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Effectiveness of E-Learning in Higher Education: Evidence from Higher Education Institutions Affiliated to Kavayitri Bahinabai Chaudahri North Maharashtra University

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Abstract: *In the recent years, e-learning in higher education has developed as a transformative mode of instruction offering accessibility, flexibility and learner-centered methodologies. With the increasing prominence on digital platforms and rapid technological incorporation, the higher educational institutions (HEIs) in India are progressively adopting e-learning to supplement traditional teaching methods. The effectiveness of e-learning within the Indian higher education setting requires systematic evaluation, in spite of its growing significance. The current research examines the effectiveness of e-learning in HEIs affiliated with Kavayitri Bahinabai Chaudhari North Maharashtra University (KBC NMU). Data was collected from a sample of 320 students and 45 faculty members across the Management institutes. A descriptive research design was used. Semi-structured interviews and with Structured questionnaires were used as data collection tools. Qualitative thematic analysis and quantitative (descriptive statistics, correlation, and regression analysis) were applied. It was revealed in the findings that e-learning significantly augments improving digital literacy, learner autonomy, flexibility and self-paced learning, on the other hand, challenges like limited faculty preparedness, inadequate infrastructure and reduced student engagement were observed. The analysis indicated that blended learning prototypes combining face-to-face and digital approaches produce the maximum effectiveness in the given institutional context. The study contributed to the on-going study on digital pedagogy by providing evidence from a regional Indian university setting. The results highlighted the need for faculty training, vigorous policy support and investment in infrastructure to make the most of the benefits of e-learning.*

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Introduction

In the recent years, e-learning has moved beyond being a substitute to conservative classroom instruction to becoming a regular practice. The colleges and Universities globally are progressively integrating e-learning strategies to enhance flexibility, access and lifelong learning opportunities for assorted student populations.

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The growth of e-learning has been equally significant in India, though marked by various challenges and opportunities. Enterprises such as the SWAYAM, National Mission on Education through ICT (NMEICT) and the National Digital Library of India have sought to reduce the digital divide and democratize access to higher education. (Ministry of Education, 2020). Indian higher education institutions (HEIs) are adopting virtual classrooms, Learning Management Systems (LMS) and Massive Open Online Courses (MOOCs) to complement traditional methods of teaching (Jena, 2020).

The incorporation of Information and Communication Technology (ICT) in HEIs has played anessential role in reshaping educational delivery. Online platforms such as Microsoft Teams, Google Classroomand Moodle have become pervasive in both developing and developed countries, offering synchronous and asynchronous learning (Dhawan, 2020).

The present study emphases the effectiveness of e-learning in higher education institutions affiliated with Kavayitri Bahinabai Chaudhari North Maharashtra University (KBC NMU). KBC NMU caters to a large student population spread across rural, semi-urban and urban, areas. The affiliated colleges represent varied academic disciplines and socio-economic backgrounds, making them an appropriate setting to scrutinize the challenges and opportunities allied with e-learning.

Statement of the Research Problem

Despite e-learning has become a vital part of higher education; there is inadequate empirical evidence on its effectiveness in rural and semi-urban institutions in India. Most of the prevailing research emphases on metropolitan and urban areas. This leaves a gap in understanding how regional universities and their affiliated colleges implement and sustain digital pedagogy. Kavayitri Bahinabai Chaudhari North Maharashtra University (KBC NMU), located in Jalgaon, Maharashtra, serves a diverse student body drawn from rural semi-urban, and urban backgrounds. Therefore it is essential to assess the effectiveness of e-learning in these institutions for understanding its potential and its limitations in non-metropolitan settings.

Research Objectives and Questions

- To evaluate the effectiveness of e-learning in HEIs affiliated with KBC NMU.
- To identify the challenges and opportunities experienced by students and faculty in using e-learning platforms.
- To study the role of ICT infrastructure, faculty preparedness, and learner readiness in shaping e-learning outcomes.
- To suggest strategies for enhancing the effectiveness of e-learning in regional HEIs.

Based on these objectives, the study seeks to answer the following research questions:

- How effective is e-learning in improving learning outcomes and academic engagement in KBC NMU-affiliated HEIs?
- What challenges do students and faculty face in adopting and sustaining e-learning practices?
- Which factors contribute most significantly to the success or failure of e-learning in this regional university context?

Significance of the Study

This research grips both policy and academic relevance. From a policy viewpoint, the findings can inform government interventions aimed at strengthening e-learning adoption in regional HEIs. Insights from this study may guide faculty training, investments in ICT infrastructure and blended learning models. This contributes to equitable and inclusive higher education in India. From the academic perspective, it contributes to the growing body of literature on digital pedagogy. It is providing empirical evidence from a regional Indian university setting.

Review of Literature

The effectiveness of e-learning in higher education has been widely studied across diverse academic contexts. This review creates major conceptual and empirical studies that explore the technological, pedagogical and institutional magnitudes of e-learning, with particular focus on its implementation in higher education institutions (HEIs). The key themes structured I the discussion are: (1) conceptual fundamentals of e-learning, (2) effectiveness and learning outcomes, (3) technological and infrastructural challenges (4) pedagogical adaptation and faculty readiness (5) emergent trends in hybrid

and blended learning models. The review concludes with comprehensions pertinent within institutions affiliated with Kavayitri Bahinabai Chaudhari North Maharashtra University (KBC NMU).

Conceptual Foundations of E-Learning

E-learning, broadly defined as the use of information and communication technologies (ICT), electronic mediain education. It has progressed from early computer-based training to interactive and collaborative digital environments. Anderson (2017) emphasized that e-learning should not merely replicate traditional classrooms but should leverage digital affordances to enhance accessibility, learner control, and engagement. According to Clark and Mayer (2016), effective e-learning cartels cognitive engagement, multimedia principles and instructional design strategies to promote meaningful learning outcomes. The theoretical underpinnings of e-learning are often rooted in constructivist learning theory, which advocates active participation, collaboration, and contextual learning (Ally, 2019).

Effectiveness and Learning Outcomes

A meta-analysis by Bernard et al. (2019) concluded that students practicing online learning settings perform comparably or better than those in traditional settings. In a comparative study, Adarkwah (2021) found that e-learning improved digital literacy and research skills among university students, though it required sustained motivation and discipline. However, the effectiveness of e-learning is contingent upon the alignment of pedagogy, technology and content - a principle uttered in the TPACK framework (Mishra & Koehler, 2006).

Technological and Infrastructural Challenges

The success of e-learning is inhibited by technological and infrastructural limitations. Students often face issues such as unstable internet connections, lack of institutional support and limited exposure to digital tools (Kumar & Sharma, 2021). In developing countries like India, these obstacles are more pronounced, particularly in rural areas (Jena, 2020). Faculty members also face challenges in managing virtual classrooms and ensuring academic integrity (Rapanta et al., 2020).

The UNESCO (2021) report highlighted the urgent need for faculty training, infrastructural investment and inclusive policies to ensure that the benefits of digital education reach marginalized populations.

Pedagogical Adaptation and Faculty Readiness

The success of e-learning depends significantly on faculty readiness and their ability to adapt pedagogical strategies to digital platforms. Bates (2019) argued that effective online teaching requires shifting from content delivery to facilitation, mentoring and feedback. Mohalik and Sahoo (2020) observed that Indian faculty members demonstrated gradual but consistent improvement in digital pedagogy following institutional interventions. In a study across Asian universities, Govindarajan and Srivastava (2021) found that professional development programs considerably increased faculty confidence in using virtual collaboration tools and learning management systems.

Emergent trends in Hybrid and Blended Learning Models

Contemporary erudition progressively supports the integration of blended learning - an approach combining online and as an optimal model for higher education. Readings by Graham (2019) and Boelens, De Wever, and Voet (2017) revealed that blended learning environments foster higher engagement compared to fully online formats. Garrison and Kanuka (2018) defined blended learning as the 'best of both worlds,' retaining interpersonal engagement while offering flexibility. Sharma and Alvi (2021) found that blended models were predominantly effective in management education, where interaction and empirical learning are essential.

The results of the current research at KBC NMU reverberates these findings. It indicated that blended learning enhances student motivation and faculty adaptability and diminishes the limitations of pure e-learning.

Research Methodology

The methodological frame of this study was designed to analytically investigate the effectiveness of e-learning in higher education, with a particular focus on Management institutions affiliated to Kavayitri Bahinabai Chaudhari North Maharashtra University (KBC NMU). The study adopted a mixed-methods approach within the broad standard of descriptive research design considering the multifaceted nature of e-learning that integrates pedagogical, technological and behavioural dimensions.

This helped the researcher to capture the depth of qualitative insights and breadth of quantitative patterns regarding the views and experiences of students and faculty members.

Research Design

A descriptive research design was used in this research. The objective was to explore the contextual factors, challenges and opportunities that influence its implementation. It also aimed to measure the extent to which e-learning is perceived as effective. This design provided an outline to scrutinizedistinctions across teaching-learning contexts, demographic groups and institutional practices while ensuring a balanced representation of stakeholders.

Population and Sampling

Target population for the study were students and faculty members from management institutes. A sample of 320 students and 45 faculty members was drawn from multiple management institutes considering representativeness, feasibility and reliability. To ensure an adequate depiction of students across academic years and faculty across subject domains, the stratified random sampling technique was used. The sample size was reckoned sufficient to meet the requirements of statistical analysis and ensure generalizability within the context of affiliated institutes.

Data Collection Tools

The study utilized a combination of structured questionnaires and semi-structured interviews**,** allowing for methodological triangulation and enhancing the validity of findings.

- **Structured Questionnaires**:
  - Separate questionnaires were administered for students and faculty.
  - A five-point Likert scale was employed to capture attitudes and perceptions, while demographic details (age, gender, academic year/experience, and subject specialization) were also collected for subgroup analysis.
- **Semi-Structured Interviews**:
  - To complement quantitative findings with rich narratives, semi-structured interviews were conducted with a purposive sub-sample of 30 students and 12 faculty members**.**
  - Suppleness in questioning allowed respondents to intricate on their experiences, thereby capturing tones that a structured questionnaire might not reveal.

Data Collection Procedure

A pilot study including 25 students and 5 faculty members was conducted to test the clarity of instruments and reliability prior to full-scale data collection. To reduce ambiguity, minor alterations were made in the wording of items. Questionnaires were distributed electronically and through physical copies, depending on accessibility. Interviews were conducted both online and offline and subsequently transcribed for analysis. Ethical considerations were carefully observed throughout the process.

Data Analysis

The study adopted a mixed-methods analytical framework, integrating both qualitative and quantitative techniques:

- **Qualitative Analysis**
  - Thematic analysis was applied to interview transcripts.
  - Responses were coded, categorized, and clustered under emerging themes such as “flexibility and convenience,” “technical challenges,” “student engagement,” and “faculty workload.”
  - To ensure trustworthiness, peer debriefing and member checks were conducted, where selected participants validated the interpretation of their responses.
- **Quantitative Analysis**
  - Descriptive statistics (mean, standard deviation, frequency distributions) were used to summarize demographic variables and general perceptions.

- Correlation analysis was employed to examine relationships between variables, such as the association between students' frequency of e-learning usage and their perceived learning outcomes.
- Regression analysis was carried out to identify predictive factors influencing the effectiveness of e-learning. For example, independent variables such as digital literacy, access to devices, faculty support, and engagement were tested against dependent variables like academic performance and satisfaction.
- Statistical analysis was conducted using SPSS software to ensure accuracy and reliability of results.

Validity and Reliability

To reduce the probability of bias, the use of multiple tools and data sources ensured triangulation. Cronbach's Alpha was used to test the reliability of the questionnaires. It yielded satisfactory values above 0.70 for most constructs. This confirmed internal consistency. Construct validity was addressed through expert validation by three senior faculty members and literature-based item development. For qualitative analysis, credibility was reinforced through precise quotations, thick descriptions and iterative coding.

Data Analysis and Interpretation

This segment discusses the results gained from the responses of 320 students and 45 faculty members. The analysis integrates both qualitative and quantitative dimensions. The aim is to provide an in-depth understanding of the effectiveness of e-learning in higher education, focusing perceptions, challenges and differences across institutional and demographic variables.

- **Demographic Profile of Respondents**

Table 1 summarizes the demographic characteristics of student and faculty participants.

Table 1. Demographic Characteristics of Respondents

Variable	Students (n=320)	Faculty (n=45)
Gender (Male/Female)	180 / 140	28 / 17
Locality (Urban/Rural)	190 / 130	30 / 15
Academic Year (MBA I/II)	170 / 150	–
Age Range	20–24 years	30–55 years
Teaching Experience	–	5–20 years

The sample achieved a balanced distribution of gender and locality, providing scope for comparative analysis.

Student Perspectives

- **Learning Effectiveness**

Students were asked to rate the extent to which e-learning contributed to improved academic learning outcomes.

Table 2. Student Perceptions of Learning Effectiveness

Response Category	% of Students
Strongly Agree	22%
Agree	41%
Neutral	20%
Disagree	12%
Strongly Disagree	5%

Interpretation: Approximately 63% of students agreed or strongly agreed that e-learning improved their learning effectiveness. However, a notable 17% disagreed, pointing toward uneven accessibility and adaptability issues.

- **Engagement Levels**

Students were asked about the level of engagement in online classes compared to traditional classroom teaching.

Table 3. Student Engagement in E-Learning

Response	% of Students
More Engaging	18%
Equally Engaging	29%
Less Engaging	53%

Interpretation: Over half of the respondents found online learning less engaging than face-to-face classes, indicating that interactivity remains a critical gap. Qualitative comments revealed that distractions at home, lack of direct faculty presence, and monotonous delivery styles were major reasons.

- **Challenges Faced by Students**

Following key challenges were revealed through the thematic analysis of open-ended responses.

- Limited interaction and lack of real-time feedback – highlighted by 35%.
- Technical barriers (poor internet connectivity, device unavailability) – mentioned by 42% of students.
- Reduced motivation due to prolonged screen exposure – cited by 27%.
- Assessment concerns, with doubts over fairness and transparency – noted by 20%.

Faculty Perspectives

- **Teaching Effectiveness**

Through e-learning platforms, faculty members rated their ability to deliver content effectively.

Table 4. Faculty Perceptions of Teaching Effectiveness

Response Category	% of Faculty
Strongly Agree	15%
Agree	40%
Neutral	25%
Disagree	15%
Strongly Disagree	5%

Interpretation: While 55% of faculty considered e-learning effective for teaching, a significant 20% expressed dissatisfaction, citing limitations in assessing student comprehension and difficulty in nurturing discussions.

- **Adaptability to Technology**

Faculty Adaptability Levels

- High adaptability – 38%
- Moderate adaptability – 44%
- Low adaptability – 18%

Interpretation: Most faculty members displayed moderate to high adaptability. Qualitative insights revealed that older faculty members faced sharper learning curves in grasping platforms like Google Classroom and MS Teams.

- **Barriers for Faculty**

Thematic analysis of faculty interviews highlighted:

- Bigger workload: time-consuming preparation for online classes and assessments.
- Pedagogical barriers: trouble in reproducing case-study discussions online.
- Student detachment: difficulty ensuring participation when students kept cameras off.
- Technical dependency: concerns about internet stability and software glitches.

Comparative Analysis

- **Gender-Based Differences**
  - Faculty**:** Male faculty demonstrated higher adaptability (82%) compared to female faculty (65%), which may reflect differential exposure to technology.
  - Students: Female students (68% agreement) reported somewhat higher satisfaction with e-learning effectiveness than males (59%), possibly due to greater self-discipline in online environments.
- **Rural vs. Urban Students**

Table 5. Rural–Urban Comparison (Student Responses)

Indicator	Urban (%)	Rural (%)
Learning effectiveness (Agree+)	70	55
Engagement (More/Equal)	56	38
Technical barriers reported	28	61

Interpretation: Rural students faced significantly more technical barriers, leading to lower perceived effectiveness and engagement. This highlights digital divide that constrains inclusivity.

- **Faculty vs. Student Perceptions**

Figure 3. Comparative Perceptions of Effectiveness

  - Faculty (Agree+) = 55%
  - Students (Agree+) = 63%

Interpretation: Students were somewhat more hopeful than faculty regarding effectiveness. Both the groups congregated on the view that e-learning cannot fully substitute traditional classroom experiences.

Hypothesis Testing

The following hypothesis was tested:

H_1: There is a significant relationship between students' frequency of e-learning use and their perceived learning effectiveness.

- Correlation Analysis**:** Pearson's $r = 0.46$ ($p < 0.01$), indicating a moderate positive relationship.
- Regression Analysis**:** Frequency of e-learning usage significantly predicted learning effectiveness ($\beta = 0.38$, $p < 0.01$), explaining 22% of variance.

Interpretation: Larger usage of e-learning platforms was associated with higher perceived effectiveness, emphasizing the importance of digital literacy and regular exposure.

H_2: There is a significant difference in perceptions of learning effectiveness between rural and urban students**.**

- Independent Samples t-test: $t = 2.84$, $p < 0.01$ → statistically significant difference. Interpretation: Urban students reported higher effectiveness, confirming the presence of infrastructural inequalities.

Interpretation of Findings

The findings reveal a mixed but cautiously optimistic scenario for e-learning in higher education:

- Faculty flexibility: Faculty members were reasonably positive but resisted with pedagogical transformation. The determined concerns were difficulties in interactive teaching and problem of increased workload.
- Learning effectiveness: The benefits of accessibility and flexibility offered by e-learning were acknowledged by the students. Though, engagement levels were considerably lower, signaling that effectiveness is vapid by interactivity.
- Demographic acumens: Age and gender differences played significant roles in flexibility that suggested custom-made support measures are required.

- Alignment gaps: Faculty expressed uncertainty regarding depth of engagement while students observed more learning benefits than faculty. This deviation implies that institutional strategies should bridge the gap between learning expectations and teaching capacity.
- Digital divide: Rural students constantly reported higher blocks, particularly device limitations and poor connectivity leading to considerably lower effectiveness.
- Qualitative richness: Narratives highlighted a need for mix models, where online platforms complement but does not replace traditional classrooms. Both faculty and students favoured combined approaches merging interpersonal richness of face-to-face interactions with flexibility of e-learning.
- Quant**itative validation**: Hypothesis testing confirmed that frequency of e-learning usage and infrastructural access significantly effects perceptions of effectiveness, lending pragmatic strength to the findings.

Findings and Discussion

Key Findings

The present study examined the perceptions of 320 students and 45 faculty members from management institutes affiliated to KBC NMU to assess the effectiveness of e-learning in higher education. The analysis generated several significant insights:

- Engagement: 53% of the student respondents considered e-learning less engaging than traditional classes. The engagement gaps arose as an acute weakness.
- Learning effectiveness: 63% of students agreed or strongly agreed that e-learning contributed positively to their learning and 17% disagreed. This replicates that e-learning is acknowledged as academically beneficial, but not consistently effective across learners.
- Faculty adaptability: While most faculty members displayed moderate to high adaptability (82%), older faculty members found it harder to adjust to platforms like Google Classroom and MS Teams.
- Student challenges: Less interaction, technical barriers and screen fatigue were prominent challenges faced by the students. Rural students reported higher technical challenges (61%) compared to urban counterparts (28%).
- Faculty perceptions: 55% of faculty found e-learning effective for teaching, but they emphasized challenges in replicating interactive methods such as case study discussions.
- Comparative perspectives: Students were slightly more positive than faculty in rating effectiveness (63% vs. 55%), but both agreed that e-learning cannot replace fully for traditional face-to-face teaching.
- Qualitative richness: Both faculty and students stressed the need for blended models combining flexibility of online platforms with the interactive richness of in-person classes.
- Quantitative validation: Hypothesis testing confirmed a significant positive relationship between frequency of e-learning use and perceived learning effectiveness. Pointing to infrastructural inequalities, a t-test also established significant urban–rural differences.

Critical Insights Specific to KBC NMU-Affiliated HEIs

While the findings supportnational and global research, certain insights are distinguishing to the KBC NMU context:

- Faculty workload pressures: Faculty in these institutes reported that preparing e-learning materials and assessments demanded more time, a challenge compounded by limited institutional support. Unlike elite universities with dedicated IT support, KBC NMU-affiliated institutes operate with fewer resources, exacerbating the burden on faculty.
- Rural representation: The sample included a large proportion of rural students, many of whom lacked reliable connectivity. This contextualizes the digital divide as a particularly acute issue for institutes under KBC NMU, which serve semi-urban and rural populations.

- Hybrid preference: Both students and faculty advocated for blended learning models, suggesting that in the NMU-affiliated environment; e-learning is seen as a complement rather than a replacement for traditional classrooms.
- Cultural learning preferences: Students and faculty alike highlighted the importance of interpersonal interaction. Case-based learning and peer discussions are integral to management education, and their absence in online formats was strongly felt in this context.

Conclusion

The present study scrutinized the perceptions of faculty and students from management institutes affiliated to KBC NMU pertaining to the effectiveness of e-learning in higher education. The findings drawn a nuanced picture: e-learning has proved to be a valued tool in ensuring accessibility, continuity and flexibility of education, However, both groups consistently highlighted limitations in interactivity, engagement and inclusivity.

The evidence suggests that e-learning should not be viewed as an auxiliary for traditional classroom teaching, but rather as a supplement. E-learning offers scalability, flexibility and access. Its weaknesses arise in areas requiring collaboration, discussion and experiential learning. Importantly, the study revealed demographic and contextual differences: rural students reported significantly more challenges due to poor connectivity and limited device access, while older faculty faced greater difficulties adapting to digital tools.

Overall, e-learning in KBC NMU-affiliated institutions can be termed as effective but incomplete—a mechanism that enhances access and certain dimensions of learning but falls short of delivering all-inclusive educational experiences without accompanying face-to-face interactions.

Suggestions

The following suggestions are proposed for key stakeholders to fortify the effectiveness of e-learning in higher education:

- **For Higher Education Institutions (HEIs)**
  - Invest in digital infrastructure: Institutions must reinforce their technical backbones by ensuring steady internet connectivity on campus and providing access to digital libraries.
  - Establish digital support cells: Dedicated technical support teams can help students and faculty in troubleshooting platform-related issues that will reduce learning disturbances.
  - Adopt blended learning models: HEIs should assimilate e-learning with traditional classroom teaching to create hybrid ecosystems. While preserving the interactive richness of in-person sessions, blended models allow the flexibility of online education
- **For Faculty**
  - Diversify teaching approaches: Integrating breakout rooms, peer review activities, live polls and multimedia resources can enhance student engagement.
  - Enrich digital pedagogy skills: Faculty training programs should focus on pedagogical redesign for online contexts, case-based simulations, including interactive tools, and gamified assessments.
  - Balance workload**:** Faculty should be encouraged to work together in content creation to reduce idleness and workload pressures.
- **For Students**
  - Leverage digital tools: Beyond attending online lectures, students can utilize discussion forums, learning management systems and digital libraries to expand their learning.
  - Develop digital learning habits: Students should nurture time management, self-discipline and active participation strategies to make the most of e-learning environments.
  - Provide productive feedback: Active student feedback can guide faculty in addressing engagement challenges and improving delivery methods.
- **For Policymakers**
  - Frame e-learning quality standards: National and state-level bodies should describe minimum digital standards for affiliated institutions, to ensure consistency and inclusivity.

- Bridge the digital divide: Policymakers must highlight investments in rural internet infrastructure and subsidized device schemes to ensure impartial access.
- Inspire innovation: Funding for digital innovation projects in HEIs—such as AI-enabled adaptive learning or development of localized e-learning content can enhance long-term sustainability.

Limitations of the Study

- Self-reported data: The dependence on surveys and interviews means responses may be influenced by, recall bias, subjectivity or social appeal bias.
- Sample size and scope: The study covered 320 students and 45 faculty from institutes affiliated to one university (KBC NMU). While noteworthy, the findings cannot be generalized to all higher education institutions in India.
- Focus on management education: The study is specific to management programs, which rely heavily on case discussions and interaction. Findings may differ in disciplines where content delivery is more lecture-oriented.

Scope for Future Research

The study opens several avenues for future research:

- Relative studies across disciplines: Future research could compare the effectiveness of e-learning in fields such as medicine, engineering or arts, emphasizing discipline specific needs.
- Equity-focused research: Given the unambiguous rural urban divide, future research should scrutinize how targeted infrastructural interventions affect learning effectiveness and digital inclusivity.
- Experimental intrusions**:** Future research can test specific engagement strategies such as flipped classrooms and gamified learning to measure their impact on academic outcomes.
- Blended learning outcomes: The future research can empirically compare traditional classroom teaching, pure e-learning and blended approaches to recognize optimal combinations.

Ethical Approval

The study followed to ethical research principles and informed consent was obtained from all respondents.

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