

Impact of E-Learning on Secondary Education in Patna District: The Role of Teachers in Supporting Higher Secondary Students during the COVID-19 Crisis

Chandan Kumari*

Abstract

This study assesses the impact of e-learning on secondary education in the Patna district during the unprecedented COVID-19 crisis, focusing on the vital role of teachers in supporting higher secondary students. Utilizing a quantitative survey design with a sample of 150 higher secondary teachers from various schools in Patna, the research identifies both the benefits and significant challenges of the rapid transition to digital education. The findings confirm a major readiness gap, with only 20% of teachers feeling "very prepared" for e-learning. The primary challenges reported were lack of training (50%) and technological barriers (40%). In response, teachers frequently utilized Regular Feedback (60%) and Resource Sharing (55%) as core support and engagement strategies. Despite the challenges, a significant proportion of students reported improvements in understanding concepts (50%) and assignment completion (55%). Additionally, the study highlights issues such as unequal access to digital devices, inconsistent internet connectivity, and increased workload for teachers, which further influenced the effectiveness of online teaching. Teachers emphasized the need for institutional support, structured digital curricula, and student motivation mechanisms. The study concludes that while e-learning is a valuable educational tool, sustained benefits require further investment in improved technological infrastructure, continuous teacher training, and innovative engagement strategies to meet the diverse needs of students and educators. Furthermore, the findings suggest that blended learning models may offer a sustainable approach beyond the pandemic by combining digital tools with traditional classroom practices. Policymakers and educational administrators are encouraged to formulate clear e-learning policies and provide adequate resources to ensure inclusive, effective, and resilient secondary education systems.

Keywords: COVID-19 crisis, digital competency, e-learning, readiness gap, secondary education, student engagement strategies, teacher training, technological barriers

INTRODUCTION

The COVID-19 pandemic has led to the unprecedented closure of educational institutions worldwide, impacting millions of students. According to UNESCO, approximately 1.5 billion learners were affected globally due to school closures [1]. This situation necessitated the rapid adoption of e-learning platforms to ensure that education continued despite physical distancing measures.

*Author for Correspondence

Chandan Kumari
E-mail: chandanijs1004@gmail.com

Assistant Librarian, Patna Women's College, Patna & Ph. D Research Scholar, DLISc, GLOCAL University, Saharanpur Uttar Pradesh.

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E-learning, or electronic learning, refers to education that uses electronic resources. It includes online learning materials such as e-books, e-journals, and digital libraries accessed through devices like computers and smartphones connected to the internet [2]. Advancements in technology and the internet have transformed education. E-learning

provides access to education for people worldwide. In India, initiatives by the Ministry of Human Resource Development (MHRD) include platforms like DIKSHA, SWAYAM, and the National Digital Library. The Jammu & Kashmir government has also launched programs to support students, such as the Jammu and Kashmir Knowledge Network Portal and various online resources for career guidance. Additionally, the Directorate of School Education, Jammu (DSEJ) has organized online activities and competitions for students aged 3–15 [3].

The COVID-19 pandemic has greatly affected education worldwide, leading to the temporary closure of schools in many countries. This has impacted about 70% of students globally. As of May 25, 2020, around 1.186 billion learners were affected by school closures in response to the pandemic. UNESCO recommended using e-learning and online platforms to help students continue their education. E-learning creates a learning environment that combines knowledge with ICT, allowing students to study anytime and anywhere [4].

LITERATURE REVIEW

Foundational principles of distance education were established well before the recent crisis [5]. It highlights that effective e-learning environments can lead to improved learning outcomes due to the personalized nature of online education, providing flexibility and accessibility that allow learners to engage with content at their own pace. Building on this, research by [6] emphasizes the importance of interactive content and active learning strategies; they found that incorporating multimedia elements and collaborative tools significantly enhances student participation and motivation. Furthermore, it emphasizes that the teacher's ability to project a "social presence" through video and interactive forums is vital for student retention and helps mitigate feelings of isolation among higher secondary students.

The onset of the 2020 pandemic forced a rapid shift in pedagogy. It emphasized that many educators felt unprepared for this sudden transition. It highlighted that teachers' adaptability and proficiency with digital tools [7] significantly impact student engagement, despite challenges like inadequate training and a lack of resources. In the specific context of Bihar, it was found that students faced acute challenges due to erratic power supply and limited internet, forcing teachers in the Patna District to adopt asynchronous methods like WhatsApp [8].

During this period, the TPACK (Technological Pedagogical Content Knowledge) framework became essential. It argued that teachers with a blend of subject expertise and digital fluency were most successful in creating inclusive virtual classrooms. To address the lack of physical laboratory access, they noted how teachers in Indian government schools utilized virtual simulations and O-Labs to bridge the gap in science education [9].

Social and structural mediators also played a role. Author observed that in regions with lower literacy rates, such as parts of the Patna District, teachers took on the role of "parent-educators" to help guardians facilitate digital learning. Simultaneously, assessment strategies shifted; authors noted that traditional examinations were replaced by continuous internal assessments and digital portfolios [10]. Finally, as the crisis progressed into the following year, research explored the resulting "Zoom fatigue" and mental health strains, noting that the blurring of home and work boundaries led to teacher burnout and a subsequent decline in student support quality [11, 12].

OBJECTIVES OF THE STUDY

1. To assess the impact of e-learning on secondary education in Patna district.
2. To identify the challenges faced by teachers in supporting higher secondary students during the COVID-19 crisis.
3. To explore the innovative strategies employed by teachers to enhance student engagement and learning outcomes in an online environment.

RESEARCH METHODS

This study utilized a quantitative survey design to gather data from teachers and students involved in higher secondary education in Patna District. A structured questionnaire was developed to collect information on experiences, challenges, and strategies related to e-learning during the pandemic. The sample consisted of 150 higher secondary teachers from various schools in Patna District. Participants were selected using a stratified random sampling method to ensure representation across different school types (government, private, and aided institutions). Data were collected through an online questionnaire distributed via email and WhatsApp platforms.

Data Analysis and Interpretation

Data were collected through surveys distributed to higher secondary teachers and students in the Patna District. The following tables present the findings regarding the impact of e-learning, challenges faced, and the support mechanisms provided by teachers.

Table 1 indicates that while a majority of teachers (55%) feel confident in their readiness for e-learning, a substantial 45% still lack full preparedness. Specifically, 35% are "Prepared" and 20% are "Very Prepared," representing the most equipped group. Conversely, 30% are only "Somewhat Prepared," and 15% are "Not Prepared," highlighting a significant need for additional training and institutional support to bridge the digital divide in the teaching staff.

Table 2 identifies the primary obstacles hindering effective e-learning, with Lack of Training emerging as the most significant challenge at 50%. This is followed closely by Technological Barriers (40%) and Student Engagement Issues (35%), suggesting that both infrastructure and pedagogical shifts remain difficult for educators. Additionally, Curriculum Adaptation (30%) and Time Management (25%) represent secondary but notable pressures. Overall, the data indicates that institutional support and technical upskilling are the most urgent requirements for teachers.

Table 3 outlines the strategies used to maintain student engagement, with Regular Feedback being the most prevalent method at 60%. Interactive Quizzes (55%) and Multimedia Presentations (50%) are also widely adopted, reflecting a strong reliance on digital tools to keep students active. While Group Discussions (45%) are moderately used, Virtual Office Hours are the least common strategy at 30%, suggesting that teachers prioritize group-based or automated engagement over one-on-one virtual support.

Table 4 illustrates the impact of e-learning on various student outcomes, showing a generally positive trend. Assignment Completion saw the highest improvement at 55%, followed by Understanding of Concepts (50%) and Participation (45%). Despite these gains, a consistent 20% of students experienced a decline across all categories, while approximately 25–35% remained unchanged. This suggests that while e-learning effectively facilitates task completion and conceptual grasp for the majority, a significant minority still struggles to adapt or see progress in a virtual environment.

Table 5 shows that Resource Sharing (55%) and Parent-Teacher Communication (50%) are the primary support mechanisms used by educators. One-on-One Tutoring (40%) and Emotional Support (35%) are utilized less frequently, indicating that teachers currently prioritize logistical and external communication over individualized or affective student support.

Table 1. Teacher preparedness for e-learning.

Preparedness Level	Frequency (%)
Very Prepared	20%
Prepared	35%
Somewhat Prepared	30%
Not Prepared	15%

Table 2. Challenges faced by teachers.

Challenge	Frequency (%)
Lack of Training	50%
Technological Barriers	40%
Student Engagement Issues	35%
Time Management	25%
Curriculum Adaptation	30%

Table 3. Student engagement strategies employed by teachers.

Engagement Strategy	Frequency (%)
Interactive Quizzes	55%
Group Discussions	45%
Multimedia Presentations	50%
Regular Feedback	60%
Virtual Office Hours	30%

Table 4. Impact on student learning outcomes.

Learning Outcome	Improved (%)	Unchanged (%)	Declined (%)
Understanding of Concepts	50%	30%	20%
Participation in Class	45%	35%	20%
Assignment Completion	55%	25%	20%

Table 5. Teacher support mechanisms.

Support Mechanism	Frequency (%)
One-on-One Tutoring	40%
Resource Sharing	55%
Emotional Support	35%
Parent-Teacher Communication	50%
Community Learning Sessions	30%

MAJOR FINDINGS

1. A slight majority of teachers (55%) are prepared for e-learning, but a significant 45% lack full readiness. This indicates a certain "digital divide" within the faculty that could lead to inconsistent educational quality across different classrooms.
2. The most critical inhibitors to e-learning success are a Lack of Training (50%) and Technological Barriers (40%). These systemic issues outweigh pedagogical concerns like curriculum adaptation or time management, highlighting that teachers are struggling more with the medium than the content.
3. Teachers favor engagement strategies that are scalable or tool-based, such as Regular Feedback (60%) and Interactive Quizzes (55%). Conversely, individualized support through Virtual Office Hours (30%) is the least utilized, suggesting a shift toward standardized digital interaction over personal mentorship.
4. E-learning has a largely positive impact on productivity, particularly in Assignment Completion (55% improvement). However, a consistent 20% of students experienced a decline in learning outcomes across the board, proving that e-learning is not yet an effective substitute for everyone.
5. Support mechanisms are currently skewed toward logistics – Resource Sharing (55%) and Parent-Teacher Communication (50%). Softer support structures, such as Emotional Support (35%) and Community Learning (30%), are less prioritized, revealing a focus on academic continuity over student well-being.

CONCLUSION

The transition to e-learning during the COVID-19 pandemic has revealed both the potential and challenges of digital education in higher secondary schools. While the majority of teachers embraced e-learning, issues such as slow internet speeds and low student participation rates must be addressed to enhance the effectiveness of this educational approach. The findings emphasize the need for improved technological infrastructure, training for educators, and innovative engagement strategies to foster a more effective e-learning environment. As the educational landscape evolves, ongoing support and adaptation will be crucial in ensuring that e-learning meets the diverse needs of students and educators alike.

The analysis of data reveals that while teachers faced significant challenges in adapting to e-learning, they also implemented various strategies to support their students effectively. The positive impact on student learning outcomes suggests that with the right support and resources, e-learning can be a valuable educational tool even in challenging circumstances. Further investment in teacher training and technology is essential for sustaining these benefits in the long term.

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