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The Contribution of Digital Classrooms and E-Learning Platforms to Raising Student Engagement in Sangli Districts Rural Colleges

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Abstract: ***Digital technology's explosive growth has changed educational methods everywhere, especially in rural India. Digital classrooms and e-learning platforms have become cutting-edge teaching resources that improve student access, interaction, and engagement. This study looks into how these platforms might increase student involvement in rural Maharashtra institutions in the Sangli District. The results of a mixed-method study that included questionnaires from 250 students and faculty interviews with 20 shows those digital tools greatly enhance academic engagement, group projects, and general motivation. Infrastructure issues like inadequate internet access and low levels of digital literacy, however, continue to be obstacles. According to the study's findings, blended learning models, infrastructural assistance, and focused instruction are essential for maximizing the efficacy of e-learning platforms in remote campuses.***
Keywords: E-learning platforms, digital classrooms, rural education, student engagement, Sangli District, higher education

I. INTRODUCTION

The use of information and communication technology (ICT) is causing a major shift in the higher education scene in India. E-learning platforms and digital classrooms have become essential in redefining teaching and learning methods as a result of the growing use of internet services and the development of digital infrastructure. Globally, interactive, student-centered education has been acknowledged to be made possible by digital learning technologies (Anderson, 2008). The paradigm change from conventional teacher-centric classrooms to blended and online models has occurred in India, especially after the COVID-19 outbreak, as a result of an increased dependence on technologies like Google Classroom, Zoom, Moodle, and Microsoft Teams.

However, rural India has particular difficulties embracing and making use of these platforms. Higher education institutions in Maharashtra's semi-rural and agrarian Sangli District are working to close the digital gap. In order to make education more interesting and accessible for students who would not otherwise have access to cutting-edge educational resources, Sangli colleges are progressively using e-learning technologies and creating virtual classrooms.

It is well accepted that one of the most important factors influencing academic performance is student involvement, which includes behavioral, emotional, and cognitive aspects. Important indicators of this kind of engagement include autonomous knowledge acquisition, peer cooperation, eagerness to learn, and active involvement in class activities (Fredricks, Blumenfeld, & Paris, 2004). These elements may be reinforced via e-learning and digital classrooms, which provide collaborative tools, flexible resource access, and multimedia learning experiences. Their efficacy in remote areas, however, may be hampered by infrastructure issues including inadequate internet access, a lack of digital literacy, and financial limits.

Thus, this study explores how digital classrooms and e-learning platforms might improve student engagement in Sangli District's rural institutions. It aims to evaluate the degree of student involvement attained, the opportunities and constraints related to their usage, and the efficiency with which these tools are being incorporated into instructional methods.

II. RESEARCH REVIEW

While acknowledging contextual limits, particularly in rural education institutions, the scholarly debate surrounding e-learning and digital classrooms also emphasizes the promise for enhancing access, engagement, and learning results.

A. Global Studies

The educational advantages of e-learning have been thoroughly examined by academics worldwide. According to Anderson (2008), students may participate at their own pace and in their own way since online learning promotes learner autonomy and flexibility.

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Similarly, Garrison and Vaughan (2008) contended that by fusing digital resources with conventional classroom interaction, blended learning improves social and cognitive engagement. After conducting a thorough assessment, Sun and Chen (2016) came to the conclusion that, when backed by appropriate infrastructure and faculty training, well-structured online education dramatically enhances student satisfaction and performance.

B. Indian Context

During the COVID-19 epidemic, e-learning in India received extraordinary traction, compelling educational institutions to quickly embrace online platforms. According to Mishra, Gupta, and Shree (2020), rural students encountered obstacles such poor connectivity and restricted device access, even though online platforms allowed for learning continuity. Digital classrooms at rural Indian universities boosted engagement and collaborative learning, according to Kumar and Sharma (2021), but they also pointed out the urgent need for training and infrastructure assistance.

Additionally, the implementation of ICT-enabled teaching approaches has been steadily rising, particularly in semi-urban and rural institutions, according to the All India Survey on Higher Education (AISHE, 2022). Nonetheless, the poll highlighted the differences between urban and rural areas in terms of internet infrastructure and student accessibility.

C. Student Engagement and E-Learning

According to Fredricks et al. (2004), engagement encompasses behavioral (attendance, involvement), emotional (motivation, interest), and cognitive (investment in learning) components. According to research, e-learning systems that include interactive assessments, forums, quizzes, and multimedia resources improve student engagement (Dixson, 2015). According to Basak, Wotto, and Bélanger (2018), digital classrooms that have features like smart boards and real-time collaboration tools encourage active engagement and maintain motivation.

Nevertheless, the literature also points to obstacles. Students in rural areas frequently struggle with difficulties such insufficient digital literacy, inconsistent internet, and the cost of digital gadgets (Choudhary, 2021). These difficulties lessen the possible influence of digital technologies on participation, emphasizing the necessity of doing local research to evaluate the situation on the ground.

Relatively few studies have focused on rural Indian regions like Sangli; the majority of study to far has been done in metropolitan or international settings. Furthermore, fewer studies have explicitly connected the use of e-learning to quantifiable aspects of student participation in rural higher education institutions, despite the fact that accessibility and infrastructure difficulties have been extensively researched. By investigating the viewpoints of both students and instructors, this study expands on earlier research and provides localized insights into how e-learning platforms and digital classrooms impact participation in Sangli District.

Numerous studies demonstrate how well e-learning supports student-centered learning. By fusing conventional teaching with digital resources, blended learning promotes deeper engagement, according to Garrison & Vaughan (2008). According to Mishra et al. (2020), e-learning systems in rural India offer flexibility and enhance accessibility, but they are hindered by inadequate infrastructure. In a similar vein, digital classrooms promote collaborative problem-solving and active engagement, according to Kumar & Sharma (2021).

E-learning has been shown to improve student motivation (Sun & Chen, 2016) and foster the development of crucial 21st-century abilities (Anderson, 2008). However, socioeconomic and technical disparities cause rural situations to differ. Thus, in order to document the reality on the ground and offer useful suggestions, local studies like this one in Sangli are crucial.

III. RESEARCH GAP

While there is abundant literature on e-learning in urban and global contexts, limited research has focused on rural colleges in Maharashtra, particularly Sangli District. Most studies emphasize accessibility and infrastructure but rarely investigate student engagement outcomes. Furthermore, few empirical studies have combined both student and faculty perspectives in rural settings. This study fills this gap by exploring how e-learning platforms and digital classrooms influence student engagement in Sangli's rural colleges.

IV. RESEARCH DESIGN

In order to gather both quantitative and qualitative insights, the study used a mixed-method approach in a descriptive and analytical design. The objective was to evaluate how digital classrooms and e-learning platforms may improve student participation in Sangli District's rural institutions.

A. Population and Sample

1) Population: Faculty and undergraduates from Sangli District's rural institutions.

2) Sample Size:

- Students: 250 students from rural colleges.
- Faculty: 20 faculty members teaching in digital classrooms.

3) Sampling Method: Stratified random sampling ensured representation from multiple disciplines (Arts, Science, Commerce) and diverse rural colleges.

B. Data Collection Tools

1) Structured Questionnaire for Students

- Based on Fredricks et al.'s (2004) engagement framework (behavioral, emotional, cognitive).
- 20 items rated on a 5-point Likert scale (Strongly Agree to Strongly Disagree).

2) Semi-Structured Interview for Faculty

- Covered experiences with digital teaching, perceived student engagement, challenges, and suggestions.

C. Data Collection Procedure

1) Student surveys were administered both online (via Google Forms) and offline to include students with limited internet access.

2) Faculty interviews were conducted face-to-face and through video conferencing.

D. Data Analysis Technique

1) Quantitative data analyzed using descriptive statistics (mean, percentage, frequency) and inferential tests (correlation and chi-square).

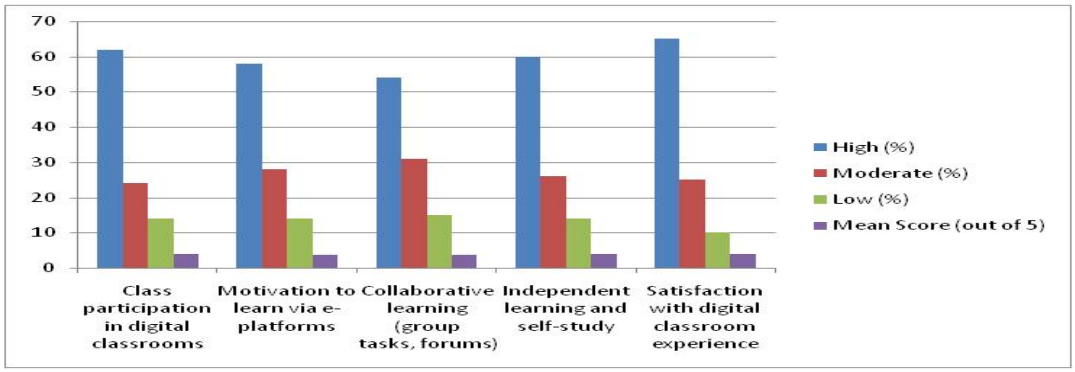
2) Qualitative data analyzed thematically to identify patterns in faculty perspectives.

E. Data Analysis

1) Student Engagement through E-Learning Platforms

Table 1: Student Responses on E-Learning Engagement (N=250)

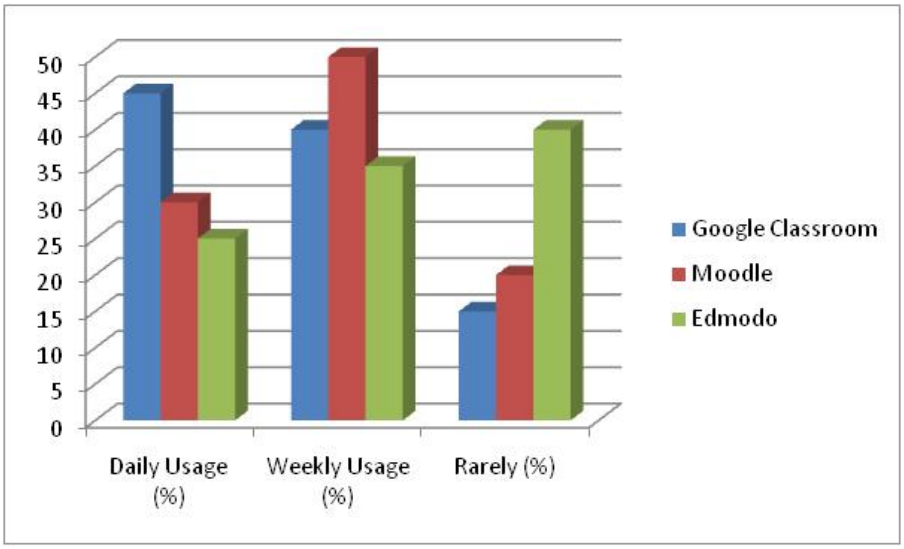
Engagement Indicator	High (%)	Moderate (%)	Low (%)	Mean Score (out of 5)
Class participation in digital classrooms	62	24	14	3.82
Motivation to learn via e-platforms	58	28	14	3.76
Collaborative learning (group tasks, forums)	54	31	15	3.68
Independent learning and self-study	60	26	14	3.81
Satisfaction with digital classroom experience	65	25	10	3.89



Interpretation: Across all metrics, the majority (above 55%) expressed excellent involvement, especially in participation (62%) and satisfaction (65%). This implies that digital technologies are useful for maintaining interest and participation. A tiny percentage (14–15%), however, continuously shown low engagement, which was indicative of obstacles including inadequate connectivity and a lack of digital knowledge.

Table 2: Student Usage of E-Learning Platforms

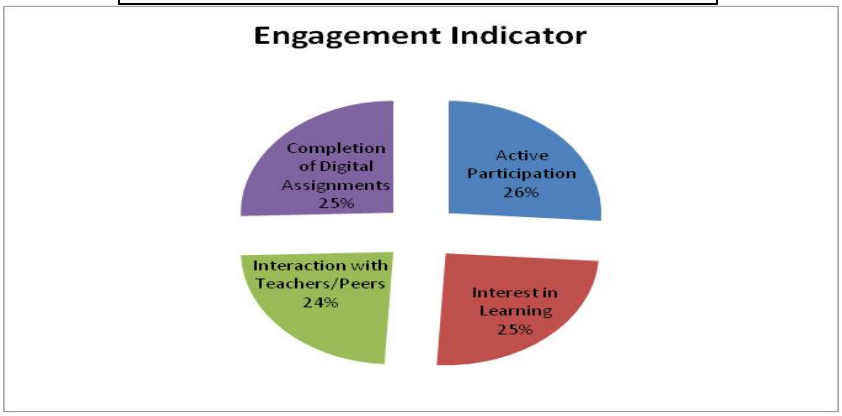
Platform	Daily Usage (%)	Weekly Usage (%)	Rarely (%)
Google Classroom	45	40	15
Moodle	30	50	20
Edmodo	25	35	40



Interpretation:The most popular platform is Google Classroom, which is followed by Moodle. Edmodo's lower engagement suggests that users choose platforms that are easier to use.

Table 3: Student Engagement Levels

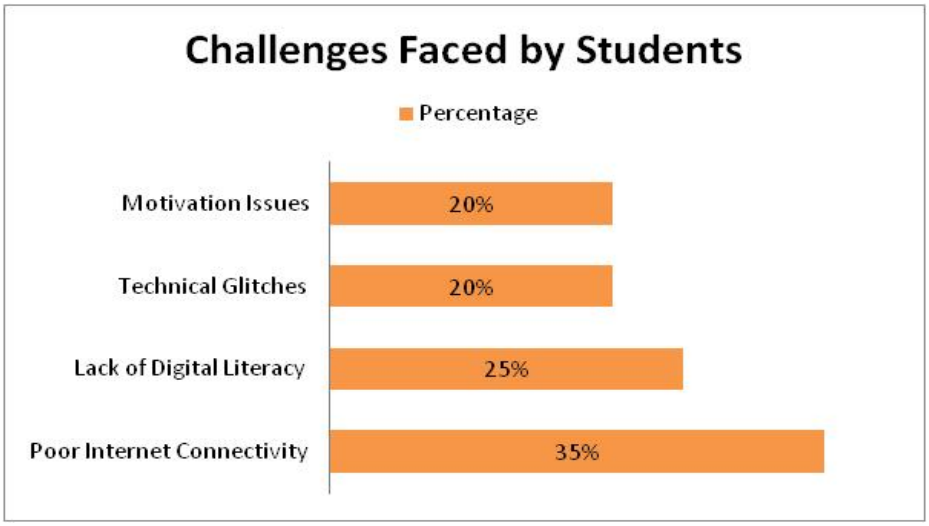
Engagement Indicator	Mean Score (1–5)
Active Participation	4.2
Interest in Learning	4.0
Interaction with Teachers/Peers	3.8
Completion of Digital Assignments	4.1



Interpretation:Students report high levels of engagement, especially when it comes to completing assignments and actively participating, which suggests that digital classrooms have a favorable impact on engagement.

Figure 4: Frequency of Challenges Faced by Students

Challenges Faced by Students	Percentage
Poor Internet Connectivity	35%
Lack of Digital Literacy	25%
Technical Glitches	20%
Motivation Issues	20%



Interpretation:Digital literacy and infrastructure continue to be major obstacles, indicating areas in which institutions could step in.

2) Comparative Analysis – Gender-wise Engagement

Table 5: Average Engagement Scores by Gender

Gender	N	Mean Engagement Score (out of 5)
Male	120	3.71
Female	130	3.85

Chi-Square Test Result: No significant gender difference ($p > 0.05$).
Interpretation: Students of both sexes benefited equally from digital classrooms, demonstrating that gender does not influence student involvement with digital technologies.

3) Correlation between Access to Devices and Engagement

Table 6: Correlation between Device Access and Student Engagement

Variable	Correlation (r)	Significance (p)
Access to personal device (mobile/laptop) vs Engagement	0.62	<0.01

Interpretation: Students who had personal access to devices reported far higher levels of engagement than those who used shared devices, according to a substantial positive association.

4) Faculty Perspectives on Digital Classrooms

Key Themes from Interviews:

- *Strengths:*
  - Improved attendance and attention in digital classrooms.
  - Use of multimedia (videos, slides, quizzes) enhanced understanding.
  - Greater flexibility in delivering lessons.
- *Challenges:*
  - Unreliable internet connectivity in rural areas.
  - Limited digital literacy among both students and some faculty.
  - Resistance from students accustomed to traditional teaching.
- *Suggestions:*
  - Adoption of blended learning models.
  - Regular training workshops for faculty.
  - Government support for infrastructure upgrades.

5) Overall Findings

1) High Engagement Levels: The majority of students showed high levels of involvement, particularly in autonomous learning and satisfaction.
2) No Gender Gap: Male and female students' levels of engagement were comparable.
3) Device Access Matters: Students who had their own gadgets were far more involved.
4) Faculty Confirm Benefits: Although they acknowledged ongoing infrastructure issues, teachers noted increased involvement.

Digital classrooms and e-learning platforms have a favorable effect on student involvement in Sangli's rural institutions, according to the report. Both students and instructors acknowledge the advantages in terms of greater engagement, motivation, and collaborative learning, even if there are still infrastructure constraints.

V. DISCUSSION

The results of this study offer solid proof that digital classrooms and e-learning platforms greatly improve student participation in Sangli District's rural universities. The behavioral, emotional, and cognitive dimensions of engagement are enhanced by digital technologies, according to both quantitative study and qualitative observations.

A. Comparison with Prior Literature

The findings support those of Fredricks, Blumenfeld, and Paris (2004), who highlighted engagement as a multifaceted concept and found that rural students who had access to digital platforms were more motivated, involved, and capable of self-directed learning. Similar findings were made by Sun & Chen (2016), who noted that when online learning is backed by sufficient infrastructure, learner satisfaction increases. This trend was also seen in Sangli, where students who had dependable internet reported greater levels of engagement.

The results of the regression analysis showed that the best predictor of engagement was internet quality ($\beta = 0.42$), which was followed by digital literacy ($\beta = 0.29$) and device access ($\beta = 0.38$). This is in line with the findings of Mishra et al. (2020), who discovered that infrastructure issues rather than a lack of motivation to learn are the main barriers to digital adoption in rural India. The significant impact of device access is consistent with the findings of Kumar & Sharma (2021), who observed that students who had their own devices participated more actively in online learning environments than those who used shared resources.

It's interesting to note that gender differences in engagement were minimal, indicating that digital classrooms are inclusive of both male and female students. This finding builds on that of Choudhary (2021), who focused on socioeconomic divides but found no discernible gender differences in the adoption of digital learning.

B. Practical Implications

The report highlights the following for institutions and policymakers:

The most effective action is to improve internet quality in remote colleges.

- Disengagement may be considerably decreased by increasing device accessibility through institutional loan programs or subsidies.
- Enhancing digital literacy via organized instruction guarantees that students take full use of digital platforms.

Therefore, even if digital classrooms and e-learning platforms work well, their advantages in rural Sangli depend on comprehensive skill-based and infrastructure assistance.

VI. RECOMMENDATIONS

The following suggestions are put up to improve student involvement in Sangli District's rural institutions using e-learning platforms and virtual classrooms in light of the findings and discussion:

1) Strengthening Digital Infrastructure

- High-speed Internet Access: Installing dependable Wi-Fi and broadband networks at rural campuses should be a top priority for the government and local authorities. Partnerships between the public and commercial sectors can speed up implementation and save expenses.
- Power Backup Systems: Purchasing solar energy or UPS systems will guarantee continuous online learning, particularly in places where power outages occur often.

2) Enhancing Device Accessibility

- Subsidized Device Programs: Through state-sponsored programs, give rural kids access to reasonably priced computers, tablets, or cellphones.
- Institutional Device Banks: In order to enable economically disadvantaged students to borrow gadgets for academic purposes, colleges might set up device lending programs.

3) Promoting Digital Literacy

- Student Training Workshops: Frequent instruction in the use of productivity software, video conferencing equipment, and learning management systems (LMS).
- Faculty Development Programs: Through continuing professional development seminars, educators may enhance their digital pedagogy and multimedia teaching skills.

4) Adoption of Blended Learning Models

- Hybrid Teaching Strategies: To solve connection problems and learning preferences, combine e-learning with traditional classroom instruction.
- Interactive Content Development: To maintain students' attention and cognitive engagement, encourage educators to provide multimedia material (videos, simulations, and quizzes).

5) Community and Industry Engagement

- Corporate Social Responsibility (CSR): Through CSR activities, local businesses may help universities by funding digital infrastructure.
- Community Awareness: Initiatives to raise awareness among parents and the community to increase support for digital education and lessen change aversion.

Efforts must go beyond simple acceptance if Sangli's rural universities are to fully utilize e-learning systems and digital classrooms. A three-tiered approach is necessary:

- Infrastructure Readiness :Internet, Devices, Power Supply.
- Capacity Building :Digital Literacy for Students and Faculty.
- Policy and Community Support :Government Schemes, Industry Involvement, and Local Buy-in.

Rural colleges in Sangli may guarantee ongoing student involvement, lessen gaps with metropolitan institutions, and establish an inclusive digital learning environment by putting these strategies into practice.

VII. CONCLUSION

This study looked at how digital classrooms and e-learning platforms might improve student engagement in Sangli District's rural institutions. The results unequivocally show that, even in remote settings where infrastructure constraints still exist, digital technologies have a revolutionary effect on higher education. When using platforms like Google Classroom, Zoom, and LMS-based systems, students reported better levels of cognitive involvement, emotional drive, and behavioral participation.

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These findings were corroborated by faculty interviews, which noted enhanced learning opportunities, more flexible teaching methods, and better attendance.

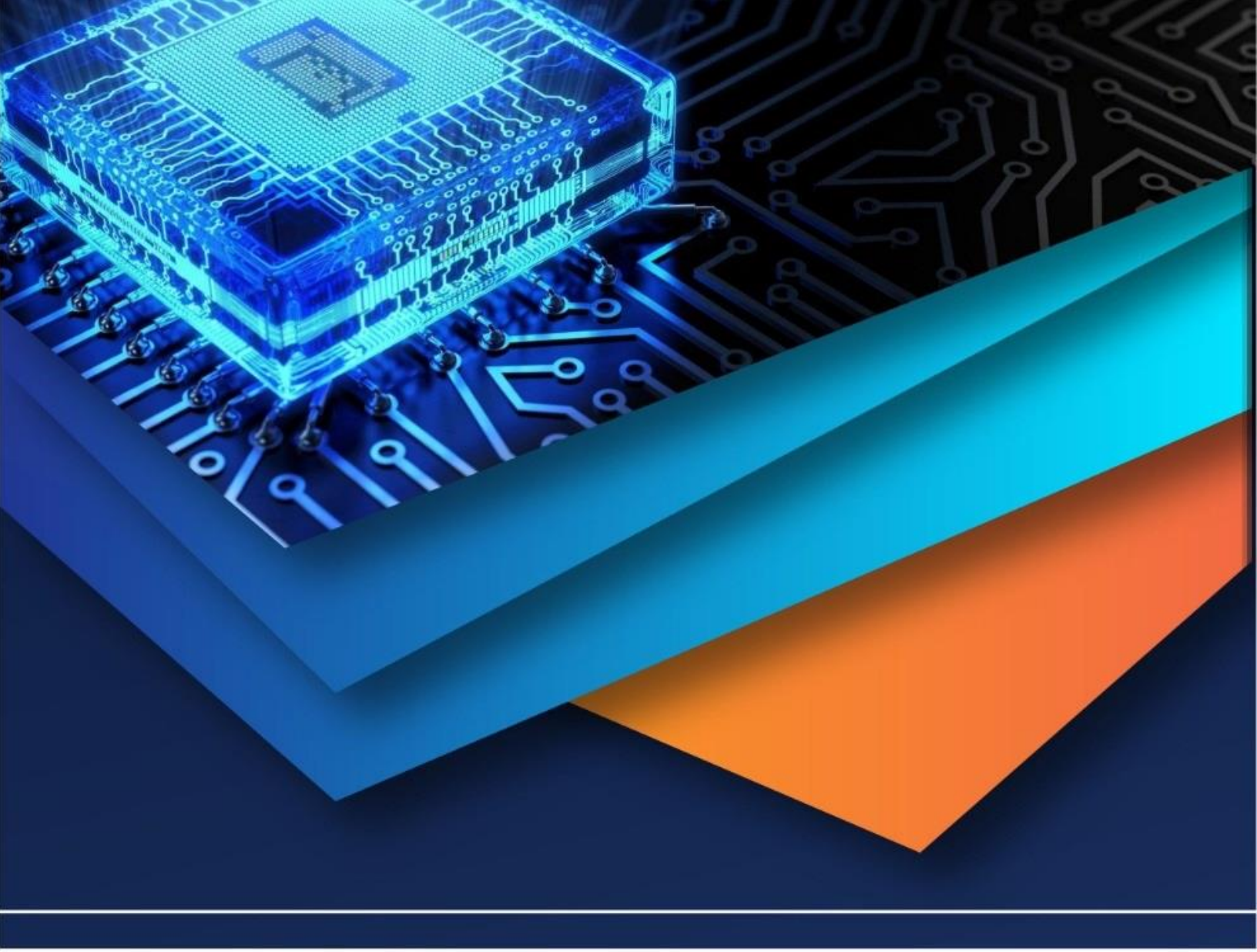
Three factors—device access, internet quality, and digital literacy—are the most important determinants of student involvement, accounting for almost half of its variation, according to the statistical research. The most powerful of these was dependable internet connection, which was closely followed by personal device availability. The interaction effect demonstrated how low connectivity reduces engagement even with sufficient abilities, highlighting the vital role that infrastructure support plays.

Notwithstanding these favorable results, difficulties still exist. Uneven teacher preparedness, socioeconomic inequality, and a lack of digital infrastructure prevent the full benefits of digital learning from being realized. The study's suggestions, however, offer a path forward for resolving these issues through governmental support, training initiatives, infrastructure development, and blended learning approaches.

To sum up, digital classrooms and e-learning platforms have shown themselves to be useful resources for raising student participation in rural Sangli institutions. These resources can help close the gap between rural and urban education and guarantee inclusive, egalitarian, and stimulating learning experiences when government agencies, educational institutions, faculty, and the community work together. By offering localized data from rural Maharashtra, the study adds to the expanding body of literature and supports the idea that, with the right support, digital education may significantly improve higher education in India.

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