conducting our study. It describing the nature and extent of the digital divide, learning challenges, and strategies used by institutions.

Research methods

Data collection methods

Quantitative Methods

- **Surveys and Questionnaires:** Structured tools like questionnaires from students were used for collecting

numerical data from a large number of respondents.

- **Secondary data:** Various books, journals and websites are used.
- **Statistical Analysis:** Using statistical techniques like regression analysis, multiple regression analysis is used to analyse and interpret numerical data.

Sampling

a. Sampling Technique

Stratified sampling is ideal: Our data is stratified by learning mode (online vs. traditional), and within each stratum, random sampling is used to select participants.

- **Population of the study:** Students enrolled in higher education institutions who have experienced either online, traditional, or both modes of learning.
- **Sampling Frame:** Students from a mix of institutions (government, private, rural, urban).

b. Sample Size

Formula for Sample Size Calculation

we can estimate the sample size using the following formula For estimating the sample size for a proportion, we can use the following formula:

$$n = Z^2 \cdot p \cdot (1 - p) / E^2$$

So, we will need a sample size of approximately 385 respondents to achieve our desired precision and confidence level.

- **Sample size:** 384 respondents, which is statistically valid for large populations with a 95% confidence level and ±5% margin of error.

Below is the List of challenges associated with online learning

Challenges Related to People

Challenges related to people are explained in the following table

Students related	Faculty related
Lack of self-discipline and time management	Resistance to adopting new technologies
Low motivation in online settings	Limited training or experience in online pedagogy
Digital literacy gaps	Time constraints for redesigning courses for hybrid delivery
Uneven access to technology or internet at home	Burnout from managing dual modes of teaching
Difficulty in adapting to hybrid formats	Difficulty in monitoring student engagement online
Isolation and lack of engagement	Challenges in assessing students fairly in both modalities
Reduced participation in online discussions	Lack of collaboration with IT and instructional design teams
Overwhelm from balancing in-person and remote responsibilities	Unclear boundaries between work and personal time
Inconsistent attendance (online vs. in-person)	
Poor communication with peers and instructors	
Managing two environments: Teachers must prepare for both in-person and online learners, often without adequate support or training.	

Challenges related to methods

Course Design Challenges	Content Delivery Challenges	Assessment and Evaluation Challenges	Engagement and Interaction Challenges	Support and Feedback Mechanism Challenges
Inconsistent integration between online and in-person components Lack of cohesion between the two modalities can cause confusion and disconnect	Over-reliance on passive content (e.g., recorded lectures, PDFs) Minimal interaction or active learning opportunities in the	Lack of fair and valid assessment across modalities Inability to design assessments that are equally effective and secure in both online and in-person formats.	Insufficient interactive elements in the online environment	Limited individualized learning support Difficulty offering personalized guidance in hybrid formats.

	online component.			
One-size-fits-all approach	Technical limitations in delivering complex content online Challenges with subjects that require hands-on learning (e.g., labs, art, engineering).	Increased risk of academic dishonesty in online assessments Difficulty in monitoring or proctoring exams and quizzes remotely.	Low student involvement due to limited collaborative activities or discussions.	Insufficient feedback loops for course improvement Student feedback is often delayed or not systematically collected in hybrid courses.
Use of identical content or delivery strategies for both formats without adaptation.	Difficulty maintaining content consistency across modalities Instructors struggle to ensure that remote and in-person students receive equivalent experiences.	Limited use of formative assessments Focus on summative evaluation without regular checks for understanding.	Disconnection between remote and in-person students	Unclear communication of expectations and deadlines Misalignment between platforms, syllabi, and announcements creates confusion.
Poorly structured learning pathways Unclear sequencing of activities, leading to cognitive overload or disengagement.	Delayed feedback in asynchronous methods Slow instructor response time impacts learning progress and motivation.	Assessment misalignment with learning outcomes Tasks may not reflect hybrid learning objectives or student engagement methods.	Lack of meaningful interaction or group work that includes both groups equally.	
Lack of flexibility in learning models Limited options for asynchronous learning or choice in participation formats.			Lack of real-time engagement tools	
			Inadequate use of breakout rooms, polls, chats, or collaborative platforms.	
			Ineffective discussion facilitation across formats Instructors may struggle to manage and connect in-class and online dialogue.	

Challenges Related Machines

Challenges Due to Machines in Online Learning

Hardware and Equipment Issues	Lack of access to adequate devices Students or faculty may not have reliable laptops, webcams, microphones, or tablets.
	Device compatibility problems Software or platforms may not work across different operating systems or older hardware.
	Limited availability of specialized equipment Labs, simulators, or technical devices needed for practical learning may not be portable or digitally replicable.
	Frequent hardware malfunctions Faulty or aging devices can disrupt learning and teaching continuity.
Internet and Connectivity Challenges	Unstable or slow internet connections Causes disruptions in live sessions, difficulty uploading assignments, or accessing resources.
	Bandwidth limitations Especially problematic for video conferencing, large downloads, or media-heavy platforms.
	Geographic disparities in internet availability Students in rural or underdeveloped areas face significant access issues.
Software and Platform Issues	Over-reliance on multiple platforms Use of too many tools (e.g., LMS, Zoom, Google Classroom, Teams) leads to confusion and cognitive overload.
	Frequent technical glitches or outages Interruptions in learning sessions due to unstable software performance. Poor user interface or experience Non-intuitive software design affects ease of navigation and engagement.
	Limited integration between platforms Difficulty syncing grades, attendance, assignments, or communication across systems.
Infrastructure and Institutional Technology Limitations	Inadequate institutional IT infrastructure Schools may lack sufficient server capacity, support systems, or digital learning environments. Delayed tech support and maintenance

	Slow response from IT departments in resolving technical issues disrupts teaching continuity.
	Lack of proper classroom technology setup Hybrid classrooms may not be equipped with high-quality cameras, audio systems, or smart boards.
	Security and privacy concerns Risks of data breaches, unauthorized access, or use of unsecured applications.
Accessibility and Usability Challenges	Technology not designed for accessibility Incompatibility with screen readers, captions, or other assistive tools for students with disabilities.
	High learning curve for using new machines or software Users need time and training to use tools efficiently, impacting early course engagement.
	Device or software fatigue Overuse of screens and digital platforms can lead to eye strain, fatigue, and decreased learning retention.
Technological Disparities	Unequal access to devices and internet: Students in rural or low-income areas may not have reliable internet or up-to-date devices.
	Digital divide: Inconsistent access to technology creates disparities in learning experiences and outcomes.

Challenges related to environment

Home Learning Environment	Distractions at home: Noise, family responsibilities, or lack of a quiet space can interfere with concentration.
	Lack of ergonomic setup: Poor lighting, uncomfortable furniture, or shared spaces can affect health and productivity.
Classroom and School Environment	Inconsistent learning conditions: Students switching between physical classrooms and home environments may face difficulty adapting to varying settings and expectations.
	Health and safety concerns: In-person components still pose risks (e.g., COVID-19, flu), especially if proper safety measures aren't in place.
Environmental Stress and Mental Health	Isolation and detachment: Online components can lead to social isolation, affecting motivation and mental health.
	Cognitive overload: Switching between online and offline formats can cause fatigue and decrease engagement.
Environmental Equity	Inequities in learning space: Students without a safe, quiet, and resource-rich home environment are at a disadvantage.
	Power outages and weather disruptions: In some regions, environmental instability (e.g., storms, heatwaves) affects connectivity and attendance.

Materials

Inconsistent Access to Materials	Digital vs. physical format mismatch: Some students receive materials online while others get physical copies, leading to confusion or disparities.
	Outdated or inaccessible resources: Materials may not be regularly updated or formatted for diverse learners (e.g., students with disabilities).
Lack of Standardization	Multiple platforms: Teachers may use a mix of tools (e.g., Google Classroom, Zoom, email), making it hard for students to track assignments.
	Inconsistent presentation: Lessons may be delivered differently in-person and online, causing learning gaps.
Engagement with Materials	Passive content: Static PDFs or recorded lectures often fail to engage learners.
	Limited interactivity: Online learners may not have access to hands-on learning materials used in physical classrooms (e.g., lab equipment, manipulatives).

Challenges related to management

Time and Task Management	Scheduling confusion: Coordinating synchronous and asynchronous sessions can overwhelm students and teachers.
	Procrastination risks: Without structured supervision, students may fall behind on assignments.
Classroom Management	Split attention: Teachers must manage in-person and remote students simultaneously, often leading to uneven support.
	Behavioural issues: Maintaining discipline or attention online is harder without physical presence.
Communication and Feedback	Delayed feedback: Online students may not get timely responses or clarification.
	Miscommunication: Instructions can be misinterpreted when delivered across different platforms or formats.
Assessment and Monitoring	Cheating concerns: It's harder to monitor assessments in online settings, raising questions of academic integrity.
	Inconsistent evaluation: In-person and remote students may be assessed differently, which can be unfair.

Findings

The regression analysis is used to examine the effect of internet speed (X) on students' learning experience (Y) in an online education setting. Regression model in our study shows a very strong, positive, and statistically significant relationship between digital skills and learning experience. Higher digital skills are consistently associated with higher learning experience scores. The high R² value suggests that

digital skills are a major determinant of how effectively students engage and learn in online settings.

This regression model also provides strong evidence of a positive and significant relationship between internet use and learning experience. Higher levels of internet use are closely associated with improved learning outcomes. With over 88% of the variance explained, the model is highly predictive and confirms that fostering greater access to and

use of the internet can significantly enhance students' online learning experiences. the regression results strongly support the alternative hypothesis (H₁) that institutional strategies have a significant and positive effect on online academic performance, and thus, play a crucial role in addressing learning challenges related to the digital divide. The statistical results indicate that student engagement and motivation are significant and positive predictors of academic performance in online classes. Institutions aiming to improve online academic outcomes should focus on enhancing both engagement and motivation strategies for students. On the basis of data collected from the respondents our study identified a detailed list of challenges associated with online learning environment. They are challenges related to people which is again sub-divided into challenges associated with students and faculty. Again, next are challenges related to methods subdivided into challenges associated with (course design, content delivery, assessment and interaction, support and feedback mechanism). Challenges associated with machines, materials, methods environment were also identified and listed out in details in our study.

Suggestions and Conclusion of the study

The paper_“Digital Divide and Institutional Strategy: An Analysis of Learning Challenges in Online Higher Education”. A study undertaken in Assam where higher educational institutions were targeted for collecting the sample data. Our study is an attempt to identify the primary and secondary challenges related to online education in higher educational institutions in the state of Assam. From the data collected from questionnaire and a survey done with our respondents were a survey form was filled up by the respondents which aided in listing the challenges related to online learning. The key parameters identified were people, method, machines, environment, materials and management. The study provides an understanding of how the digital divide affects learners differently in various instructional settings.

Through the second objective "To analyse how institutional strategies address or fail to address the challenges" the research critically examines the effectiveness of current institutional responses. It assesses whether policies and support systems (such as digital infrastructure, faculty training, and student support services) are equitable and adaptable across learning modes. This contributes to the academic and policy literature by highlighting gaps in institutional preparedness.

The third objective "To recommend strategic approaches to minimize learning gaps due to the digital divide "enables the study to contribute actionable solutions. These include tailored strategies for digital inclusion, resource allocation, blended learning frameworks, and technology integration practices that can help bridge the learning gap for disadvantaged student populations.

The findings and methodology of this study can serve as a foundation for future research on digital equity in education. Institutions and policymakers can use the results to design more inclusive learning environments and to better align their strategies with the diverse needs of students.

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