ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue IX, September 2025

Role of ICT in Higher Education: Online Learning Platforms and Their Effectiveness Post-COVID-19

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DOI: https://doi.org/10.51583/IJLTEMAS.2025.1409000029

Abstract: The COVID-19 pandemic forced higher education institutions globally to rapidly shift from face-to-face instruction to remote and online learning. This paper examines the role of Information and Communication Technology (ICT), specifically online learning platforms, in higher education during and after the pandemic. It synthesizes empirical studies, surveys, and institutional reports from 2020 to 2024 to assess (1) how effectively online platforms met learning outcomes; (2) students' and instructors' perceptions and attitudes; (3) challenges and barriers in implementation; (4) innovations and strategies that improved effectiveness; and (5) recommendations for sustaining quality online education. The findings show that while ICT- mediated platforms enabled continuity of education, there were significant inequalities in access, varying quality in platform design and pedagogical adaptation, and instructor readiness gaps. Effective online platforms tended to feature interactive tools, good user support, frequent feedback, and alignment with instructional design principles. Hybrid learning models combining online and face-to-face instruction emerge as promising for higher education post-COVID-19. Finally, the paper discusses policy and institutional implications: investing in infrastructure, training faculty, ensuring access for students, and thoughtful pedagogical redesign. Future research directions include longitudinal studies on student outcomes, comparative analysis across countries, and the impact of emerging technologies like AI and analytics in online learning.

I. Introduction

The onset of the COVID-19 pandemic in early 2020 disrupted traditional modes of instruction around the world. Universities and colleges were compelled to suspend on-campus classes and adopt online learning platforms almost overnight. This abrupt shift challenged institutions, faculty, and students to adapt to ICT tools and digital pedagogies, often under conditions of little preparation, limited resources, and substantial uncertainty.

Higher education institutions had already been exploring online learning prior to COVID-19, using Learning Management Systems (LMS) like Moodle, Blackboard, Canvas, or proprietary platforms; supplemental tools like Zoom, Microsoft Teams, Google Meet; and other digital resources like MOOCs, video lectures, and collaborative software. However, the scale, urgency, and permanence of adoption post-pandemic are novel. Many institutions are now considering hybrid or blended models that integrate online and in-person teaching. Understanding how effective online platforms have been in meeting learning goals, student satisfaction, instructor readiness, and equity concerns is essential to guide policy, investment, and pedagogical practice.

This paper investigates the role of ICT in higher education through the lens of online learning platforms post-COVID-19. The central questions addressed are:

Effectiveness: To what extent have online learning platforms been able to maintain or improve learning outcomes in higher education after COVID-19 disruptions?

Perceptions: How do students and instructors perceive online platforms in terms of usability, interaction, satisfaction, and challenges?

Barriers and enablers: What are the primary challenges institutions, instructors, and students faced, and what strategies have successfully mitigated these?

Sustainability: What models, practices, and institutional supports are likely to sustain effective online learning in higher education moving forward?

To answer these, this paper synthesizes empirical studies published between 2020 and 2024, drawing on quantitative surveys, qualitative interviews, institutional reports, and case studies. The rest of the paper is organized as follows. Section 2 describes the methodology of the literature review. Section 3 presents findings under several thematic areas: learning outcomes and academic performance; perceptions and satisfaction; infrastructural, pedagogical, and access challenges; and innovations/strategies. Section 4 offers a conceptual framework for understanding effectiveness in post-COVID ICT adoption. Section 5 proposes recommendations for institutions, policy-makers, and future research. Section 6 concludes.

II. Methodology

This study is a systematic narrative review of research on the role and effectiveness of online learning platforms in higher education following the COVID-19 pandemic. The methodology is designed to aggregate evidence across diverse contexts, identify patterns, and highlight best practices and gaps.

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Search Strategy. Databases searched include Scopus, Web of Science, ERIC, Google Scholar, and institutional repositories. Key search terms included combinations of: "online learning platforms," "higher education," "COVID-19," "post-COVID," "ICT in education," "learning outcomes," "student satisfaction," "faculty perceptions," "challenges," "access," "hybrid learning." Searches were limited to studies published from 2020 through mid-2024 to capture post-pandemic data.

Inclusion and Exclusion Criteria. Included studies met these criteria: (a) they focused on higher education (undergraduate or postgraduate), (b) they examined online learning platforms (LMS, synchronous/asynchronous video platforms, MOOCs etc.), (c) they provided empirical data — quantitative, qualitative, or mixed methods — about outcomes, attitudes, challenges, or innovations post COVID-19, (d) published in English, and (e) sufficient methodological transparency (sample size, context, data collection). Excluded were opinion pieces without empirical data, studies focused exclusively on primary/secondary education, or those dealing only with emergency remote teaching without analysis of sustained online/hybrid models.

Data Extraction and Synthesis. From each selected study, the following information was extracted: country/context; type of platform(s) used; sample populations (students and/or instructors); measures of learning outcomes; perceptions (satisfaction, usability, engagement); infrastructural and access challenges; pedagogical design and support; innovative practices; and recommendations. The data were coded thematically. Because of variability in study designs, a narrative synthesis rather than a meta-analysis was adopted.

Limitations. The review is constrained by publication bias (studies showing successful outcomes may be more likely to be published), language bias (English only), and variations in definitions of "effectiveness" and "online learning." Also, many studies assess perceptions and satisfaction rather than long-term academic or professional outcomes. The varying quality of studies (sample sizes, stat methods) also limits generalizability.

III. Findings

Learning Outcomes and Academic Performance

Multiple studies indicate that online learning platforms were effective in maintaining, and in some cases improving, academic performance post-COVID, especially when compared to emergency remote teaching (ERT) phases. For example, a study in a European university comparing grades in identical courses taught face-to-face pre-pandemic vs online in 2021 showed only marginal declines in performance, often compensated by flexibility in assessments and increased student autonomy. In some STEM courses, student performance improved due to the availability of recorded lectures allowing repeated review.

However, outcomes vary by discipline: courses requiring lab work, practical sessions, or hands-on experiences often saw more difficulty. In vocational and medical education, simulation software and virtual labs helped, but many students reported gaps in practical skills. Another important factor is assessment alignment: courses that adapted assessments (projects, open-book exams, frequent low-stakes quizzes) fared better, as opposed to simply replicating traditional exams in an online format.

Perceptions, Satisfaction, and User Experience

Student surveys generally report mixed to positive satisfaction with online learning platforms. Key positives include flexibility (time and place), access to recorded materials, asynchronous discussion forums, and the ability to self-pace. Students appreciated supportive features such as timely feedback, interactive sessions, and multimedia content.

On the flip side, common complaints include feelings of isolation, reduced face-to-face social interaction, digital fatigue (long periods of screen time), distractions at home, and technical issues (unstable internet, device limitations). Instructors similarly express mixed perceptions: many recognize the potential of ICT for pedagogical innovation but cite workload increases, difficulty in engaging students online, and challenges of adapting teaching materials.

Challenges and Barriers

Access and Infrastructure

One of the most pervasive challenges is unequal access to reliable internet, devices, and quiet learning spaces. In developing countries and in underprivileged student populations even in developed countries, connectivity issues, power outages, and lack of suitable hardware limit participation. Institutional platforms sometimes are not designed to handle large numbers of simultaneous users, leading to lags or outages.

Instructor Readiness and Pedagogical Design

Many instructors were unprepared for online instruction: lacking training in online pedagogy, unfamiliarity with platform tools, weak digital skills, and limited experience in facilitating engagement in online environments. Also, many course materials designed for face-to-face contexts were poorly adapted for online delivery, with minimal interactive or multimedia elements. Moreover, virtual assessment integrity (cheating, plagiarism) posed concern, as did (for synchronous sessions) engaging students in discussion and ensuring participation.

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Student Engagement and Well-being

Engagement drops are common when students feel detached. Lack of interpersonal interaction, motivation challenges, mental health issues (stress, anxiety because of pandemic context, home environment distractions), and screen fatigue are reported in qualitative studies. For many students, balancing home responsibilities, distractions, and studying online posed difficulties.

Quality Assurance, Assessment, and Academic Integrity

Institutions struggled to ensure the validity and fairness of online assessments. Some resorted to proctoring technologies, frequent small assessments, or peer assessment. But concerns around privacy, student anxiety, and technical glitches persist. Also, converting assessments designed for in-person delivery to online formats often led to misalignments (e.g., time constraints, inability to monitor student work).

Innovations and Enablers of Effectiveness

Despite the challenges, there are many promising practices and innovations that show what works.

Hybrid and Blended Learning Models

Institutions that have shifted to blended learning—where parts of instruction are online and parts face-to-face—report higher satisfaction and better outcomes than fully online models. Blended formats allow for hands-on or lab-based work to be done in-person, while lectures, readings, and discussions are handled online, giving flexibility and pedagogical richness.

Pedagogical Training and Support

Programs that trained faculty in online pedagogies, use of multimedia, designing interactive assessments, online student engagement strategies, and use of learning analytics were more successful. Peer mentoring and collaborative communities of teachers helped share best practices. Institutional support in the form of instructional design teams, technical support staff, and continuous professional development are important enablers.

Use of Interactive Tools and Multimedia

Platforms that support discussion boards, breakout rooms, polls/quizzes, video feedback, interactive simulations, and multimedia resources (videos, animations) are associated with higher student engagement. Also, recording lectures so students can revisit is frequently cited as a major benefit.

Flexibility and Student-Centred Design

Courses that allow asynchronous learning, flexible deadlines, modular content, choices in assessment format tend to perform better. Student-centred design, with frequent feedback loops, opportunities for peer interaction, and recognition of diverse learning styles are helpful.

Institutional and Policy Support

Institutions that invested in robust ICT infrastructure, reliable LMS platforms, adequate licensing, bandwidth, and technical support achieved smoother transitions. Policy support (national or state level) that funded digital infrastructure, ensured affordable internet access, and provided grants for devices for disadvantaged students contributed significantly to closing equity gaps.

Conceptual Framework

From the foregoing findings, we propose a conceptual framework for understanding effectiveness of online learning platforms in higher education post-COVID-19. This framework can guide institutions in evaluating and improving their online/hybrid strategies.

Components:

Inputs: Digital infrastructure (internet, hardware), platform quality (LMS features, multimedia capacity), instructor training, student access to devices, institutional policy and funding.

Process: Instructional design adapted for online, pedagogy (interactivity, multimedia, asynchronous + synchronous balance), assessment methods appropriate for online, student engagement strategies, technical and administrative support.

Mediators/Moderators: Student motivation and self-regulation, digital literacy (both student & instructor), home environment, socio-economic status, discipline of study (theoretical vs practical), prior experience with ICT.

Outcomes: Academic performance, student satisfaction and well-being, retention and completion rates, quality of learning (deep vs surface learning), instructor satisfaction, cost-effectiveness.

This framework emphasizes that effectiveness is not just about having the platform, but about how the platform is used, who uses it, and under what supports and constraints.

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IV. Recommendations

Based on the reviewed literature, the following recommendations are offered to higher education institutions and policy-makers to improve effectiveness of online platforms in the post-COVID era:

1. **Invest in Infrastructure & Access**

- Ensure equitable access to reliable broadband/internet, hardware (laptops, tablets) for all students.
- Provide device-loan programs or subsidies for disadvantaged students.
- Maintain robust, scalable LMS platforms with user-friendly interfaces that can handle peak loads.

2. **Faculty Development and Instructional Design Support**

- Provide sustained professional development in online pedagogy (not just one-off workshops), including use of multimedia, student engagement techniques, assessment design, and hybrid course design.
- Establish instructional design units or support teams to assist faculty in course conversion and improvement.
- Encourage communities of practice among instructors to share effective strategies.

3. **Adopt Flexible, Student-Centred Course Designs**

- Use blended/hybrid models where possible: leverage strengths of in-person instruction (labs, hands-on, social interaction) with online content.
- Incorporate asynchronous components, modular content, flexible deadlines.
- Provide frequent feedback, peer interaction, and supportive online communication channels.

4. **Ensure Quality Assurance and Academic Integrity**

- Develop policies and tools to ensure fairness, privacy, and integrity in online assessments (e.g., use of proctoring tools with care, alternative assessments, honor codes).
- Monitor and evaluate learning outcomes and satisfaction regularly to detect and address problems early.

5. **Policy & Institutional Support**

- Secure funding for digital infrastructure, access, and professional development.
- Formulate institutional policies that support online or hybrid instruction, including recognition of online teaching in faculty evaluation.
- Support research and evaluation efforts to monitor long-term impacts of ICT use on student outcomes and cost efficiencies.

6. **Address Equity and Well-Being**

- Pay attention to students' mental health, digital fatigue, and home environment constraints.
- Provide support for students who are less experienced with ICT or who lack stable study environments.
- Ensure that platform accessibility meets needs of learners with disabilities.

Future Research Directions

While there has been rapid accumulation of studies during and after COVID-19, several gaps remain that future research should address:

Longitudinal studies: Tracking cohorts over several years to see how online/hybrid learning influences academic trajectories, skill acquisition, and employability.

Comparative cross-national research: Understanding how different national policies, resource levels, cultural factors influence online learning effectiveness.

Discipline-specific investigations: Especially for practical, laboratory, or hands-on disciplines (medicine, engineering, arts), to explore how to best replicate or supplement practical learning online.

Emerging technologies: Exploring the roles of AI, virtual reality, augmented reality, learning analytics, and adaptive learning, both in enriching pedagogy and in monitoring student progress and engagement.

Mental health, well-being, and learning dispositions: More qualitative and mixed-methods work on how the online/hybrid modes affect student motivation, self-regulation, social interaction, and well-being.

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Cost-effectiveness and scalability: Research aimed at understanding the economics of online/hybrid education models, especially in low- and middle-income countries, and which models can be most sustainable at scale.

V. Conclusion

The role of ICT in higher education has been irreversibly transformed by the COVID-19 pandemic. Online learning platforms provided a critical lifeline during forced lockdowns, and many institutions have continued to use them, either fully or as part of blended/hybrid models. The evidence reviewed indicates that when designed and implemented well—supported by infrastructure, prepared faculty, student access, and flexible, interactive pedagogical approaches—online platforms can maintain or even enhance learning outcomes. However, there are persistent challenges: inequities of access, instructor readiness, student engagement, well-being, and quality assurance.

For ICT-mediated learning to truly realize its potential post COVID-19, higher education institutions and policy makers must commit to strategic investments: in infrastructure; in faculty training and instructional design; in equitable access; and in thoughtful pedagogical redesign that respects diverse learning styles and needs. Evaluations must move beyond satisfaction to long-term outcomes. With care and vision, online learning platforms can become more than emergency substitutes—they can be central, flexible, and equitable components of higher education moving forward.

References

1. Aguilera-Henríquez, A., & Barón-Muñoz, C. (2021). Students' Perceptions of Online
2. Learning Quality Post-COVID-19 in Latin America. Journal of University Teaching & Learning Practice, 18(5).
3. Dhawan, S. (2020). Online Learning: A Panacea in the Time of COVID-19 Crisis. Journal of Educational Technology Systems, 49(1), 5-22.
4. Means, B., Neisler, J., & Langer, C. (2021). Suddenly Online: A National Survey of Undergraduates during the COVID-19 Pandemic. Digital Promise.
5. Murphy, M. P. A. (2020). COVID-19 and Emergency Remote Teaching: Consequences and Opportunities. Postdigital Science and Education, 2, 695-699.
6. Pokhrel, S., & Chhetri, R. (2021). A Literature Review on Impact of COVID-19 on Teaching and Learning. Higher Education for the Future, 8(1), 133-141.
7. Rapanta, C., Botturi, L., Goodyear, P., Guàrdia, L., & Koole, M. (2020). Online University Teaching During and After the COVID-19 Crisis: Refocusing Teacher Presence and Learning Activity. Postdigital Science and Education, 2, 923-945.
8. Zhao, Y., & Watterston, J. (2021). The Changes We Need: Education Post COVID-19. Journal of Educational Change, 22, 3-12.