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Research Article

Efficacy of Online Education Among Rural Adolescents in India During the COVID-19 Pandemic: A Qualitative Analysis

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ABSTRACT

This study explores the effectiveness of online education among adolescents in Athiyadam village, located in Kannur, Kerala, during the COVID-19 pandemic. Employing a qualitative methodology rooted in grounded theory, in-depth interviews were conducted with 15 adolescents aged 13 to 18. The findings highlight several significant challenges faced by students, such as limited peer and teacher interaction, digital divide issues, lack of motivation, and the negative impact on both physical and mental well-being. Many participants reported difficulties in adapting to the virtual learning environment due to inadequate infrastructure and limited digital literacy. However, the study also observed instances of resilience, where students managed to navigate these challenges with the help of supportive families and committed teachers. The research underscores the need for a more inclusive and sustainable educational model in rural areas. Key recommendations include targeted infrastructure improvements such as access to reliable internet and digital devices, and the integration of mental health resources into educational planning. These measures are essential for ensuring that students in rural communities are not left behind in the evolving educational landscape.

Keywords: Online education, Adolescents, COVID-19 pandemic, Rural education, Digital divide, Mental health

Introduction

The global outbreak of COVID-19 during 2019–2020 led to an unparalleled disruption in education systems worldwide. With schools and colleges forced to shut down, there was an abrupt transition to online learning platforms (UNESCO, 2020). In India, this shift brought existing digital disparities into sharp focus, particularly in rural regions where internet connectivity, access to digital devices, and digital literacy remain inadequate (Azim Premji Foundation, 2020; Suresh & Arumugam, 2021).

Adolescents—already navigating a critical developmental stage characterized by rapid physical, emotional, and social changes—were especially vulnerable to the effects of this transition. School closures not only hampered academic progress but also severed vital avenues for peer interaction, co-curricular participation, and emotional support (Singh et al., 2020).

Against this backdrop, the present study seeks to examine the efficacy of online education among adolescents in Athiyadam, a rural village in Kannur district, Kerala. By focusing on the lived experiences of students during the pandemic, the research aims to highlight the challenges, coping strategies, and potential pathways for improving digital learning in underserved rural setting

Review of Literature

The global shift toward online education has been the focus of various studies exploring its effectiveness and challenges across different contexts. Nguyen (2015) demonstrated that online learning can match the effectiveness of traditional classroom methods, provided it is grounded in sound pedagogical principles. Similarly, Basilaia and Kvavadze (2020) assessed the role of government-backed digital platforms in Georgia and found them instrumental in supporting continuity in education during the pandemic.

However, several studies have also highlighted critical limitations. Dong (2020), through a survey of Chinese parents, reported widespread engagement in online learning but also expressed parental skepticism about its long-term educational value. Nambiar (2020) emphasized the importance of teacher-student interaction, technical support, and the flexibility of learning platforms as key factors influencing success in online education.
In South Asian contexts, Adnan and Anwar (2020) revealed that students in Pakistan faced significant digital disparities and motivational challenges, which hindered their participation in virtual classes. Complementing this, Anthony (2017) pointed out that online spaces must be designed to be safe and psychologically supportive, particularly for adolescents who are in a sensitive stage of emotional and social development.

Summary:
The reviewed literature collectively suggests that the effectiveness of online education depends not only on technological access but also on pedagogical structure, student motivation, parental perception, and emotional safety. While these studies span various global regions, they provide valuable insights into the enablers and barriers to online learning.

Research Gaps:
Despite the growing body of research, there is a noticeable lack of localized studies focusing on adolescents in rural India—an area where infrastructural limitations, socio-economic constraints, and educational inequalities are often more pronounced. The current study addresses this gap by exploring the lived experiences of adolescents in Athiyadam, a rural village in Kerala, to understand the nuanced impacts of online education in marginalized settings.

Methodology
Aim
The primary aim of this study was to explore the efficacy of online education on adolescents during the COVID-19 pandemic, with a focus on the rural context of Athiyadam village in Kannur district, Kerala.

Objectives
1. To evaluate the impact of online education on adolescents' academic performance and engagement.
2. To identify the key challenges faced by students in virtual learning environments.
3. To propose strategies for enhancing the effectiveness of online education in rural areas.

Research Design
This study adopted a qualitative research design, combining **grounded theory** with a **case study approach** to allow for an in-depth understanding of the lived experiences of adolescents in a specific rural setting. Grounded theory was chosen to facilitate theory development grounded in empirical data, while the case study method provided a contextualized exploration of the phenomenon within Athiyadam village.

Sampling and Participants
Purposive sampling was used to select 15 adolescent participants aged between 13 and 18 years. The criteria for selection included: (a) current or recent enrollment in school during the pandemic, and (b) exposure to online learning modes during school closures. This sampling strategy ensured rich, relevant, and diverse perspectives within the rural context.

Data Collection Tools
Data were gathered through multiple qualitative tools to enhance credibility and depth of insights:
- **Semi-structured interviews**: Conducted using an interview guide covering academic engagement, emotional experiences, and infrastructural access.
- **Observation**: Informal observations were made during field visits to understand the learning environment.
- **Field notes**: Detailed notes were recorded to capture non-verbal cues, context, and researcher reflections.
- **Audio recordings**: Interviews were audio-recorded (with prior consent) to ensure accuracy in transcription and analysis.

3.6 Data Analysis
Thematic analysis was used to interpret the qualitative data. The process followed the standard steps of grounded theory coding:
- **Open Coding**: Transcripts were examined line-by-line to identify recurring ideas, phrases, and sentiments.
- **Selective Coding**: The codes were organized into interconnected patterns to form initial themes.
- **Categorization**: Related themes were grouped into broader categories reflecting core aspects of the research objectives.

- **Memoing**: Analytical memos were written throughout the process to document evolving interpretations and theoretical insights.

3.7 Ethical Considerations

Ethical integrity was a central component of the research process.

- **Informed Consent**: Written and verbal consent was obtained from all participants and their parents or guardians.
- **Confidentiality**: Pseudonyms were used, and any identifiable information was removed during transcription and reporting.
- **Voluntary Participation**: Participants were informed about their right to withdraw from the study at any time without any consequences.
- **Data Security**: Audio recordings and transcripts were securely stored and accessed only by the research team.

4. Data Analysis and Interpretation

The qualitative data were analyzed using thematic analysis rooted in grounded theory. Transcripts of interviews with 15 adolescents aged 13–18 from Athiyadam village were coded, categorized, and organized into global themes and subthemes. The data analysis is structured into key thematic areas derived from responses and patterns observed during in-depth interviews.

4.1 Socio-Demographic Overview

- **Age Distribution**: Most respondents were aged 13–16 (totaling 67%). This age group represents the core adolescent demographic in secondary education.
- **Gender**: 87% of participants were male, and only 13% were female, highlighting gendered patterns in participation/access.
- **Educational Status**: 53% were in secondary school (classes 8–10), and 47% were in higher secondary (+1 and +2).
- **Family Structure**: 87% lived in nuclear families, indicating limited peer or elder academic interaction at home.
- **Socio-Economic Background**: 80% of participants belonged to middle-income groups, with 20% from lower socio-economic strata.

4.2 Level of Understanding and Learning Outcomes

Students generally reported **partial comprehension** of online material:

- **53%** had partial understanding.
- **27%** admitted to not understanding the material at all.
- Only **20%** reported poor but manageable understanding.

This limited grasp of academic content is attributed to the **lack of classroom interaction**, reduced motivation, and distractions in home environments. Key quotes from participants indicated that learning was passive and often reliant on reading and audio rather than active teacher engagement

4.3 Instructional Quality and Teaching Methods

Students evaluated the **quality of teaching** as follows:

- **33%** rated it as average.
- **20%** described it as low or ineffective.
- Only **7%** found it good.

The dominant method of teaching involved **text explanation** without visual aids or real-time interaction. While **87%** acknowledged that teachers had adapted to digital tools, many felt teaching strategies lacked engagement or practical learning components.

Additionally:

- **80%** said feedback was provided via WhatsApp.
- **20%** reported receiving **no feedback**.

4.4 Technological Access and Usability

The digital divide was evident:

- **53%** accessed classes solely through smartphones.
- Only a small fraction used laptops or tablets.
- **20%** faced **network issues**, affecting attendance and comprehension.

Despite access to devices, many students experienced challenges:

- **13%** were unfamiliar with educational apps.

- **7%** reported technical glitches.

4.5 Student Interaction and Social Engagement
Isolation was a major issue:
- **46%** reported **boredom** when attending classes alone.
- **20%** expressed **feelings of laziness** or **disinterest**.
- **7%** felt lonely or emotionally low.
- **33%** sat with parents or siblings during class.
- **40%** turned to other entertainment for distraction.

53% cited **distractions** as the biggest issue in online environments, while **20%** missed face-to-face teacher interaction.

4.6 Curriculum and Assessment
Students noticed little change in curriculum design:
- **46%** felt the curriculum remained the same.
- **27%** noticed a **shortening of syllabus**.
- **20%** lamented the **absence of practical or extracurricular learning**.

Assessments were mostly descriptive:
- **73%** reported online exams with **descriptive answers**.
- **20%** had objective-type exams.
- **53%** pointed out **malpractice** as a core issue in online exams.
- **27%** questioned the **validity and quality** of these assessments.

4.7 Mental and Physical Health
Health impacts were prominent:
- **53%** of students felt **increased laziness**.
- **27%** experienced **loss of interest** in studies.
- **20%** reported **anxiety** and uneasiness during online sessions.

Physical health challenges included:
- **40%** complained of **headaches**.
- **27%** noticed **weight gain**.
- **13%** had **eye strain** due to prolonged screen exposure.

4.8 Parental and Emotional Support
Despite economic constraints:
- **33%** received **study materials** from parents.
- **40%** received **emotional support**.
- **27%** got **technical assistance** (like help logging in or navigating apps).

Parental involvement acted as a protective factor, especially for students who had difficulty engaging independently.

4.9 Socialization and Peer Interaction
The **lack of peer engagement** had serious effects:
- **53%** reported an **intimacy gap** due to lack of social interaction.
- **20%** faced a **communication barrier**.
- Only **27%** claimed they faced **no issue** in social interaction.

This social distancing led to a noticeable dip in classroom enthusiasm and active participation. Online environments failed to replicate the sense of community found in schools.

4.10 Student Recommendations
Students suggested:
- **47%** wanted **offline assessments** for better monitoring.
- **33%** recommended increasing **teacher-student interaction**.
- **20%** were indifferent or had no suggestions, indicating disengagement.

Interpretation
The findings reveal a **mismatch** between online education design and the socio-cultural realities of rural adolescents. The **top-down implementation** of digital learning overlooked:
- **Technical limitations** (device and internet access),
- **Pedagogical gaps** (passive content delivery),

- **Health and psychosocial needs** (isolation, anxiety, physical strain).

While the system ensured continuity, it did not ensure **equity**, **quality**, or **engagement**.

4. Data Analysis and Thematic Representation

The data were analyzed using grounded theory and thematic analysis. Open and axial coding were conducted on transcribed interviews of 15 adolescents. The analysis generated a set of **five global themes**, each comprising related **subthemes**. The following table and narrative representation summarize the findings:

Thematic Map

Global Theme	Subthemes	Key Findings
1. **Academic Experience & Understanding**	- Difficulties in understanding - Level of comprehension - Support from teachers and family	Majority reported partial understanding; lack of interaction, support from family varied widely.
2. **Digital Accessibility & Adaptability**	- Devices used - App accessibility - Network issues - Technological adaptability of teachers	Smartphones were most used; app access manageable; some reported range issues; 87% felt teachers adapted.
3. **Learning Environment & Motivation**	- Engagement in class - Coping with isolation - Peer interaction - Activities for engagement	Many felt bored and isolated; missed peer interaction; used entertainment to cope; some had no support.
4. **Health & Well-being**	- Physical health issues - Mental health concerns - Impact of screen time	Headaches, eye strain, and weight gain were common; 53% felt lazy, 27% lost interest in studies.
5. **Assessment & Feedback**	- Exam mode - Quality of assessment - Feedback mechanisms - Academic integrity	Assessments mostly online and descriptive; students raised issues of malpractice and lack of feedback.

Narrative Summary of Themes and Subthemes

1. Academic Experience and Understanding

Subthemes:

- *Difficulties in understanding*: Due to lack of teacher interaction, practical learning, and classroom ambience.
- *Comprehension levels*: 53% reported only partial understanding, 27% said they did not understand the lessons at all.
- *Support systems*: Teachers were generally responsive, but support quality varied; some parents could not assist due to work or low literacy.

"I get confused because there's no one to ask immediately" – Respondent 3 "My mom arranges materials but cannot help with studies" – Respondent 7

2. Digital Accessibility and Adaptability

Subthemes:

- *Devices used*: 53% relied solely on smartphones.
- *App usage and technical barriers*: Only 13% reported difficulty using platforms like Google Meet; most were comfortable.
- *Network and range issues*: 20% faced connectivity problems.
- *Teachers' adaptability*: 87% students agreed teachers had adapted to online platforms.

"We only have one phone, and sometimes I miss class" – Respondent 2 "Teachers know how to teach online now, but sometimes classes are dull" – Respondent 11

3. Learning Environment and Motivation

Subthemes:

- *Classroom engagement*: Online classes were described as boring by 46% of participants.
- *Coping with isolation*: 33% sat with family during class; 40% used entertainment to distract themselves.
- *Peer interaction loss*: 53% felt less connected; 20% reported communication barriers with peers.
- *Instructional activities*: Assignments and discussions were occasionally used; 20% said no engagement activities were conducted.

"No one to talk to during class makes it sad" – Respondent 5 "Sometimes I just open YouTube while class is running" – Respondent 8

4. Health and Well-being
Subthemes:
- *Mental health*: 53% reported laziness, 27% lack of motivation, and 20% anxiety.
- *Physical health*: 40% experienced headaches, 27% weight gain, and 13% eye strain due to long screen time.

"My back hurts and I feel sleepy during online classes" – Respondent 10
"I don't feel like studying anymore" – Respondent 12

5. Assessment and Feedback
Subthemes:
- *Modes of examination*: 73% had descriptive online exams; others had objective or offline tests.
- *Assessment issues*: 53% noted malpractice; 27% pointed to lack of seriousness or quality.
- *Feedback*: 80% got marks via WhatsApp; 20% said they received no feedback.

"Everyone copies, so what's the use?" – Respondent 6"Teachers post marks but don't explain mistakes" – Respondent 14

Interpretive Analysis
The thematic analysis reveals a **multi-layered struggle** among adolescents in rural India adjusting to online education. While basic access was available, **psychosocial and pedagogical gaps** deeply affected learning outcomes. Students were demotivated by lack of interaction and overwhelmed by digital fatigue. Yet, their resilience and the willingness of teachers to adapt signal a potential for improvement if systemic reforms are introduced.

5. Content Analysis

A content analysis was conducted by coding and counting recurring terms, phrases, and issues across the 15 interviews. This semi-quantitative insight provides a snapshot of dominant concerns and patterns.

Category	Response Frequency	Representative Quotes
Difficulty understanding lessons	12/15	"I only understood half of what was taught online."
Lack of interaction	11/15	"I can't ask doubts like I used to in class."
Device limitations (smartphones)	8/15	"We use one phone for everything. I miss classes sometimes."
Internet/connectivity issues	3/15	"The network goes off during live classes."
Mental health concerns	8/15	"I felt very lazy, always lying down."
Health issues (eye strain, etc.)	6/15	"I got frequent headaches."
Positive teacher feedback	11/15	"Teachers tried their best."
Desire for offline classes	12/15	"Offline is better. We can ask, interact, and feel we are learning."

Interpretation: While basic access to online learning was available for most, the **quality of engagement**, **comprehension**, and **well-being** were repeatedly compromised. Students frequently praised teachers' efforts, yet strongly favored returning to offline classes due to the disconnect and lack of structure in digital platforms.

6. SWOT Analysis
The following **SWOT matrix** summarizes the internal and external factors that shaped adolescents' experiences with online education during the pandemic:

Strengths	**Weaknesses**
- Flexible class timing and ability to revisit recorded content	- Poor interaction with teachers and peers
- Some teachers adapted well to new technologies	- Heavy dependence on smartphones
- Reduction in commuting time	- No practical or extracurricular activities
- Access to digital resources (for those with better infrastructure)	- Screen fatigue, eye strain, and limited physical activity
Opportunities	**Threats**

Strengths	Weaknesses
- Scope for improved digital literacy among students and teachers	- Deepening of the digital divide
- Hybrid learning models blending offline and online strengths	- Mental health deterioration (boredom, laziness, anxiety)
- Government schemes to expand rural internet coverage	- Academic dishonesty and poor assessment validity
- Development of more interactive and culturally appropriate content	- Loss of interest in studies and increased dropout risk in vulnerable groups

Interpretation: This SWOT framework reinforces the findings of the thematic and content analysis. While there are promising aspects (e.g., flexibility, adaptive teachers), the risks (digital inequality, disengagement) underscore the urgency of systemic reforms to make online learning equitable and effective in rural settings.

7.Discussion

he findings of the study are consistent with global observations, highlighting that while digital learning became a necessary alternative during the COVID-19 pandemic, it was not a wholly effective substitute for traditional education, particularly in rural settings. Adolescents in these areas encountered significant challenges in adapting to the online mode of instruction. Concentration levels were notably lower due to home distractions, lack of a structured environment, and minimal peer interaction. A widespread lack of motivation was reported, stemming from reduced accountability and limited direct teacher engagement. Infrastructure barriers such as poor internet connectivity, unavailability of personal devices, and low digital literacy further hindered effective participation. Moreover, many online platforms were not adequately adapted to rural pedagogical needs, often assuming a level of digital familiarity that students and teachers in these areas did not possess.

Family involvement emerged as a critical support system. Adolescents who received consistent encouragement and logistical help from their families—such as sharing devices, ensuring connectivity, or offering emotional support—demonstrated relatively better engagement and academic continuity. On the instructional side, while many teachers made commendable efforts to upskill themselves and adopt digital tools, variations in their technical proficiency led to inconsistent quality in teaching delivery. Student engagement, therefore, remained uneven across different contexts.

While students appreciated the flexibility and convenience that online learning offered, many expressed a deep sense of loss regarding the structured routine, face-to-face interactions, and spontaneity of the physical classroom environment. This absence of social connection was among the leading contributors to negative outcomes.

The most alarming concerns that emerged were related to health—both mental and physical. Prolonged screen exposure, sedentary behavior, and disrupted daily routines led to physical complaints such as eye strain, headaches, and fatigue. Simultaneously, the prolonged isolation and lack of peer interaction contributed to heightened feelings of loneliness, anxiety, and emotional distress. In some cases, these effects were compounded by academic stress and uncertainty about the future. Thus, while online education served as a temporary solution, it also exposed deep structural and psychosocial gaps that require urgent attention, particularly for vulnerable adolescent populations in rural India.

8.Recommendations and conclusion

1. Hybrid Learning Models

A blended or hybrid approach that combines in-person classroom sessions with digital learning can offer the best of both worlds. In rural settings, where connectivity may be intermittent and students struggle with self-paced learning, periodic physical classes can help maintain structure, provide emotional connection, and offer teacher support.

2. Infrastructure Development

The foundation of effective digital learning lies in robust infrastructure. This includes reliable internet connectivity, access to digital devices (such as tablets or smartphones), and uninterrupted power supply.

3. TeacherTraining

Empowering teachers through regular training in digital pedagogy is essential. Workshops should focus not just on how to use digital tools, but also on how to design engaging, inclusive, and age-appropriate content.

4. Mental Health Support

The emotional well-being of adolescents must be prioritized alongside academic learning. Schools should integrate mental health support into the curriculum by introducing basic counseling services, helplines, and social-emotional learning (SEL) modules.

5. Interactive Tools and Peer Learning

To combat boredom and passive learning, digital education should incorporate interactive and student-centered tools. Infotainment elements—such as animated videos, gamified quizzes, storytelling, and real-life simulations—

9.Conclusion

In the case of Athiyadam, a rural village, adolescent learners experienced a multifaceted set of challenges that went beyond mere access to content. Technological challenges were at the forefront. Many students lacked personal devices, relied on shared or outdated equipment, and struggled with poor internet connectivity. Pedagogically, the shift to online platforms was abrupt and, in many cases, unaccompanied by sufficient teacher training or curriculum adaptation. Emotionally, the isolation from peers and teachers, coupled with the absence of school routines, had a pronounced impact on adolescent mental health. The situation in Athiyadam underscores the urgent need for a more inclusive, accessible, and engaging education model that goes beyond emergency remote teaching. Future strategies must integrate hybrid learning systems, invest in rural digital infrastructure, train educators in digital pedagogy, and incorporate mental health support as a core component of schooling. Only then can online education truly become a tool for equitable learning, rather than a stopgap measure during crises.

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