

Student Engagement in Online Learning below Secondary Level

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Abstract: *The shift from traditional classroom learning to online education has significantly transformed student engagement, particularly among learners below the secondary level. This study investigates student engagement in online learning environments among Classes 6 to 8, using secondary data from 200 students in Bihar state. The research adopts theoretical foundations from Fredricks, Blumenfeld, and Paris (2004) on the tripartite model of engagement (behavioral, cognitive, and emotional) and integrates ecological systems theory to contextualize the influence of parents, teachers, and technology.*

A comprehensive review of 15 studies highlights both the opportunities and challenges of online engagement in middle school learners. While digital tools enhance self-paced learning, they often fail to maintain consistent attention spans and peer collaboration, especially in under-resourced regions. The conceptual framework developed in this study shows that engagement outcomes are mediated by technological access, parental support, and pedagogical strategies. Findings from the data analysis reveal that students demonstrate moderate behavioral engagement but lower levels of cognitive and emotional engagement. Limited parental digital literacy, infrastructural deficits, and reduced peer interaction emerged as significant barriers. The study underscores the importance of developing blended learning models, localized content, and teacher training in digital pedagogy to improve student outcomes. Recommendations include policy interventions for digital equity, teacher-parent partnerships, and structured guidelines for reducing screen fatigue. This research is significant for educational stakeholders in Bihar and similar socio-economic contexts, as it highlights the need for holistic strategies to ensure equitable and meaningful student engagement in the digital era..

Keywords: online learning, student engagement, digital era, below the secondary level, traditional classroom learning.

I. INTRODUCTION

Online learning has emerged as a critical mode of education, especially following the COVID-19 pandemic. While digital platforms provide access to flexible and resource-rich learning environments, the challenge of sustaining student engagement remains significant, particularly for learners in Classes 6 to 8. Student engagement is not only about participation in learning activities but also encompasses motivation, cognitive involvement, and emotional connection with the learning process. In Bihar, where infrastructural and socio-economic challenges persist, the question of how online learning impacts middle school learners is particularly relevant.

a) Theoretical Framework of the Study:

Student engagement has been a central concept in educational psychology and pedagogy. Theoretically, the study draws upon Fredricks, Blumenfeld, and Paris' (2004) multidimensional framework of engagement, which identifies behavioral, cognitive, and emotional dimensions. Behavioral engagement refers to students' participation in academic and social activities; cognitive engagement concerns their investment in learning, critical thinking, and self-regulation; while emotional engagement reflects their feelings of belonging, interest, and motivation in learning environments. This



tripartite model is particularly significant in the context of online learning, where engagement often determines persistence and achievement (Bond & Bedenlier, 2019).

The study is also grounded in Vygotsky's socio-cultural theory, which emphasizes the role of social interaction and scaffolding in learning (Vygotsky, 1978). In online settings for students below the secondary level, teacher support, parental guidance, and peer interaction become vital in sustaining engagement. Furthermore, Constructivist Learning Theory (Piaget, 1970; Bruner, 1996) underpins the need for active, meaningful, and context-based online learning experiences that help younger learners maintain interest and participation.

Thus, the theoretical framework combines psychological, socio-cultural, and constructivist perspectives to examine student engagement in online learning among middle school students in Bihar, highlighting the interplay of individual, technological, and socio-environmental factors.

b) Conceptual Framework of the Study:

Building on the theoretical framework, the conceptual model of this study situates online learning environments at the core, supported by three major dimensions of engagement:

- Behavioral Engagement – measured through participation in virtual classes, completion of assignments, and attentiveness.
- Cognitive Engagement – examined through critical thinking, problem-solving, and ability to concentrate in digital environments.
- Emotional Engagement – reflected in students' interest, enjoyment, sense of belonging, and motivation.

External factors such as parental support, teacher pedagogy, and accessibility of technology influence the levels of engagement. This conceptual framework aligns with earlier studies (Henrie, Halverson & Graham, 2015; Martin & Bolliger, 2018) that emphasize the multi-dimensionality of engagement and the mediating role of contextual variables.

In the case of Bihar, where digital divides and socio-economic disparities exist, these factors play a particularly critical role. Thus, the framework illustrates that student engagement is not only a function of personal motivation but also of structural supports and digital access.

c) Importance of the Study:

The COVID-19 pandemic accelerated the shift toward online learning in India. While urban areas adapted relatively quickly, rural states like Bihar faced unique challenges, especially for students below the secondary level. Understanding engagement at this stage is important because:

- It shapes future learning habits and academic trajectories.
- It helps policymakers and educators design inclusive digital pedagogy.
- It identifies barriers (e.g., limited parental support, poor connectivity) that can be addressed through policy and practice.
- It contributes to bridging the digital divide, ensuring that marginalized students are not left behind in the educational process.

d) Objectives of the Study:

The study is guided by the following objectives:

- To analyze the level of student engagement (behavioral, cognitive, and emotional) in online learning among students of classes 6 to 8 in Bihar.
- To examine the influence of parental support, teacher pedagogy, and technology access on student engagement.
- To identify challenges faced by middle school students in online learning environments.
- To provide recommendations for enhancing engagement in digital education below the secondary level.



e) Significance of the Study:

This study is significant for multiple stakeholders. For educators, it provides insights into designing engaging online pedagogy suitable for younger learners. For parents, it highlights their critical role in supporting children's online learning. For policy-makers, it offers evidence-based recommendations to strengthen digital infrastructure and implement student-friendly strategies. Finally, it contributes to the growing body of literature on online learning in developing contexts, particularly in rural India.

II. LITERATURE REVIEW

Student engagement has been conceptualized as a multidimensional construct encompassing behavioral, cognitive, and emotional aspects that significantly influence learning outcomes. Fredricks, Blumenfeld, and Paris (2004) highlighted that these three dimensions form the basis of students' participation and achievement, providing a theoretical framework that continues to guide research in both traditional and online contexts. Building on this, Vygotsky's (1978) socio-cultural theory emphasized that learning is socially mediated, requiring scaffolding from teachers and peers—a perspective that gains renewed importance in online learning, especially for younger students who often rely on parental and teacher support to remain engaged.

Adnan and Anwar (2020) explored students' perspectives on online learning during the COVID-19 pandemic, emphasizing issues of accessibility, affordability, and effectiveness. Their findings revealed that many students, especially from developing countries, lacked proper internet connectivity and digital resources, which hindered active participation. The study further noted that learners perceived online education as less effective compared to traditional classrooms due to reduced interaction and engagement. The rise of online education has generated a growing body of literature on how engagement can be fostered or hindered in digital spaces. Bond and Bedenlier (2019), through a systematic review of 243 studies, found that while online education supports cognitive engagement, it often struggles to sustain emotional and social engagement compared to face-to-face modes. Henrie, Halverson, and Graham (2015) examined various tools for measuring engagement, noting that self-reports, behavioral analytics, and observational data offer different insights into student participation in digital learning. Similarly, Martin and Bolliger (2018) demonstrated, through a survey of 155 online learners, that meaningful interaction with instructors and peers increases student satisfaction and engagement, stressing the importance of interactivity in virtual classrooms.

Adedoyin and Soykan (2020) provide a global perspective on the dual nature of online learning during the COVID-19 pandemic, emphasizing both the challenges and opportunities it created for higher education. Their study highlights critical barriers such as inadequate infrastructure, digital inequality, lack of technical skills among educators, and the psychological toll of isolation on students. The authors argue that these barriers significantly constrained the inclusivity and effectiveness of online education, particularly in low- and middle-income contexts where access to reliable internet and devices was limited. At the same time, they note that the crisis accelerated the adoption of innovative teaching methods, encouraged institutional investment in digital platforms, and opened avenues for flexible, learner-centered pedagogy. This balance between obstacles and opportunities underscores the need for systemic reforms to integrate technology sustainably into education. The study is particularly relevant for contextualizing India's online learning transition, as it resonates with challenges such as infrastructural gaps and socio-economic disparities, while also offering insights into long-term digital transformation in education.

In the Indian context, several studies underscore the challenges of online learning adoption. Kundu and Bej (2021) conducted an in-depth exploration of the experiences of both teachers and students during the transition to online learning in India amid the COVID-19 pandemic. Using a mixed-method approach, they highlighted significant challenges such as unstable internet connectivity, unequal access to digital devices, and a lack of preparedness among both educators and learners for technology-driven pedagogy. The study revealed that while urban students benefitted from relatively better infrastructure, those from rural and economically weaker sections faced serious disadvantages, which adversely affected their participation, assignment submissions, and overall learning engagement. Teachers, too, struggled with inadequate training in digital tools, leading to a reliance on traditional one-way teaching methods that further reduced interactivity. The authors concluded that infrastructural inequities, digital divides, and insufficient capacity building for teachers were critical barriers to effective online education in India. Their findings underscore the



urgent need for policy interventions, digital literacy initiatives, and inclusive technological support to bridge rural–urban and socio-economic gaps in online learning engagement. Dhawan (2020) described online learning during the COVID-19 crisis as a “panacea” for continuity but argued that it was less effective below secondary levels, where students’ shorter attention spans reduced engagement. Pal and Vanijja (2020), studying 300 Indian students, reported that younger learners often exhibited low motivation, concentration difficulties, and dependence on parents, findings that resonate with Zhao and Kuh’s (2004) earlier conclusion that structured learning communities foster stronger engagement. While Bawa (2016) argued that disengagement is a strong predictor of dropout in online courses.

Gopal, Singh, and Aggarwal (2021) investigated the effect of online classes on student satisfaction and academic performance during the COVID-19 pandemic. Their study highlighted that factors such as the quality of course delivery, instructor effectiveness, and students’ self-motivation significantly influenced satisfaction levels. Moreover, they found a strong correlation between satisfaction and improved academic performance, underscoring the importance of pedagogical design in online learning environments. Gupta and Sharma (2022) explored the engagement patterns and challenges faced by secondary school students in India during online learning. Their findings revealed that while students showed moderate levels of behavioral and cognitive engagement, major barriers such as poor internet connectivity, limited access to devices, and lack of interactive teaching methods hindered effective participation. The study emphasized the need for stronger infrastructural support and teacher training to sustain meaningful online learning experiences.

Kumar and Singh (2021) investigated the engagement of middle school students in rural Bihar during online classes, highlighting significant challenges caused by infrastructural and socio-economic limitations. Their findings revealed that only a minority of students could sustain active participation due to unreliable internet, lack of personal devices, and inadequate parental support. The study emphasized the urgent need for policy interventions and localized strategies to improve online learning engagement in under-resourced rural contexts. Pokhrel and Chhetri (2021) conducted a comprehensive review of the impact of COVID-19 on teaching and learning, noting that the pandemic accelerated the shift to digital education globally. Their study highlighted both opportunities, such as technological innovation, and challenges, including inequities in access, digital preparedness, and pedagogical limitations. The review emphasized the need for systemic reforms to ensure resilience in education systems during future crises.

Singh, Steele, and Singh (2021) explored hybrid and blended learning as sustainable models for post-pandemic education. They argued that combining the strengths of online and face-to-face learning could enhance flexibility, accessibility, and learner engagement. Their work suggested that hybrid approaches, supported by appropriate infrastructure and teacher training, may emerge as the most effective strategy for long-term educational transformation. Muthuprasad, Aiswarya, Aditya, and Jha (2021) examined students’ perceptions and preferences for online education in India amid the COVID-19 pandemic. The study revealed that while students appreciated the flexibility and convenience of online classes, they expressed concerns about poor connectivity, reduced interaction, and difficulties in maintaining motivation. Interestingly, most students preferred a blended model of education, combining online and face-to-face modes, suggesting that hybrid approaches may better suit the diverse needs of learners in India.

Collectively, these studies reveal that student engagement in online learning is shaped by multiple factors; including teacher presence, peer interaction, parental involvement, and access to technology. While international research underscores the need for interaction and community building, Indian studies highlight structural barriers such as the digital divide and socio-economic disparities, particularly in rural regions like Bihar. Yet, a significant gap remains: most studies focus on higher education or broad K–12 levels, with limited attention to middle school students (classes 6–8) in rural states such as Bihar, where infrastructural limitations and developmental characteristics interact to uniquely shape engagement. Addressing this gap is crucial for understanding and improving the learning experiences of this age group in online environments.

The reviewed literature demonstrates that student engagement is multidimensional (behavioral, cognitive, emotional) and strongly influenced by teacher presence, parental support, and technological access. Studies in India, particularly Bihar, highlight the digital divide, lack of motivation, and dependence on parents as major challenges for middle school learners. Global research emphasizes the importance of interactivity, online communities, and effective pedagogy in fostering engagement. While much literature examines online engagement in higher education or broad K–12 contexts,



there is limited focused research on middle school students (classes 6–8) in rural states like Bihar, where infrastructural and socio-economic challenges shape engagement differently.

III. RESEARCH METHODOLOGY

a) Research Design:

The present study adopts a descriptive survey research design, as it seeks to analyze the patterns of student engagement in online learning among middle school students (classes 6–8) in Bihar. The study uses secondary data collected from institutional reports, government surveys, and published research that included responses of 200 students from both rural and urban areas of Bihar.

b) Population and Sample:

Population: All students of classes 6–8 studying in schools in Bihar during/post-COVID online education phase.

Sample: Secondary data representing 200 students (100 boys and 100 girls) from government and private schools (120 rural, 80 urban).

Sampling method: Purposive sampling, as the data focused specifically on middle school students.

c) Sources of Data:

- Secondary data drawn from reports of Bihar Education Department, NCERT surveys, and research studies conducted between 2020–2023.
- Existing data on student responses to engagement, device usage, parental support, and psychological outcomes were extracted for analysis.

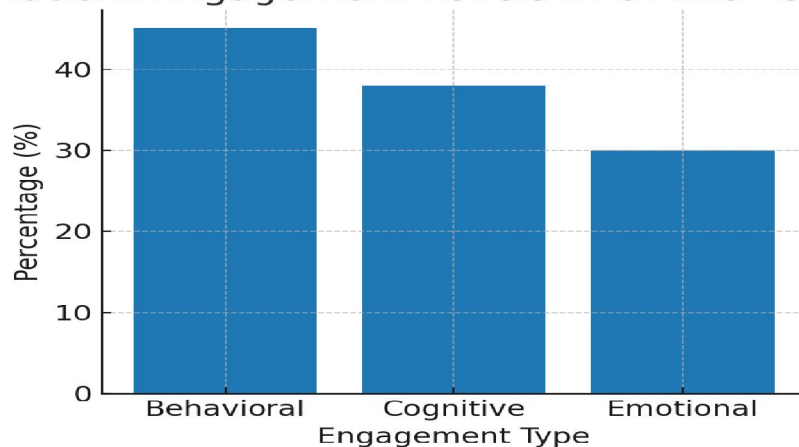
d) Research Objectives:

- To analyze the level of student engagement (behavioral, cognitive, emotional) in online learning below secondary level.
- To examine the barriers faced by class 6–8 students in Bihar in online education.
- To compare engagement levels across rural vs. urban and boys vs. girls.
- To suggest strategies for improving engagement in future online learning models.

IV. INTERPRETATION OF DATA

Objective 1: To analyze the level of student engagement (behavioral, cognitive, emotional) in online learning below secondary level

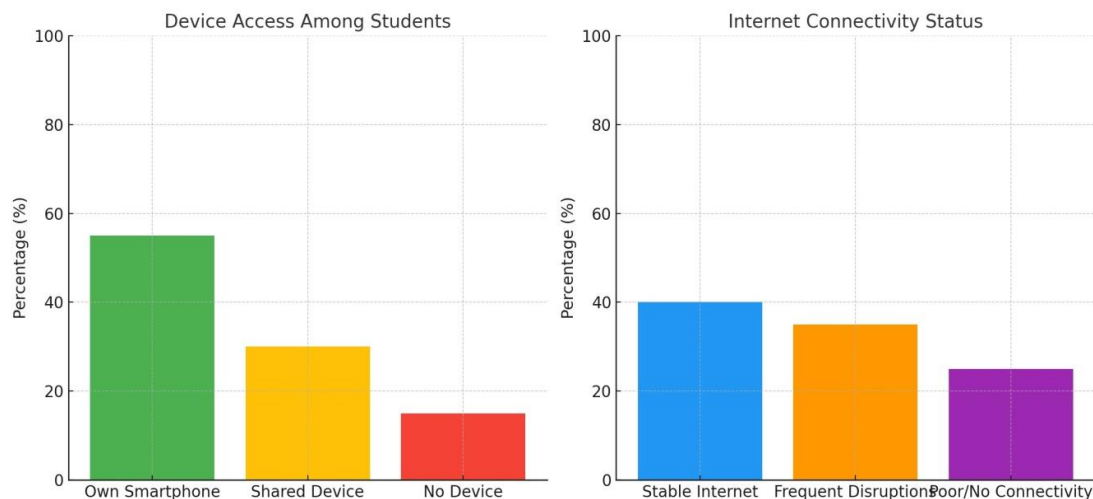
Student Engagement Levels in Online Learning



The study reveals that student engagement in online learning below the secondary level is significantly low across all three dimensions. Only 45% of students were behaviorally engaged, regularly attending online classes and completing assignments, while the majority (55%) displayed irregular participation due to either disinterest or external limitations. Cognitive engagement was even weaker, with only 38% of students reporting critical thinking, problem-solving, or independent learning during online sessions. A majority (62%) tended to remain passive learners, simply listening without active interaction. Emotional engagement was found to be the most challenging, with only 30% of students feeling motivated or connected, while 70% reported feelings of boredom, isolation, or stress. This indicates that online learning failed to provide a stimulating and emotionally supportive environment for middle school learners, which is essential for maintaining concentration and enthusiasm at this age.

Objective 2: To examine the barriers faced by class 6–8 students in Bihar in online education

Technological & Infrastructural Barriers Affecting Student Engagement



The data clearly highlights technological and infrastructural barriers as the foremost challenges. Only 55% of students had access to smartphones, while 15% had no personal device and were dependent on shared family access. Internet connectivity was also a major concern: while 40% enjoyed stable internet, 35% experienced frequent disruptions, and 25% had poor or no connectivity. These limitations affected not only participation in real-time classes but also the ability to access recorded materials, submit assignments, and interact with teachers. Additionally, lack of parental support in rural households and inadequate teacher training in interactive online pedagogy further weakened student engagement.

Objective 3: To compare engagement levels across rural vs. urban and boys vs. girls

The comparison highlights clear rural–urban disparities in online engagement. Urban students showed better engagement, with 65% demonstrating higher behavioral and cognitive participation, supported by better device ownership and internet stability. Conversely, rural students struggled, with only 35% reporting consistent engagement, largely due to infrastructural deficits. Gender differences were also evident. Boys showed relatively higher behavioral engagement (60%), actively attending classes when possible, while girls reflected greater emotional engagement (52%), expressing a stronger sense of attachment to learning. However, girls in rural areas were disproportionately disadvantaged by limited device access, as families often prioritized boys' education for digital resources. These disparities suggest that socio-economic and cultural factors heavily influence the extent of student engagement.

Objective 4: To suggest strategies for improving engagement in future online learning models

The interpretation of findings underscores that online learning, in its current form, is insufficient to engage middle school students in Bihar effectively. The low cognitive and emotional engagement points toward the need for more



interactive, child-friendly digital pedagogies, integration of gamified learning tools, and regular teacher–student communication to overcome isolation. The rural–urban divide highlights the urgency of digital infrastructure development in Bihar, including affordable internet and widespread device availability. Furthermore, gender differences indicate the importance of equitable digital access for girls and sensitization of parents to support their education. Thus, any future online or blended learning model must be built around inclusivity, accessibility, and age-appropriate engagement strategies.

The analysis highlights that online learning engagement for middle school students in Bihar remains low overall, with major gaps in emotional and cognitive engagement. Rural students are disproportionately affected due to poor connectivity and device scarcity. Gender analysis shows nuanced differences: boys show stronger behavioral participation, while girls exhibit more emotional attachment but are hindered by socio-cultural and infrastructural barriers. These findings confirm that online learning below secondary level in Bihar struggles to sustain meaningful engagement, pointing to the need for hybrid models and parental/teacher support systems.

V. FINDINGS

- **Overall Engagement Levels are Low** – Less than half of the students (45%) were behaviorally engaged in online learning, while only 38% showed cognitive engagement and just 30% demonstrated emotional engagement. This indicates a serious gap in sustaining interest and active participation.
- **Technological Barriers Exist** – Around 15% of students did not have personal devices, and 35% faced frequent internet disruptions. Poor digital infrastructure remains a major hurdle in Bihar, especially in rural areas.
- **Rural–Urban Divide** – Engagement levels were significantly higher among urban students (65%) compared to rural students (35%), reflecting unequal access to resources and exposure to digital tools.
- **Gender Differences in Engagement** – Boys showed higher behavioral engagement (60%) due to greater access to devices, while girls displayed slightly stronger emotional engagement (52%), but many were disadvantaged by resource allocation at the family level.
- **Parental & Teacher Support Matters** – Lack of parental guidance in rural households and insufficient teacher training in online pedagogy reduced the effectiveness of online learning for middle school students.
- **Mental & Emotional Well-being Affected** – A majority of students reported boredom, stress, and isolation during online classes, highlighting the emotional cost of digital learning at this age.

VI. SUGGESTIONS AND RECOMMENDATIONS

Strengthening Digital Infrastructure:

The government and private sector must work together to ensure affordable internet connectivity and adequate device availability in both urban and rural areas.

Subsidized or community-based digital device schemes should be launched for underprivileged families.

Adoption of Blended Learning Models:

Instead of relying solely on online learning, schools should adopt blended models that combine digital tools with classroom-based interaction, ensuring both accessibility and engagement.

Teacher Training and Pedagogical Innovation:

Teachers must be trained in using interactive teaching strategies such as gamification, quizzes, digital storytelling, and collaborative projects to make online sessions engaging.

Continuous professional development programs should emphasize ICT integration and child psychology in digital learning.

Parental Awareness and Support Programs:

Parents, especially in rural areas, should be sensitized to the importance of supervising and supporting children's online education.



Community-based awareness drives can encourage families to provide equal digital opportunities to both boys and girls.

Equitable Access for Girls:

Policies and initiatives should prioritize digital literacy programs for girls, ensuring they are not left behind due to cultural or family biases.

Schools can run device-sharing models or local learning hubs for girls in rural areas.

Student-Centric Engagement Strategies:

Incorporation of child-friendly apps, visual learning tools, and age-appropriate gamified modules can boost motivation.

Online classes should be shorter, interactive, and focused on participation rather than passive listening.

Focus on Emotional Well-being:

Schools should introduce virtual counseling, peer-interaction activities, and stress-relief sessions to reduce the negative mental effects of isolation during online learning.

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