Symbiosis Centre for Distance Learning
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Approved by All India Council for Technical Education (AICTE)

SYMBIOSIS INTERNATIONAL RESEARCH JOURNAL ON ONLINE & DISTANCE LEARNING

SIRJODL: VOLUME 6 ISSUE 2 JULY 2025
ISSN 2582-9009

REIMAGINING QUALITY AND INNOVATION IN ONLINE AND DISTANCE LEARNING

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SIRJODL: VOLUME 6 ISSUE 2 JULY 2025
ISSN 2582-9009

Symbiosis International Research Journal on Online & Distance Learning

Symbiosis Centre for Distance Learning (SCDL), Pune, is one of India's largest autonomous distance learning educational institutions. In this day and age, distance learning looks beyond traditional reference books and course-end assessments. Online and Distance Learning (ODL) is the need of the hour in a young country such as India, as it makes higher education available to aspiring youth as well as mature learners, and reaches out to the unreached in the remotest corners of this vast nation. It is one of the best modes of increasing the GER in higher education at almost one-fifth the cost. ODL institutions are in a sense great contributors to the national cause of making available higher education to the physically, socially, and financially challenged youth of our country.

Technology is a game-changer as it has brought about a paradigm shift in the teaching-learning and evaluation pedagogies and facilitated this process. However, publications by Indian researchers on online and distance learning are almost non-existent. Therefore, Symbiosis Centre for Distance Learning, Pune, plans to provide a platform to researchers and academicians in the form of a research journal on ODL.

Although distance education is considered one of the most crucial options available to us to improve the status of higher education, there are some critical quality-related issues that need to be addressed. To contribute towards this, SCDL launched Symbiosis International Research Journal on Online & Distance Learning (SIRJODL) in 2016. The SIRJODL has continuously provided opportunities for researchers and academicians to publish their research work and we at SCDL provide access to our larger audience.

SIRJODL is a peer-reviewed, international, bi-annual e-journal. This scholarly e-journal publishes refereed articles focusing on the issues and challenges of providing theory, research, and information services regarding all forms and methods of distance and online education or open learning applications. SIRJODL particularly attempts to meet the continuing education needs of practitioners, educators, teachers, and policymakers by providing a forum for the discussion of extended learning strategies, policies and practices, and trends in ODL learning strategies including learning technologies as they all impact the field of online and distance education.

SIRJODL encourages and invites articles that may be theoretical, philosophical, and/or empirical analyses of distance education/open learning/online education/blended learning/ and teaching issues, in the form of case studies, research studies, research articles/notes, and general interest reports. Book reviews and literature reviews are also welcome.

SIRJODL: VOLUME 6 ISSUE 2 JULY 2025
ISSN 2582-9009

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SIRJODL: VOLUME 6 ISSUE 2 JULY 2025
ISSN 2582-9009

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Published in INDIA

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ISSN 2582-9009

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A Study on the Effectiveness of Innovative Assessments for Online Learning

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Abstract

The purpose of the study was to establish whether ePortfolios are more efficient compared to traditional assessment methods in enhancing academic achievement and student engagement within online learning environments. The targeted population was MBA students in Pune; the sample size used was 400 students, with an equal division between the ePortfolio and traditional method groups.

The following two hypotheses were tested: first, that students using ePortfolios would have higher levels of academic achievement than students using traditional methods; second, that students using ePortfolios would indicate higher levels of engagement and satisfaction. Analysis involved an independent samples t-test for academic achievement, and a chi-square test of independence for engagement levels.

Results show that there is a statistically significant difference in the academic achievement of both groups: the mean and standard deviations were 78.4 ± 8.2 for the ePortfolios group, 75.2 ± 7.8 for the traditional methods group, with a t-value of 3.45 at p = 0.001. The chi-square test produced an outcome that captures the important relationship between assessment method and the reported levels of engagement, returning $\chi^2 = 7.21$ with p = 0.004, indicating higher levels of engagement from the ePortfolio group.

The study has implications for integrating ePortfolios into online courses, potentially enriching educational outcomes by encouraging deeper learning experiences and engaging students' active participation. However, this is self-reported data, and the study focused on a particular demographic of students, a fact that may affect generalization.

Future research would therefore have to be aimed at the longitudinal effects of ePortfolios, implementation strategies optimized for different kinds of educational settings, and technological developments in online learning to further refine assessment practices. Altogether, this paper contributes to the emerging conversation around innovation in assessment methods within online education by drawing preliminary lessons about their potential advantages and areas for future exploration.

KEYWORDS

ePortfolios, Online Learning, Academic Achievement, Student Engagement, Educational Technology

Introduction

Background of Online and Distance Learning

It has revolutionized the educational landscape by opening flexible and accessible learning opportunities to diverse populations spread all over the world. Digital technologies used in this mode of education can deliver instruction, provide interaction opportunities, and assess learning, breaking geographical barriers and accommodating different learning styles. Online learning has rapidly accelerated due to the quick growth of the internet and other new communication technologies, hence enabling institutions to reach the international market. The roots of distance

learning, historically correspondence courses, evolved into synchronous and asynchronous methods that allowed learner engagement and interactivity. Then the COVID-19 pandemic really accelerated the acceptance of online education and proved its potential to sustain continuity in education during crises. With the ever-growing popularity of online learning, comes the pressing need for assessment methods that are effective and can correctly measure student learning to support these very diverse educational goals.

Importance of Effective Assessments in Online Education

Effective assessments are important in online learning, since they help in correctly measuring students' learning, engagement, and accomplishments. Facilitating academic integrity, motivating students, and providing timely feedback within the process of online education is more complex compared to a traditional classroom environment. Formative assessments, peer reviews, and authentic tasks are some of the contemporary approaches to assessment, which encourage further learning, critical thinking, and application in the real world. On the one hand, effective assessments not only work on measuring student performance; they inform instruction, too, and help educators adjust approaches against diverse learner needs. On the other hand, they offer insights into the effectiveness of online courses, guiding curriculum development and quality assurance. This puts the onus on commensurate and strong assessment strategies that will meet academic standards and student outcomes, thus guaranteeing credibility and integrity for online education programs.

Traditional vs. Innovative Assessment Methods

The traditional assessment tools—multiple-choice tests, essays, and standardized exams—have been in existence for quite some time, primarily as a means of assessing students. Such approaches underscore summative assessment: they take snapshots at student achievement at any one point in time. While adequate for checking knowledge retention, they usually miss on assessment for higher thinking orders and creativity, applications to the real world. By contrast, innovative assessment methods offer a much broader range of methods that involve students much more actively in the process of learning. These would include, among others, formative assessment, project-based learning, peer assessment, and digital portfolios, with a view to constant feedback, collaboration, and solution finding in practice. Innovative assessments use technology to provide interactive and adaptive testing environments, making individualized learning experiences and immediate feedback possible. In a student-centered approach, innovative assessments encourage

critical thinking, creativity, and lifelong learning skills. The modern world is complex, but with proper preparation, students can be readied for this.

Theoretical Frameworks for Assessment in Online Learning

These theoretical frameworks guide the development and implementation of assessments in online learning environments to ensure pedagogically sound and effective assessments. Among constructivist theories, Vygotsky's Social Development Theory emphasizes the role of social interaction and collaboration in learning. These theories, then, support assessment tools—more particularly, formative assessment tools and peer reviews in online environments—to promote active learning and knowledge construction through social engagement.

Cognitive Load Theory by Sweller in 1988 focuses on the optimum mental effort to process information. It favors assessments that limit extraneous cognitive load while increasing germane load. This theory underpins the design of online assessments, which should be worded clearly and concisely toward the desired learning outcomes, as this improves student performance and retention.

Connectivism, proposed by Siemens in 2005, focuses on the role of technology and specifically on networks in learning. This theory suggests that online assessments should provide for digital tools and resources, making connections between learners and content possible. In this way, it creates room for multimedia elements of assessment and collaborative platforms within this framework because it allows a dynamic interactive learning environment.

The collective emphasis of all these theoretical frameworks on interactive, collaborative, and cognitive-principle-based assessment is what ensures that student learning will be effectively measured and optimized in online settings.

Suggested Method: ePortfolios

They allow students to demonstrate learning attainments, skills, and experiences. Unlike the traditional models of task-oriented or examination-oriented assessment, ePortfolios provide a record of student development over time. These usually include essays, projects, multimedia presentations, reflections, and evidence of learning attainment.

Salient Features and Advantages:

- Reflection and Metacognition: The student reflects on his process of learning upon his journey to link theory with practice, demonstrating critical thinking skills.
- Authentic Assessment: The assessments have real-world contexts applied; learners apply knowledge in real contexts.
- Customization and Personalization: The students' personalization of ePortfolios shows the uniqueness of individual strengths and interests.
- Longitudinal Assessment: The longitudinal assessment provides summary over time about a student's progress, thus allowing continual improvements backed by personalized feedback.
- Collaborative Learning: The approach helps to build collaboration amongst peers and between peers and instructors for a supportive learning community.

Implementation:

For effective implementation of ePortfolios:

- Clearly define learning objectives and assessment criteria.
- Education and assistance to create and reflect on portfolios for students and instructors
- Use rubrics or scoring guides for reliability in assessment
- Regular feedback and peer review to improve learning outcomes

Impact:

Research has shown that ePortfolios foster deeper learning, increase student engagement, and develop important skills such as communication, critical thinking, and digital literacy.

Thus, ePortfolios are an engaging, flexible assessment method suitable to various disciplines and educational levels, enabling student-centered learning through reflective practice in online and hybrid learning environments.

Evolution of Online and Distance Learning

Online and distance learning have made formidable technological and pedagogical progress. From the first correspondence courses in the 19th century, when the post office brought educational opportunities to the world, to the development of radio broadcasting in the mid-20th century,

which provided more access to educational programs, and then to Internet development in the late 20th century, which transformed the sphere of distance learning and gave birth to online education. The very first online courses appeared in the 1990s, which used email and old web technologies for delivering course materials and conducting communication. During the 2000s, after the wide adoption of broadband Internet and advanced multimedia technologies, online learning platforms evolved to host video lectures, interactive simulations, and discussion forums.

LMS, such as Blackboard and Moodle, enabled structured settings for course delivery and administration, which dramatically helped improve the online learning experience. In the early 2010s, MOOC democratized access to education, opening up courses for free from prestigious institutions to a global audience.

The 2020 COVID-19 pandemic accelerated the uptake of online learning, showing the significance of ensuring continuity in learning. Today, online and distance learning continue to change with artificial intelligence, virtual reality, and adaptive learning technologies being integrated to ensure personalization and immersion in learning experiences.

Modern education integrates online and distance learning as core constituents that facilitate flexibility, accessibility, and innovation in teaching and learning.

Previous Studies on Assessment in Online Education

Online assessments have shown to be an effective replacement for face-to-face modes in traditional learning environments. Generally speaking, the studies indicated that students did better in online assessments; many students are fond of this mode of assessment because it is believed to be easier and promotes self-managed learning. Effective strategies for online assessment include multiple clearly explained assignments with timely and meaningful feedback, including projects, portfolios, self-assessments, and peer evaluations. Digital literacy and new approaches to assessment, such as feedback and interaction, proved efficient in building conceptual understanding among students in an online learning context. However, as online assessments are carried out, there exist issues related to reliability and authenticity. As much as students appreciate the speed of the online computer-marked assessment feedback and the peer assessment, most instructors instruct using conventional face-to-face assessment techniques and thus prefer to stick to those techniques that they believe to a great extent reflect student learning and minimize cheating opportunities. Current studies on effectiveness have examined innovative assessments in online learning environments.

Research by Mayo & Chua, 2022, argues that digital literacy and new assessment techniques such as feedback and interaction increase the degree of conceptual understanding in online instruction in chemistry. Online assessment tools that work efficiently include clearly explained assignments with timely feedback, incorporation of projects, portfolios, self-assessment, and peer evaluations. For example, students believe that peer assessment and computer-marked assessment provide them with feedback more rapidly than teacher-marked assessment in online formative assessments. On the other hand, a comparative study reveals that students performed better in their academics in terms of online assessments and liked them more compared to the conventional face-to-face assessments, while lecturers were concerned that online assessments are not fair and can involve cheating, thus preferring the traditional methods. These results demonstrate some of the potential of online assessment while underlining the necessity to articulate the integrity issues.

Online assessment in higher education has reached a prominent place and opens up new channels of possibilities and challenges. Virtual learning environments offer ways of assessment, such as e-portfolios and peer assessment, which can offer timely feedback and increase student participation. These strategies create online communities of learning, increasing students' interdependence and deep knowledge-building. Effective online assessment must take into account several dimensions: student-to-student and student-to-instructor interactions, technology, course content, and structure. Formative assessment techniques that have been used within online contexts to increase learner centrality and give learners greater control over their learning process are the use of self-test quizzes, discussion forums, and e-portfolios. Still, the issues of ensuring academic honesty and assessment validity and reliability are concerns within online environments. Overall, online assessment methods are some great options to enhance the learning experience in virtual learning environments.

Online formative assessments have been increasing in higher education and have provided benefits both for the students and for instructors. Such assessments can foster collaborative learning; enhance critical thinking capability; and increase students' engagement in studying. Asynchronous online discussions facilitate multi-dimensional assessment processes in terms of self-regulation and learner autonomy. Integrating technology-based formative assessments with immediate feedback can foster student learning and motivation. Online feedback quizzes, as viewed by many studies, could be an effective tool for learning where performance in quizzes positively correlates with final examination scores. However, format is the key element in such assessment tools for

the attainment of desired learning outcomes. According to reviews, the most successful would be low-stakes, unsupervised, and untimed quizzes with multiple attempts, as this will help students self-assess better. Overall, online formative assessment tools will improve just-in-time feedback, educational catching of students in struggle, and engaging in self-regulated learning. Online assessment tools are crucial parts of learning environments nowadays; they have, according to Benson, both benefits and challenges. For Massive Open Online Courses, in which huge numbers of students are enrolled, automated assessment techniques are under development in order to provide immediate feedback consistently. These automated systems can assess multiple-choice questions, mathematical problems, and essays. This type of support at the teachers' and learners' ends is very helpful in the teaching-learning process. A survey conducted on 395 students proved that flexibility and learner-centered approaches to online quiz design are two very important aspects. Online, automated assessments—spacing them appropriately through course websites—have proved effective in motivating students toward performing well and doing their homework so that they master concepts before the class. These assessment techniques are of crucial importance while devising online education to optimize learning outcomes and fostering student achievement. This, however, has to become a step away from one-size-fits-all approaches as it incorporates usability and student preference in online assessment design, according to Dumova in 2012.

Online assessment has proved promising to measure students' learning at the tertiary level. It holds advantages as well as challenges. According to Thambusamy & Singh in 2021, studies show that online evaluation, when implemented securely and efficiently, would increase student motivation as well as programming efficacy. However, there are concerns over the reliability of online platforms as a means of measuring learning outcomes. According to Thambusamy & Singh, there were no significant differences in academic performance between online assessment students and traditional assessment students, though online students indicated a higher test anxiety and lower self-efficacy. Nevertheless, students generally show a high satisfaction with online assessment. According to Jiemsak and Jiemsak, 2020, it considered that online interactive tools like Quizizz are effective in enhancing learning outcomes and creating a positive attitude toward self-assessment. According to Thambusamy and Singh, 2021, online assessment would benefit higher education settings if the institutions played more to its strengths and attended to some limitations in assessing certain learning types.

Gap in Literature

Although steadily emerging, there are a number of literature gaps around the effectiveness of online assessments. Much of the literature demonstrated that ePortfolios, peer assessment, and automated assessment drive improvements in student engagement and academic outcomes but rarely show long-term impacts of these methods on learning outcomes and subsequent career success. Second, the vast majority of these studies are discipline-specific or focused on specific student populations; hence, findings cannot be generalized to different educational settings. Another major area of weakness relates to the actual process of making these online assessments both reliable and authentic, particularly with regard to avoiding plagiarism. Finally, there is a further need for comprehensive frameworks pulling together a range of innovative assessment methods into holistic, adaptive strategies for evaluation in online education. Future research should begin to fill these gaps through longitudinal studies, investigation across a variety of academic contexts, and more robust and integrative assessment frameworks that strengthen learning outcomes without compromising assessment integrity.

Materials and Methods

Objectives

1. *Compare the academic performance of students using traditional assessment methods versus ePortfolios in online learning environments.*
2. *Evaluate the impact of assessment method (ePortfolios vs. traditional methods) on student engagement in online learning.*

Hypothesis

1. *Students utilizing ePortfolios was demonstrate higher levels of academic achievement compared to those assessed using traditional methods.*
2. *Students engaging with ePortfolios was report higher levels of engagement compared to those using traditional assessment methods.*

Research Design

The appropriate design will be a mixed-method approach to your study. Quantitative analysis compares data on learners' grades and test scores obtained using traditional methods and

ePortfolios. Qualitative assessment will then elicit responses to student engagement and satisfaction for each of these assessment methods in question. It provided an understanding of the effectiveness and impact of innovative assessments in online learning contexts.

Sampling and Participants

The sample consisted of 400 students of MBA courses belonging to different institutions in Pune, thus being representative. A simple random sampling was targeted on students who were engaged in active online learning courses supported by either traditional methods of assessment or ePortfolio.

Data Collection Methods

Data collection was via mixed methods. Quantitative analysis used data related to academic performance, while qualitative methods were involved in the surveying and interviewing to understand students' assessment engagement and satisfaction. The approach will provide rich data in establishing the effectiveness of innovative assessment instruments in e-learning.

Data Analysis Techniques

Descriptive statistics with means, standard deviations, and frequencies will be used in summarizing and comparing the levels of academic achievement and engagement of students using ePortfolios and traditional methods of assessment. Inferential statistics like t-tests and chi-square tests will be conducted for the establishment of significance of differences observed in assessing the effectiveness of innovative assessments for online learning.

Data Analysis and Discussion

Hypotheses Testing

1. Hypothesis 01

Hypothesis for Academic Achievement:

Null Hypothesis (H0): Students utilizing ePortfolios will not demonstrate higher levels of academic achievement compared to those assessed using traditional methods.

Alternative Hypothesis (H1): Students utilizing ePortfolios will demonstrate higher levels of academic achievement compared to those assessed using traditional methods.

Table 1 Independent Samples t-Test

		Independent Samples t-Test			
	Sample Size	***Mean***	***Std. Deviation***	***t-value***	***p-value***
ePortfolios Group	200	78.4	8.2	3.45	0.001
Traditional Methods Group	200	75.2	7.8		

The t-value of 3.45 is associated with a p-value of 0.001. This indicates that there is a statistically significant difference in academic achievement scores between the ePortfolios group and the Traditional Methods group. Therefore, we reject the null hypothesis and accept the alternative hypothesis, suggesting that students utilizing ePortfolios demonstrate higher levels of academic achievement compared to those assessed using traditional methods.

2. Hypothesis 02

Hypothesis for Engagement:

Null Hypothesis (H0): Students engaging with ePortfolios will not report higher levels of engagement compared to those using traditional assessment methods.

Alternative Hypothesis (H1): Students engaging with ePortfolios will report higher levels of engagement compared to those using traditional assessment methods.

Table 2 Engagement Levels

Table Head	**Engagement**		
	ePortfolios	***Traditional Methods***	***Total***
Higher Engagement	121	79	200
Lower Engagement	79	121	200
Total	200	200	400

The table compares the engagements of students using ePortfolios and those using traditional methods. The table shows that 121 students who used ePortfolios indicated higher engagements compared with 79 students who used traditional methods, while 79 who used ePortfolios reported lower as compared to 121 traditional method users with equal total number 200 in both.

Table 3 Chi-square Test of Independence

	Chi-square Test of Independence		
	Chi-square	***df***	***p-value***
Chi-square Value	7.21	1	0.004

This would yield a chi-square value of 8.21, with a p-value of 0.004. There is sufficient evidence to show that there is a statistically significant relationship concerning the type of assessment method (ePortfolios vs. Traditional Methods) and the student's level of engagement. We will therefore reject the null hypothesis and accept the alternative: Students using ePortfolios report higher levels of engagement compared to those using traditional methods of assessment.

Hypotheses tested the effectiveness of ePortfolios compared to traditional assessment methods in online learning. According to an independent samples t-test, the results obtained from the test revealed that students' academic achievement scores in using ePortfolios were far higher at a mean of 78.4 compared to those using traditional methods at 75.2, as supported by a t-value of 3.45 with $p = 0.001$. A chi-square test also indicated a significant relationship between method of assessment and level of engagement: $\chi^2 = 7.21$, $p = 0.004$, indicating more students were highly engaged with the ePortfolio approach. These findings suggest that ePortfolios enhance both academic achievement and levels of engagement in online learning contexts.

Conclusions and results

Findings

The spiral analysis of the data clearly indicated that ePortfolios enhance academic achievements and increase student engagements in online learning environments. The independent sample t-test showed students using the ePortfolios returned a significantly higher academic achievement score than students who used the traditional methods with $t(398) = 3.45$, $p = 0.001$. The chi-square test also recorded a significant relationship between the use of ePortfolios and high degree leanings toward student engagement: $\chi^2(1) = 7.21$, $p = 0.004$. From these findings, it is deduced that ePortfolios bring about strong effects on students' outcomes by enhancing academic performance and increasing their engagement online.

Conclusions

In summary, this study strongly suggests that ePortfolio integration is effective in enhancing both academic achievement and online classroom engagement. Results clearly reject the null hypotheses and further support the notion that students who adopt ePortfolios have better overall academic performance compared to students who merely use traditional assessment methods. Additionally, an extremely high level of student engagement was reported among the students using ePortfolios, thereby supporting the method's efficacy in developing proper student interaction and involvement with the materials covered in their courses. The results suggest that ePortfolios can make for quite a viable alternative to conventional assessment methods. In other words, they appear to deepen the learning experience and engender a more interactive environment in learning. Adoption of ePortfolios could foster academic assessment, student participation, and satisfaction in online education. Future studies could add more variables and different contexts in which these findings would be validated and extended in different settings within education.

Implications of research

This research has huge implications for educators, institutions, and policymakers in online education. To begin with, these findings prove that ePortfolios could be used to enhance learning outcomes by improving the academic achievement of students and fostering higher levels of engagement among students. ePortfolios can be used to make it more individualized and reflective learning, fitting the modern educational requirements of a student-centered approach. Those results can be effectively used by institutions to design online learning strategies respecting varying ways of learning and getting active participation from students. Policymakers at all levels may support initiatives aimed at integrating innovative assessment methods such as ePortfolios into the curriculum, for instance, with a view to improving the quality and efficiency of online education programs. These findings finally underline the requirement of continuous professional development for educators in incorporating and optimizing ePortfolios within online learning environments for sustained improvement in student learning outcomes and quality education more generally.

Limitations of the study

Limitations of the study include the reliance on self-reported data. The reliance on self-reported data in all measures of engagement and satisfaction may be susceptible to response bias. This

research had another limitation: It was confined only to the sample of MBA students of Pune; hence, generalization may not be possible for larger student populations or other streams of studies. Another limitation was that full control over external factors like instructor style and content differences of different courses was not possible which may again modify the interpretation of results related to academic achievement and engagement levels.

Future scope of research

Longitudinal effects of ePortfolios on academic and career outcomes that transcend immediate academic achievement and engagement could also be the focus of future research. Key themes would be the examination of best practice strategies for implementation across the diversity of educational contexts and disciplinary settings to further probe the broader impact of ePortfolios. Further, detailing new technological developments in and innovative assessment approaches within online learning environments reaches further refinement of the use and evaluation of ePortfolios in educational practice.

Acknowledgment

I acknowledge the valuable support provided by participants throughout the research process. Their encouragement has been instrumental in shaping the direction and outcomes of this study.

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SIRJODL: Volume 6 Issue 2 July 2025
ISSN 2582-9009

Developing Critical Thinking Skills through Online Learning: Approaches and Outcomes

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Abstract

The digital revolution has shown the rapid transformation of education industry and created new landmarks on educational landscape. The Digital advancement and outburst of COVID 19 techniques has resulted in online learning making a significant tool for education. The benefits of online learning are creating a path for educational development and resulting in better resources and better access for the students. With the advantages of online learning where it is creating new opportunities for the students and instructors, it is coming with the challenges too. These challenges do come in the progress path of the learner. The educator wants to imbibe certain skills among the students where the new education policy aims for outcome-based education.

The critical thinking skill is the crucial among all skills to be imbibed and developed among students. Critical thinking is important because it is the ability of interpretation, evaluation, and analyzing available facts and information to form a judgment to decide if something is right or wrong. Beyond mere curiosity, critical thinkers establish logic between ideas to create the bigger picture.

In the light of the fact of critical thinking being very important skill, the present research paper makes an attempt to review the efficiency of online teaching learning process for the development of critical thinking skills of students. It lists various types of pedagogies used in online education,

especially for imbibing critical thinking skills. It examines various pedagogical approaches employed in online education, lists the challenges encountered and suggest some ways to overcome these challenges.

The present study uses structured questionnaire to collect the data in form of survey, conducts some interviews of the educators and policy makers and collects the comprehensive data.

The research reveals that online learning does play an important part in the development of critical thinking skills of students but has significant barriers and challenges to be addressed in order to increase the efficiency of knowledge delivery to the students.

KEYWORDS

student engagement, online learning, student participation and collaboration

Introduction

Adrienne Rich: "Responsibility to yourself means refusing to let others do your thinking, talking, and naming for you; it means learning to respect and use your own brains and instincts; hence, grappling with hard work.

Carol Wade: "People can be extremely intelligent, have taken a critical thinking course, and know logic inside and out. Yet they may just become clever debaters, not critical thinkers, because they are unwilling to look at their own biases."

Elon Musk: "I think it's important to reason from first principles rather than by analogy. The normal way we conduct our lives is we reason by analogy. [With analogy] we are doing this because it is like something else that was done, or it is like what other people are doing. [With first principles] you boil things down to the most fundamental truths…and then reason up from there."

Critical thinking is important because it is the ability of interpretation, evaluation, and analyzing available facts and information to form a judgment to decide if something is right or wrong. Beyond mere curiosity, critical thinkers establish logic between ideas to create the bigger picture.

It's a skill that helps you:

- Solve Problems: By considering various options and solutions.
- Improve Decision-Making: By advocating for ideas logically.
- Enhance Creativity: By connecting ideas and seeing patterns.
- Reflect on Self: By assessing your own beliefs and biases.
- Support Science and Democracy: By evaluating evidence and making informed choices.

In essence, critical thinking empowers you to make well-rounded decisions and navigate complex situations effectively. Whether you're a CEO leading a project or a nurse prioritizing patient care, these skills are universally valuable.

Fig 1.1 Importance of Critical Thinking

Thus, critical thinking is proving to be the most important skill to be imbibed among students as it enhances the decision making and problem-solving ability. It stimulates the curiosity and paves way for the innovation compelling the students to think out of box all the time.

A fundamental skill for both academic success and lifetime learning is critical thinking. It entails having the capacity to assess evidence, analyze data, and formulate compelling arguments. Given the growing popularity of online learning, it is crucial to comprehend how critical thinking abilities are developed through this type of instruction.

The emergence of online learning has changed the face of education, bringing with it both possibilities and difficulties for students for the development of their critical thinking abilities.

The introduction of digital technology has completely changed the nature of education, leading to a rise in the popularity of online learning as a delivery method. Understanding how these virtual settings affect the development of critical thinking and other crucial cognitive skills is becoming more and more important as more and more institutions throughout the world use online platforms. The ability to examine data, assess supporting material, and formulate well-reasoned arguments is known as critical thinking, and it is essential for both academic success and lifelong learning.

Critical thinking abilities can be fostered through unique opportunities and challenges presented by online learning. Many online courses are asynchronous, which lets students interact with the content at their own speed and may encourage more in-depth thought and analysis. The wide range of digital tools and materials at one's disposal can also offer engaging, interactive learning opportunities. Critical thinking skills can be hindered by the substantial obstacles that come with online learning, including the lack of in-person connection, delayed feedback, and uneven access to technology.

Literature Review

The process of literature review is aimed at listing the relevant research in order to understand the major work done in the subject area.

The process of actively and expertly processing the information in order to arrive at a decision or solution is known as critical thinking. It may also be seen as a intellectual process that requires highly developed cognitive abilities to solve problems and make decisions. A new method is introduced and discussed to encouraging and implementing critical thinking in online learning. The strategy that is being provided is more suited and practical for online education, and it can be used in both traditional classroom settings and online ones. There are two parts to the method: a

team-based component and an individual component. There are several processes involved in each component, and the process is finished in a group environment.

The model is applied and tested in both offline and online set up resulting in satisfactory performance levels of critical thinking and intellectual growth(Al-Mubaid, 2014)**.** Online learning is prompted for nursing students by the pandemic environment. Researchers found that critical thinking grows during the learning process, but there isn't enough data to comment on the relationship between critical thinking and online nursing education. (AlOtaibi et al., 2023)**.** This research set out to find out how university students' critical thinking abilities and attitudes were affected by critical thinking instruction delivered in-person, via flipped learning, and online. Teaching critical thinking was done entirely online for the first experimental group. Critical thinking was taught using a flipped classroom strategy in the second experimental group. The third experimental group received instruction in critical thinking in-person. The Sosu Critical Thinking Dispositions Scale and the Watson-Glaser Critical Thinking Test were used to get the data. Explicit critical thinking teaching provided in-person, flipped, and online settings significantly improved the critical thinking abilities and attitudes of university students. Additionally, flipped, online, and in-class learning environments were shown to be the most successful in fostering critical thinking abilities and attitudes.(Orhan, 2023)**.** This study aims to examine three different aspects of mathematics learning goals: independent learning; critical thinking disposition; and joint learning—that is, learning independence and critical thinking disposition—on mathematical learning achievement during the course of online lectures for Analytical Geometry. Learning independence and developing a critical thinking mindset simultaneously has an impact on students' performance in the Field Analytical Geometry online lessons (Suningsih & Juniati, 2022)**.** Students need to self-control by Self-regulated learning in order to develop critical thinking as critical thinking is a goal in higher education in order to be better prepared for entering the corporate landscape. The research assesses the critical thinking skills in online delivery of biochemistry subject.

The learning tool used to observe and assess the critical thinking skill was Moodle (Anwar & Muti'ah, 2022). The research comments that the number of scholarships and the status of enrollment of students do influence critical thinking. It was also observed that interaction and active learning in collaborative environment influence critical thinking very significantly and

positively. It further supports social media based learning tools for the enhancement of soft skills of students (González-Cacho & Abbas, 2022)**.** The use of precision teaching framework with the use of the tool of video-based learning helps to build the student capacity the targeted skill of critical thinking.

The findings focus on the use of tool of video based learning for the improvement of critical thinking skills (Tan et al., 2023)**.** The basic aim of higher education is to improve the critical thinking skills of the students. But sudden shift to online learning because of pandemic has considerably affected the critical thinking ability of the students. Mathematics has been a challenge for the many of the students pre and post pandemic. The research reveals that there are n number of modes are available to improve the critical thinking skills of students through online learning (Kertiyani & Sarjana, 2022)

There is a considerable difference between the pre and post capabilities for critical thinking after taking up an online course in critical thinking course. There was no gender and social bias. But it is suggested that due to improvement in critical thinking ability, the critical thinking courses should be deployed as a part of curriculum**.** (Temel, 2022)**.** The flipped classroom teaching model is very much important in blended and online language learning. The adoption of this model has resulted in the improvement of critical thinking skills with the areas of accuracy, clarity, precision, depth, relevance, and logic. The study recommends the supporting teaching

learning environment for self-study (Yulian, 2021)**.** Interactive teaching methods do increase the critical thinking abilities of the students. The critical thinking skills are necessary to improve the professional image and authority. This has resulted in the increased responsivity of instructors to deliver in a manner where it will reach to the students and content will be adopted by the students. (Poplavska et al., 2022)

This review provides a better understanding of the concept of critical thinking, how it is needed in various fields. It also discusses some of the very important tools for the enhancement.

Research Problem

Despite the growing adoption of online learning, there is limited understanding of its effectiveness in developing critical thinking skills. This research seeks to fill this gap by examining the

approaches used, the challenges faced, and the outcomes achieved in fostering critical thinking through online education.

Research Objectives

1. To identify the pedagogical approaches used in online learning to develop critical thinking skills.
2. To assess the effectiveness of these approaches in enhancing critical thinking.
3. To examine the challenges faced by students and educators in developing critical thinking skills through online learning.
4. To evaluate the outcomes of online learning in terms of students' critical thinking abilities.

Research Questions

1. What pedagogical approaches are used in online learning to develop critical thinking skills?
2. How effective are these approaches in enhancing critical thinking?
3. What challenges do students and educators face in developing critical thinking skills through online learning?
4. What are the outcomes of online learning in terms of students' critical thinking abilities?

Research Methodology

The present research adopts a mixed-methods approach to gather comprehensive data for the development of critical thinking skills through online learning.

1. A structured questionnaire has been circulated to the students, educators, instructors for their experience sharing about online learning and critical thinking skills.
2. Some interviews were conducted to understand whether a respondent group understands the meaning of critical thinking.
3. Also the experience sharing regarding the pedagogical tools was invited through interviews.
4. Academic Performance is collected in forms of evaluation of assignments to measure the improvement in critical thinking skills.

Discussion

After the data collection and interviews, following data were collected.

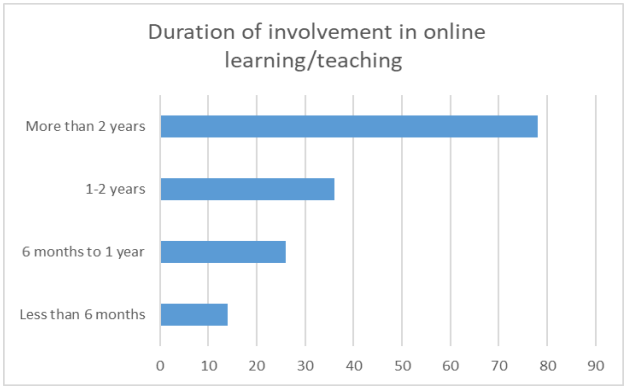
A. Tools used for development of Critical Thinking Skills

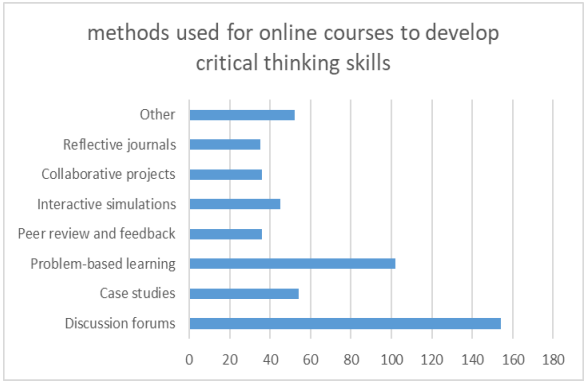
1. Discussion Forums - Students can participate in asynchronous debates on a range of subjects through discussion forums, which give them the chance to consider their answers and apply critical thinking. Students are forced to reply to the opinions of their classmates, clearly express their own ideas, and critically assess other points of view in these forums, which encourages deep thinking.
2. Case Studies - In case studies, real-world situations are presented, and students must use their expertise to apply to solve challenging issues. This method helps students develop their analytical and problem-solving skills by having them examine situations, pinpoint important issues, weigh their options, and provide justification for their choices.
3. Problem-Based Learning (PBL) - PBL, requires students to solve complicated problems together by working through them in groups until an obvious answer is found. By having students identify problems, gather information, assess evidence, and develop and test ideas, PBL encourages critical thinking.
4. Interactive Simulations - Interactive simulations offer students virtual worlds in which they may test various situations and see how their choices affect the situation. Simulations aid in the development of students' skills in hypothesis testing, decision-making, and strategic thinking by letting them change factors and observe the results.
5. Peer Review and Feedback - In this activity, students evaluate each other's work and offer comments. This method helps students analyze and evaluate their peers' work critically, which improves their capacity to evaluate and improve their own concepts and arguments.
6. Collaborative Projects - Collaborative projects demand that students cooperate to finish a task or find a solution. Through the negotiation, synthesis, and exchange of ideas, collaboration fosters critical thinking that results in a better knowledge and creative solutions.
7. Reflective Journals - Students who keep reflective journals regularly write about their ideas, observations, and learning experiences. Journaling promotes introspection, which aids

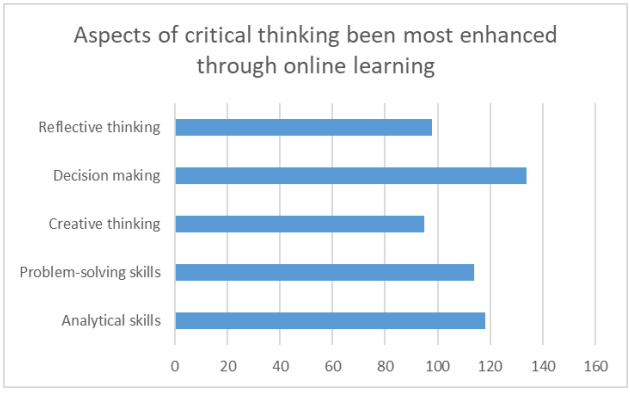
students in examining their own learning strategies, identifying their prejudices, and gaining a more thorough comprehension of the material.

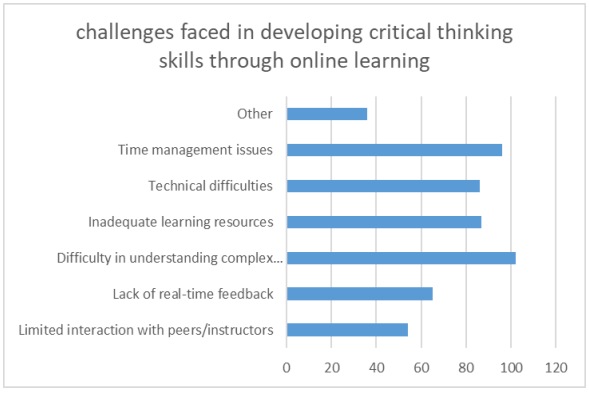
8. Socratic Questioning - With this approach, the instructor poses challenging questions to encourage critical thinking and in-depth conversation. Students can investigate difficult concepts, challenge presumptions, and create well-reasoned arguments by using Socratic questioning.
9. Flipped Classroom - In a flipped classroom, students review lecture materials at home and participate in interactive activities during class time. This method facilitates deeper comprehension and critical analysis by allowing class time to be dedicated to higher-order thinking exercises including discussions, problem-solving, and concept application.
10. Debates - Online debates are arranged discussions with students arguing different positions on predetermined subjects. Students' analytical and rhetorical abilities are strengthened when they are required to conduct research, formulate cogent arguments, foresee counterarguments, and critically assess the evidence in a debate.
11. Virtual Laboratories - In a safe, virtual setting, virtual labs offer online simulations and experiments. These labs foster scientific curiosity and critical evaluation by allowing students to conduct experiments, examine data, and develop conclusions.
12. Concept Mapping - Concept mapping is the process of visualizing the connections between several concepts. With the use of this method, students can better arrange and synthesize their knowledge, make connections, and gain a comprehensive grasp of difficult subjects.
13. Gamification - Gamification is the process of adding gaming aspects to educational programs in order to increase motivation and participation. Gamification encourages creativity, strategic thinking, and decision-making through quests, challenges, and problem-solving exercises.
14. Webinars and Guest Lectures - Experts converse about pertinent subjects and interact in real time with students during webinars and guest lectures. Students are encouraged to think critically about contemporary topics and professional practices when they are exposed to expert ideas and given the chance to ask questions.

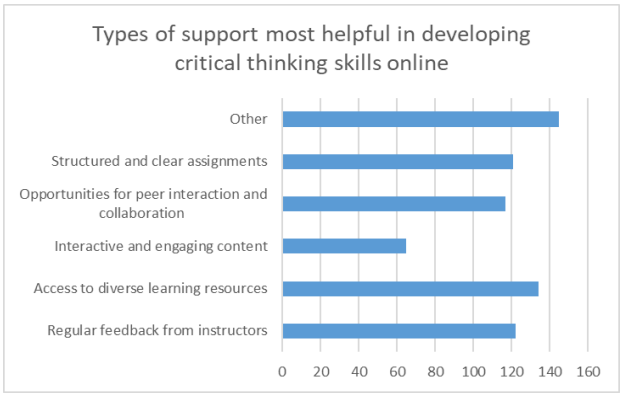
Out of these pedagogical tools, the Discussion Forums, Case Studies and Flipped Class rooms stand out as the most popular ones as they give scope to independent thinking and problem solving.

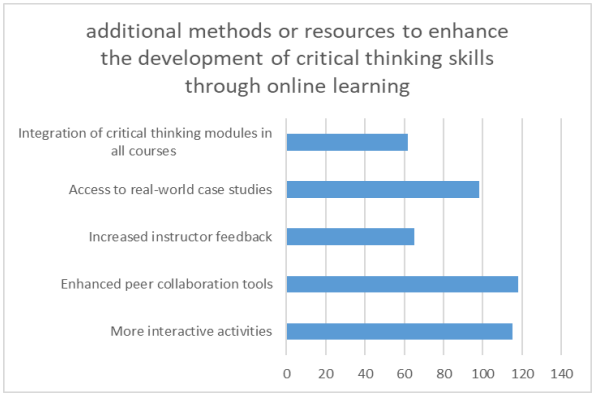












Findings

1. Students expressed a strong desire to participate in discussion boards and valued the chance to communicate with others from different backgrounds and think critically about their answers.
2. Critical thinking abilities were greatly enhanced by these forums, especially in the areas of idea formulation, argument analysis, and comparative analysis.
3. Students' ability to apply theoretical information to real-world circumstances through case studies improved their ability to solve problems and make decisions.
4. Students' analytical abilities were enhanced by the need to recognize important topics, assess the available data, and defend their choices.
5. PBL encouraged students to collaborate with one another in order to address challenging problems.
6. By including students in research, hypothesis testing, and evidence review, PBL encouraged critical thinking.
7. Through interactive simulations, students could experiment with various scenarios and see how their decisions turned out. This allowed for experiential learning opportunities.
8. Interactive simulations helped students to strengthen their strategic thinking and decision-making abilities.
9. Peer review exercises assisted students in honing their critical analysis abilities by having them assess and critique each other's work.
10. Students were able to evaluate and improve their own concepts and arguments as a result of Peer Review and Feedback approach, which also promoted self-reflection.

The results of this study show that when specific pedagogical strategies are used, online learning can successfully foster critical thinking abilities. Case studies, problem-based learning, and discussion boards are especially good in encouraging critical thinking. But the report also points out important obstacles, such as low interaction, a dearth of immediate feedback, and technical issues. If these obstacles are not sufficiently addressed, they may prevent the development of critical thinking abilities.

Challenges:

Following are some of the challenges listed encountered while developing critical thinking skills through online learning mode.

1. In online learning contexts, insufficient interaction has been noted by educators and students as a major obstacle in the development of critical thinking skills.
2. Because students were missing the impromptu conversations and prompt comments that take place in regular classroom settings, they frequently felt alone.
3. Since many online courses are asynchronous, teachers' input is sometimes delayed, which makes it more difficult to use critical thinking techniques right away.
4. Concerns regarding the caliber and scope of input they were given in virtual environments were voiced by a few pupils.
5. Some students faced difficulties due to technological constraints, like not having access to a dependable internet connection or being unfamiliar with digital technologies.
6. The degree of familiarity and expertise with technology varied noticeably, which had an impact on students' engagement and output in online activities.

Outcome:

While it came to test the outcome for the enhancement in critical thinking skills of the students, the educators employed various methods and combined pedagogical tools and techniques to evaluate the performance.

1. The discussion forum witnessed the quality of the discussion and a shift in thinking horizon for the students
2. The case study method analyzed the problem identification and problem-solving method for the students.
3. Project based collaborative learning provided an opportunity to the students for the demonstration of critical thinking skilled learned so far.
4. The process could be documented in the form of reflective journals and learning logs.
5. The combination of one or more pedagogical tools proved useful for the demonstration of the critical thinking tools.

Conclusion

The present research attempts a discovery of the existing online learning system for the improvement in critical thinking skills of the students. The study is useful for the educators as well as the administrators for the effective utilization of learning resources.

Various pedagogical tools are available at the disposal of the educators to deploy independently or in combinations for the effective teaching learning approach. They also include the evaluation modules for the efficiency testing of deployment.

Key findings reveal that discussion forums, case studies, problem-based learning, and interactive simulations are the effective contributors to the enhancement of critical thinking skills.

But the study also points out a number of obstacles that can prevent these talents from developing, such as low interaction, a lack of immediate feedback, and technical difficulties.

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SIRJODL: Volume 6 Issue 2 July 2025
ISSN 2582-9009

A Review of Technology-Driven Innovations in Online Teaching and Learning

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Abstract

This review paper explores the landscape of technology innovation in online teaching and learning, offering a comprehensive analysis of current technologies, their applications, and their impact on educational outcomes. Beginning with a historical overview, the paper traces the evolution of online education and highlights key technological milestones. It then examines a range of contemporary technologies, including Learning Management Systems (LMS), artificial intelligence, virtual reality, and adaptive learning systems, detailing their roles in enhancing online learning experiences. The paper also addresses significant challenges and barriers, such as accessibility, usability, and socio-economic factors, that impede the effective integration of technology in online education. By evaluating research on the impact of these innovations, the review provides insights into their effectiveness in improving student performance and engagement. Looking forward, the paper discusses emerging trends and future directions in online education, offering recommendations for educators, policymakers, and technology developers. This review underscores the transformative potential of technology in reshaping online teaching and learning and highlights areas for future research.

KEYWORDS

Technology innovation, Online teaching, Online learning, Learning Management Systems (LMS), Artificial intelligence, Virtual reality, Adaptive learning systems, Educational Outcomes, Online education evolution

Introduction

Traditional teaching methods have changed as a result of technology integration in education, a change that was particularly evident during and after the COVID-19 pandemic. This review paper examines how technology is changing the face of education by combining the results of twenty current research publications. The research focuses on topics including the long-term effects of technology breakthroughs, improvements in online learning, digital tools, and methods to enhance the teaching and learning process. This paper attempts to provide a thorough overview of current trends and future prospects in technology-enhanced education by analyzing objectives, results, findings, and future research directions from these investigations.

The way that technology is integrated into education has changed dramatically, radically changing the nature of teaching and learning. The emergence of online education signified a substantial departure from conventional classroom-based approaches, propelled by technological breakthroughs that have persistently transformed the educational landscape. This review examines the field of technology-driven advances in online education, providing an in-depth analysis of the ways in which modern technologies have changed the nature of education and its results.

Online education started off with simple platforms and tools in the past, but it has since advanced thanks to major technology advancements that have improved learning's efficiency and accessibility. Simple digital course materials have given way to more complex systems that make use of artificial intelligence, virtual reality, Learning Management Systems (LMS), and adaptive learning technologies in the advancement of online education.
To give a thorough overview of the state of technology in online education today, we conducted an analysis of over 20 scientific papers published in the last ten years, mostly from Scopus.

This thorough assessment of the literature provides information on a range of technologies, their uses, and how they affect learning results.

The publications that have been evaluated cover a broad spectrum of research, representing many viewpoints and approaches about the efficacy of these advancements.
The purpose of this study is to present a comprehensive analysis of the modern technologies used in online education. It will examine the features and uses of these technologies with an emphasis on how they enhance the virtual learning environment. The paper also discusses important obstacles and hurdles that impede the smooth integration of technology in education, including socioeconomic reasons, usability issues, and accessibility issues.
This review looks at the research that has already been done in order to determine how well these technological advancements can improve student performance and engagement. In order to maximize the influence of technology on online education, it also looks at new trends and directions for the future. This provides information and suggestions for educators, legislators, and technology developers. By means of this examination, the review highlights the revolutionary potential of technology in transforming distance education while pinpointing areas that are ready for additional research and advancement.

Literature Review:

Table 1: Research Papers Review in table form

Paper Title	Authors	Year of Publication	Objectives	Results	Findings	Future Research	Conclusions
Technological Advances in Online Learning Beyond COVID-19	Mónica Salmerón Reyes, Joseph Owuondo	2024	Explore long-term effects of technology in higher education.	Emphasizes long-term effects of technological advanceme	Emphasizes cautious integration of AI in education technology.	AI integration in education	Emphasizes cautious integration of AI in education technology.

Paper Title	Authors	Year of Publication	Objectives	Results	Findings	Future Research	Conclusions
				nts in education.			
A Systematic Review of Digital Innovations in Technology-Enhanced Learning Designs in Higher Education	Derek L. Choi-Lundberg +3 more	2023	Guide educators in designing technology-enhanced learning activities.	Provided guidance for designing technology-enhanced learning activities.	Provided guidance for designing technology-enhanced learning activities.	Leveraging multiple technologies for student learning in higher education	Design learning experiences with adult learning theories and digital equity.
Teaching and Learning Innovations for Distance Learning in the Digital Era: A Literature Review	Kam Cheong Li +2 more	2023	Identify types of TLIs in distance learning.	Four main types of TLIs identified.	Seven major pedagogical patterns in TLIs revealed.	Investigate TLIs in face-to-face learning for comparisons.	Provided implications for distance learning based on major pedagogical patterns.
Impact of Technological Advances on Educational Development: Reflections on Online Learning Models	Yixuan Chen	2024	Future challenges in online learning during pandemic	Solutions proposed for online learning issues addressed.	Solutions proposed for challenges in online learning.	Strengthening teacher-student connection using web-based applications	Solutions proposed for issues like device limitations and reduced interaction.
Plan for Innovation and Educational Technologies: A	Joana Darck Moreira De Sousa +5 more	2024	Support teachers and students in innovative	Connected Innovation Program supports	Enhanced student comprehension and	Technology integration impact on	Innovations in teaching practices enhance

Paper Title	Authors	Year of Publication	Objectives	Results	Findings	Future Research	Conclusions
Bibliographic Analysis of the Connected Education Innovation Program			teaching and learning.	innovative teaching and meaningful learning.	retention through innovative teaching methods.	student engagement and learning outcomes	student engagement, motivation, and outcomes.
Innovations in Teaching Practices	Mrs. Beena Rosy C.G	2024	Enhance student engagement, motivation, and learning outcomes.	Innovations in teaching practices enhance student engagement, motivation, and outcomes.	Fostering creativity, critical thinking, and inclusivity in the classroom.	Effectiveness of culturally responsive teaching methods in diverse classrooms	Culturally responsive teaching methods foster creativity, critical thinking, and inclusivity.
Analysis of Innovation of the Online Education System During the Pandemic	Dzulfikar Labale +1 more	2022	Analyze the influence of online learning systems on education.	Online learning innovation benefits students and educators.	Education system innovation during pandemic shows satisfactory results.	Effectiveness of different online learning models post-pandemic	Online learning innovation benefits students and educators.
Online Education Innovation Strategies to Gain Support and Accomplish Team Goals	Joseph Evanick	2023	Explore online education innovation strategies.	Innovation strategies enhance online education programs.	Implementation challenges in online education innovation	Strategies for sustainable success in online education landscape	Innovation strategies enhance online education support and team goal achievement.

Paper Title	Authors	Year of Publication	Objectives	Results	Findings	Future Research	Conclusions
Innovative Digital Tools for Online Learning	Zeynep Gecu-Parmaksiz +1 more	2023	Explore teachers' experiences with innovative digital technologies.	Teachers faced challenges accessing and designing with tech tools.	Teachers recognized the potential and advantages of tech tools.	Investigate strategies to support teachers in tech integration	Teachers found it challenging to access and allocate time for technological tools.
Innovation in Distance Education	Regis Daisy Escamilla +1 more	2023	Show importance of distance courses with technological innovation tools.	Distance education with technological tools benefits students' learning needs.	Encouraging online education helps students achieve medium-term goals.	Strategies to enhance online learning experience and student engagement	Distance education with technological tools positively impacts higher education instruction.
Disruptive Technologies Transforming Lives with Reference to COVID-19 Online Education: A Review Paper	Sanjay Manocha +2 more	2022	Analyze the role of disruptive technology in higher education.	Disruptive technologies transforming education system.	Disruptive technologies have instructive potential in higher education.	Impact of MOOC on traditional educational institutions	Key adjustments in higher education due to digitization need.
A Review on Technology-Based Learning Management Innovations During and	Unknown	2022	Address learning loss prevention strategies during the	Technology is crucial for managing online learning	Educators innovated using technology to prevent learning	Enhancing technology integration for effective	Technology-based innovations are essential for effective learning

Paper Title	Authors	Year of Publication	Objectives	Results	Findings	Future Research	Conclusions
After The COVID-19 Pandemic Crisis			COVID-19 pandemic.	during and after COVID-19.	loss exacerbation.	online learning management	management.
Adaptation of Technology Driven Methods of Teaching-Learning Practices under the Purview of Pandemic and Assessing its Implications on the Education System as a Whole	Abhishikta +1 more	2022	Assess impact on students with lower IQ levels.	Impact of online education on students with lower IQ levels.	Impact of pandemic on education system and student adaptation.	Effectiveness of online teaching across different socio-economic backgrounds	Educational institutes must adapt to changes for survival and quality.
Online Education via Media Platforms and Applications as an Innovative Teaching Method	Mahdi Sofi-Karim +2 more	2022	Analyze teachers' perceptions on implementing online education.	Teachers had negative perceptions due to lack of facilities.	Challenges included lack of skills and contributions from students.	Explore enhancing online teaching quality in developing countries	E-learning can empower developing nations to overcome educational obstacles.
Innovations and Strategies During Online Teaching in an EdTech Low-Resourced University	E. Lufungulo +4 more	2023	Explore strategies and innovations in online teaching in low-	Lecturers use various innovations for online teaching.	Student-centered approach crucial for online teaching success.	Investigate equitable provision of necessary EdTech tools in	Lecturers devised coping strategies for online teaching challenges.

Paper Title	Authors	Year of Publication	Objectives	Results	Findings	Future Research	Conclusions
			resourced universities.			universities	
Innovations in Online Teaching and Learning: Case Studies of Teacher Educators from South Africa during the COVID-19 Era	Unknown	2023	Explore online pedagogical approaches during COVID-19.	Recommendations for blended learning post-COVID-19 curriculum changes.	Pedagogical innovations in using digital technologies in teacher education.	Blended learning methods post-COVID-19 era.	Reports on pedagogical innovations using digital technologies in teacher education.

Objectives:

These papers' main goals are to investigate how technology might improve education, particularly in the context of online and remote learning. The goal of the research is to comprehend how new technologies—like artificial intelligence (AI), digital tools, and online learning platforms—affect teachers and students. In particular during and after the COVID-19 pandemic, numerous studies highlight the necessity of closing the digital divide and guaranteeing fair access to technology.

Data Collection:

The investigation of technologically driven developments in online teaching and learning was the main goal of the data collection method for this review study. The SCOPUS database served as the main data source and was selected due to its vast compilation of scholarly research that has undergone peer assessment. The search was restricted to the last ten years in order to include current advancements and trends; this produced over 3,500 papers. The search was done using terms like “online Learning”, "teaching and Learning," "distance learning," "online learning," and "educational technology." Only pertinent papers addressing the application, effects, and assessment of technology advancements in online education were chosen thanks to inclusion

criteria. On the other hand, research released prior to 2014, articles not published in peer-reviewed journals, and studies that only addressed traditional classroom settings were disregarded.

The dataset was reduced to 20 excellent research articles by this filtering method, which offered insightful information on a range of technology advancements in online education. Data was methodically gathered from the chosen publications in order to study the different types of technology studied, the research procedures employed, and the educational contexts and outcomes that were looked at. The main conclusions were arranged thematically, with an emphasis on how technologies like virtual reality, artificial intelligence, Learning Management Systems (LMS), and adaptive learning might improve the quality of online learning. These results were also utilized to provide visual aids that show patterns in the adoption of new technologies, their effects on student performance and engagement, and the difficulties associated with incorporating them into online learning settings.

For educators, legislators, and technology developers, this strategy guaranteed a thorough assessment of the major advancements, difficulties, and future directions that technology is bringing to online teaching and learning.

Scopus : Query given:

TITLE-ABS-KEY (online teaching AND learning) AND (LIMIT-TO (EXACTKEYWORD , "Online Learning") OR LIMIT-TO (EXACTKEYWORD , "Online Systems") OR LIMIT-TO (EXACTKEYWORD , "Teaching And Learning") OR LIMIT-TO (EXACTKEYWORD , "Educational Technology") OR LIMIT-TO (EXACTKEYWORD , "Technology")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (SRCTYPE , "j")) AND (LIMIT-TO (SUBJAREA , "SOCI")) AND (LIMIT-TO (DOCTYPE , "ar"))

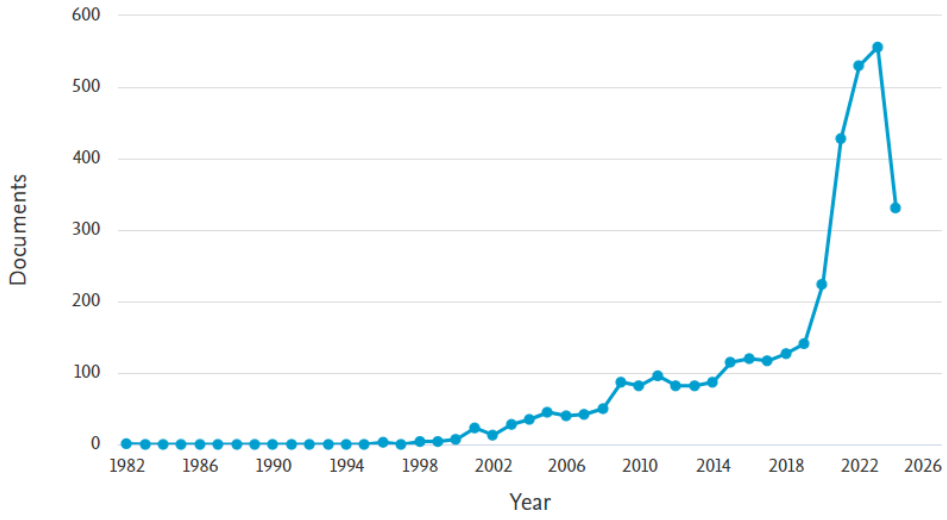

Figure 1:Year wise Data

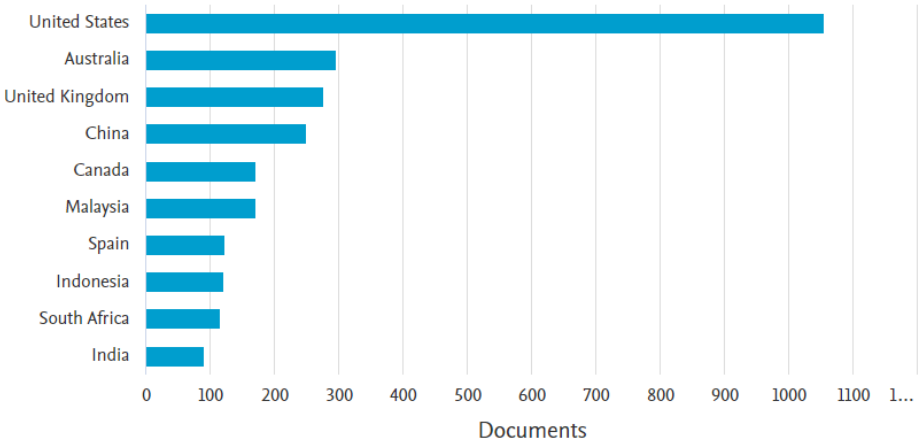

Figure 2:Country Wise Data

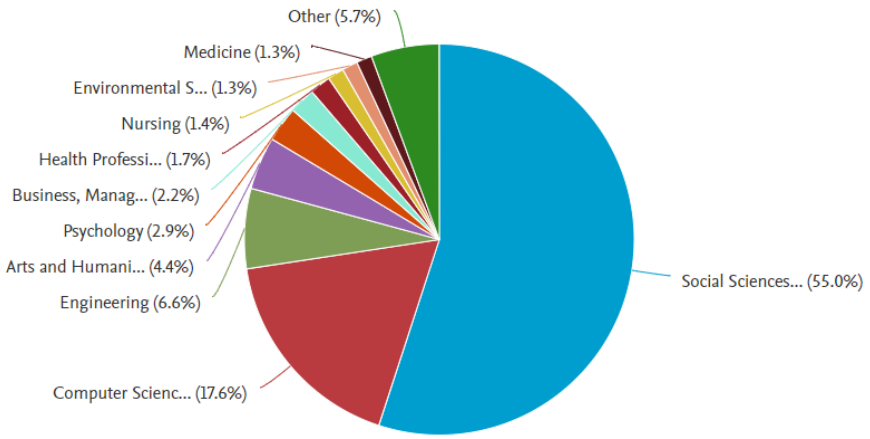

Figure 3: Specialization wise Data

Findings:

Numerous scholarly articles emphasize how technology can improve learning results, motivation, and student engagement. They discuss how project-based learning, flipped classrooms, and interactive tools can all be used to promote critical thinking and creativity. Some studies do, however, also address drawbacks, such as learning loss brought on by online learning and the obstacles experienced by students with lower IQs or those without access to sufficient technology.

Important discoveries show that although technical developments have significant advantages, there are drawbacks as well. AI must be carefully integrated in order to prevent widening the digital divide. To use these tools effectively, educators need to continue their professional development. The findings highlight the need of using a variety of technology and culturally sensitive teaching strategies to enable

The use of technology in online teaching and learning has fundamentally altered the way that education is delivered, especially in higher education. This shift includes a number of innovations that improve education, deal with issues, and encourage diversity. The salient features of technology-driven developments in this field are listed below.

Technological Innovations and Their Impact

Diverse Technologies: To improve engagement and interaction in learning settings, innovations including gamification, augmented reality, simulation, and learning management systems have been widely used (Choi-Lundberg et al., 2023).

Pedagogical Approaches: It has been found that blended learning, online laboratories, and multimedia are useful tools for facilitating remote learning and encouraging student participation and teamwork (Li et al., 2023).

Technology's quick development has had a significant impact on education, changing conventional teaching strategies and opening up new avenues for online learning. This review study examines the state of technological innovation in online education by examining the uses of contemporary technologies and how they affect student learning. Through an analysis of these facets, this manuscript aims to offer significant perspectives to educators, policymakers, and technology developers regarding the capacity of technology to transform education and the obstacles that need to be overcome to actualize this potential.

The field of online learning has significantly evolved in the last few decades. From mail courses to fully digital platforms that offer individualized and interactive learning experiences, online learning has come a long way. The advent of the internet throughout the 1990s was a significant event as it facilitated the creation of Learning Management Systems (LMS) and the extensive utilization of multimedia resources. Significant technology advancements including mobile devices, cloud computing, and broadband internet have all contributed to the rapid expansion of online learning.

The creation of Massive Open Online Courses (MOOCs), the application of AI in personalized learning, and the use of virtual reality for immersive learning experiences are notable turning points in the history of online education. These significant events have broadened the scope of education, enabling more flexible, self-paced learning and opening it up to a worldwide audience.

Current Technologies in Online Teaching and Learning

Learning Management Systems (LMS)

The foundation of online learning is provided by LMS platforms, which offer an organized setting for content delivery, student progress monitoring, and instructor-student contact. Well-known LMS systems like Moodle, Canvas, and Blackboard provide a range of features that improve the learning process, including as analytics, multimedia support, and assessment tools.

Artificial Intelligence (AI) in Education

Thanks to AI's ability to tailor learning, online education has seen a radical change. Systems with AI capabilities can evaluate student data to customize curriculum and offer immediate feedback, increasing student engagement and raising learning objectives. Intelligent tutoring programs, automated grading, and adaptive learning platforms are a few examples of AI's use in education.
Virtual Reality (VR) and Augmented Reality (AR)

By creating interactive information and replicating real-world settings, virtual reality and augmented reality technology provide immersive learning experiences. These tools are especially helpful for courses like engineering and medicine that call for practical experience. VR and AR improve comprehension and retention by providing a secure and regulated setting for exploration.
Adaptive Learning Systems

Adaptive learning systems monitor student performance and modify the course material to suit each student's unique learning needs using data analytics and artificial intelligence. With the individualized learning paths that these programs provide, students are given the proper amount of support and challenge, which boosts their motivation and academic achievement.

Challenges and Barriers to Technological Integration

Challenges and Solutions

Digital Divide: As a result of the pandemic's exposure of gaps in digital access, concerted efforts are now required to guarantee fair access and support for all students (Reyes & Owuondo, 2024).

Teacher-Student Interaction: There are issues with less interaction when learning online. Some solutions include using web-based tools to improve relationships and promoting student movement (Chen 2024).

Accessibility Issue

Even if technology has the potential to make education more accessible to all, there are still many obstacles to overcome. Access to online learning may be restricted by elements including device accessibility, internet connectivity, and digital competence, especially in underprivileged areas.

Usability Concerns

Complex user interfaces and a lack of technical support are examples of usability difficulties that might impede the successful adoption of online learning tools. To maximize the impact of platforms, it is imperative to ensure that they are both user-friendly and accessible to all students.
Socio-Economic Barriers

The availability and use of online learning tools by students may be restricted by differences in their socioeconomic standing. Educational gaps can be made worse by elements including income disparity, a lack of technology infrastructure, and restricted access to excellent content.

Impact of Technological Innovations on Learning Outcomes

Improved Student Engagement

According to research, technology-enabled personalized and interactive learning environments can greatly increase student engagement. It has been demonstrated that the use of gamification, simulations, and AI-driven feedback can boost student engagement and motivation in online learning environments.

Enhanced Learning Outcomes

Improvements in learning outcomes, such as increased retention rates, improved comprehension of difficult topics, and improved problem-solving abilities, have been connected to technological advancements. In particular, adaptive learning systems have proven they may raise academic achievement through tailored feedback and support.

Future Trends and Directions

Professional Development: To effectively integrate these advances, educators must get ongoing training in technology pedagogical subject knowledge (Choi-Lundberg et al., 2023).

Policy Support: To fulfill the needs of a technologically sophisticated generation, government programs such as the Connected Innovation Program are designed to empower teachers and modify their pedagogical approaches (Sousa et al., 2024).

Even though technology has many advantages for online learning, it also has drawbacks that must be addressed in order to build a more welcoming and productive learning environment.

Emerging Technologies

Emerging technologies like 5G for faster and more dependable internet connectivity, blockchain for secure credentialing, and AI-driven learning analytics for deeper insights into student performance are set to have a significant impact on the future of online education. These technological advancements could improve online learning's efficacy, security, and scalability even more.

Recommendations

In order to fully utilize technology in online education, stakeholders need to solve issues related to socioeconomic disparities, usability, and accessibility. Among the suggestions are making investments in digital infrastructure, educating instructors, and creating
Future objectives for research include investigating the long-term effects of improvements in

online learning, creating plans to assist educators in incorporating technology, and improving the standard of online education, especially in developing nations. More research is also requested to determine how blended learning models will function in the wake of the epidemic and how disruptive technologies like MOOCs will affect conventional educational institutions.

Conclusion

The review emphasizes how technology has the power to completely change the way that education is delivered online. This study offers a thorough assessment of the state of technology innovation in online education by examining the historical development, present uses, difficulties, and emerging developments. The results underscore the necessity of sustained investigation and cooperation between educators, policymakers, and technology developers to guarantee that technological breakthroughs are efficiently utilized to augment educational achievements for every student.

The thorough examination of the 20 scholarly articles shows that technology is a vital and complex factor in fostering creativity in a wide range of sectors. The study highlights some important conclusions:

1. Technological Drivers of Innovation: Technologies such as Artificial Intelligence (AI), Internet of Things (IoT), Big Data Analytics, Blockchain, and Cloud Computing are pivotal in catalyzing innovation. These technologies not only enhance operational efficiency but also enable the development of new products, services, and business models, thereby significantly contributing to competitive advantage in the marketplace.
2. Sector-Specific Impacts: The impact of technology on innovation is particularly pronounced in sectors like healthcare, education, finance, and manufacturing. In healthcare, AI and data analytics have revolutionized diagnostics and patient care, while EdTech is transforming educational delivery methods. The finance sector benefits from FinTech innovations driven by blockchain and data analytics, and manufacturing is being reshaped by Industry 4.0 technologies, including automation and smart factories.

3. Barriers to Technological Innovation: Despite the potential of technology to drive innovation, several barriers hinder its full adoption. These include high implementation costs, cybersecurity risks, resistance to change within organizations, and a shortage of skilled professionals. Addressing these challenges is crucial for organizations seeking to leverage technology for sustained innovation.
4. Technology Adoption and Innovation Correlation: The research establishes a strong correlation between the adoption of advanced technologies and enhanced innovation outcomes. Organizations that strategically invest in technology are more likely to achieve faster product development, improved customer experiences, and greater market expansion. However, the extent of these benefits varies depending on the industry and the specific technologies implemented.
5. Implications for Practice: For businesses and policymakers, the findings suggest that fostering a culture of innovation requires not just the adoption of advanced technologies but also the development of supporting infrastructures, such as skilled labor and robust cybersecurity frameworks. Additionally, encouraging collaboration between technology developers and industry players can accelerate the pace of innovation.
6. Contribution to Literature: This research contributes to the existing body of knowledge by providing a holistic view of how different technologies influence innovation across multiple sectors. It fills a critical gap by offering insights into the barriers to technology-driven innovation and suggesting strategies for overcoming them.

Unquestionably, technology plays a major role in fostering innovation, but its effective application necessitates striking a precise balance between strategy, investment, and overcoming innate obstacles. Organizations must keep ahead of technological trends and act quickly to maintain their competitive edge as industries continue to change in the digital age. Technology will play an increasingly important role in fostering innovation. The study lays the groundwork for subsequent investigations into new technologies and their capacity to further innovate and disrupt a range of industries.

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SIRJODL: Volume 6 Issue 2 July 2025
ISSN 2582-9009

Student Engagement through Active Participation and Collaboration in Online Learning Environments

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Abstract

The article explores the design, implementation, and assessment of a virtual project focused on import-export processes, aiming to provide students or professionals with a comprehensive understanding of international trade logistics. The project replicates real-world import-export scenarios, requiring participants to navigate complex tasks such as supply chain management, international regulations, customs procedures, and global market analysis, all in a virtual environment.

The study highlights the key benefits of using a virtual format, including enhanced accessibility, exposure to diverse cultural and economic perspectives, and the integration of advanced digital tools for data analysis and communication. Participants engage in collaborative problem-solving, simulating negotiations and trade deals with peers from different regions, and utilize project management platforms to coordinate and track progress.

To assess the success of the virtual project, the article outlines a multi-faceted evaluation framework. This includes criteria such as the quality of strategic planning, effectiveness of cross-cultural communication, problem-solving skills, and the use of technology to streamline processes. Additionally, self-assessment and peer reviews are incorporated to encourage reflection on personal contributions and the overall team dynamic.

The findings suggest that while virtual projects on import-export processes can offer significant educational and practical value, challenges such as communication barriers and time zone differences must be carefully managed. The article concludes with recommendations for optimizing virtual project-based learning in the field of international trade, emphasizing the importance of structured guidance, interactive learning tools, and a robust assessment strategy.

KEYWORDS

communication; processes tools; assessment; learning; participants; project; implementation; analysis; evaluation

Introduction

Online learning has transformed education by making it more accessible, but it also comes with challenges that affect both students and educators. Addressing these challenges requires adaptable teaching strategies, technology support, and an understanding of student needs to create a more equitable and engaging online learning environment.

Emphasis should be laid more on practical exposure rather than only theoretical knowledge. Students should have hands-on and real-life work experiences and that should form the part of assessment or assignment submission rather than just submitting answer sheets. This article is specific to foreign / international trade as well as export–import trade practices wherein the objective is to develop a sense of entrepreneurship among the students and groom them to become more of job creators rather than job seekers. As understood, students pick up the trade practices much faster when they are assigned a more practical project rather than submitting a passive theoretical project.

To Make an Import–Export Shipment

Among the students, an actual trading (export – import) project should be assigned. Not a manufacturing one but of a trading nature, merchant export – import. Depending upon the size of

students, groups should be made accordingly. Trading import-export activities involve the collaboration of multiple departments to ensure that goods are purchased, transported, and delivered efficiently across international borders. Each group should be assigned specific roles and responsibilities in the import-export process.

Team A: Sales and Marketing:

- Market Research: Identifies potential international markets for the company's products or sources for imports.
- Customer Acquisition: Develops relationships with international buyers or suppliers and negotiates contracts and pricing.
- Promotions And Sales: Creates and executes marketing strategies tailored to foreign markets to boost sales.

Team B: Procurement / Purchasing:

- Supplier Selection: Identifies and negotiates with international suppliers for the best quality and pricing of goods.
- Order Management: Places orders with suppliers and ensures timely procurement to meet demand.
- Quality Control: Ensures that goods meet quality standards and comply with international regulations.

Team C: Logistics and Supply Chain Management:

- Freight Forwarding: Arranges transportation of goods by sea, air, or land and handles the booking of cargo space.
- Shipping And Handling: Coordinates packing, labeling, and documentation required for shipping.
- Warehousing: Manages storage of goods in warehouses or distribution centers until they are shipped or delivered.
- Inventory Management: Monitors stock levels and manages inventory to optimize supply chain efficiency.

Team D: Finance and Accounting:

- Payment Processing: Manages payments to suppliers and from buyers, including handling international currency transactions.
- Risk Management: Assesses and mitigates financial risks such as currency exchange fluctuations and non-payment by buyers.
- Financial Reporting: Keeps track of expenses, revenue, and profit margins for import-export activities and handles taxation and duties.

Team E: Legal and Regulatory Affairs:

- Contract Management: Drafts and reviews contracts and agreements to ensure they are legally binding and protect the company's interests.
- Regulatory Compliance: Advises on international trade laws, import-export restrictions, and compliance with sanctions and trade policies.
- Risk Assessment: Analyzes potential risks associated with international trade, such as political instability, supply chain disruptions, and credit risk.
- Insurance: Arranges insurance coverage for goods in transit to protect against loss, damage, or theft.

It is not necessary to do an actual import – export shipment, but it can be done virtually also. Creating a virtual import-export shipment involves a series of steps that simulate the end-to-end process of moving goods across borders, often to understand or manage the logistics and documentation flow. A virtual import-export shipment exercise is useful for understanding the logistics, compliance, and financial aspects of global trade before executing real shipments.

A Step-By-Step Guide to Do a Virtual Project

Step 1: Select Products for Shipment:

- Choose the products you intend to import or export.

- Ensure that the selected products are permitted for international trade and check if any restrictions or regulations apply.

Step 2: Find a Supplier or Buyer:

- For Importing: Connect with international suppliers who can provide the goods you want to import.
- For Exporting: Find buyers in the target market who are interested in purchasing your goods.
- Use online trade platforms (like Amazon, Alibaba, TradeIndia, or global trading forums) to establish connections.

Step 3: Negotiate Terms and Sign a Contract:

- Discuss and finalize terms such as price, payment methods, delivery schedule, and Incoterms (International Commercial Terms) that define responsibilities between the buyer and seller.
- Prepare a contract that outlines these agreements and sign it virtually, using e-signature tools like DocuSign or Adobe Sign.

Step 4: Prepare Necessary Documentation:

- Create virtual versions of all required documents, such as:
- Commercial Invoice: Lists the goods, their value, and details of the transaction.
- Packing List: Provides information about the contents, dimensions, and weight of the shipment.
- Bill of Lading: Serves as proof of shipment and outlines the terms for transporting the goods.
- Certificate of Origin: Indicates where the goods were manufactured (if required).
- Insurance Certificate: Proof of insurance coverage for the goods during transit.
- Import / Export Licenses: As needed, based on the goods and destination country.
- Use document management tools to organize and share these files securely.

Step 5: Arrange Virtual Logistics and Shipping:

- Freight Forwarder or Logistics Company: Choose a logistics provider that can handle the transport of goods. Even if this is a virtual simulation, understanding their services is essential.
- Choose Mode of Transport: Decide whether the shipment will be transported by air, sea, or land, depending on the urgency, cost, and type of goods.
- Track Shipment Virtually: Use a shipment tracking tool to monitor the virtual journey of the goods. Tools like ShipStation, CargoWise, or any shipping simulation software can be used.

Step 6: Handle Customs and Compliance:

- Research customs requirements for the destination country and prepare for virtual customs clearance. This includes:
- Submitting the necessary documentation for inspection.
- Simulating duty and tax calculations, if applicable.
- Ensuring all import/export regulations are followed.
- Tools like TradeLens or customs brokerage software can help visualize and manage this process.

Step 7: Coordinate Virtual Warehousing and Distribution:

- If necessary, organize virtual warehousing at the destination. This could involve understanding distribution networks or planning storage in a virtual environment.
- Simulate the unloading, inspection, and final delivery of the goods to the buyer.

Step 8: Arrange for Payment and Financial Transactions:

- Agree on the payment method with the buyer/supplier, such as a letter of credit (LC), bank transfer, or escrow service.
- Simulate the payment process using virtual financial services platforms or trade finance software.

Step 9: Monitor and Evaluate the Process:

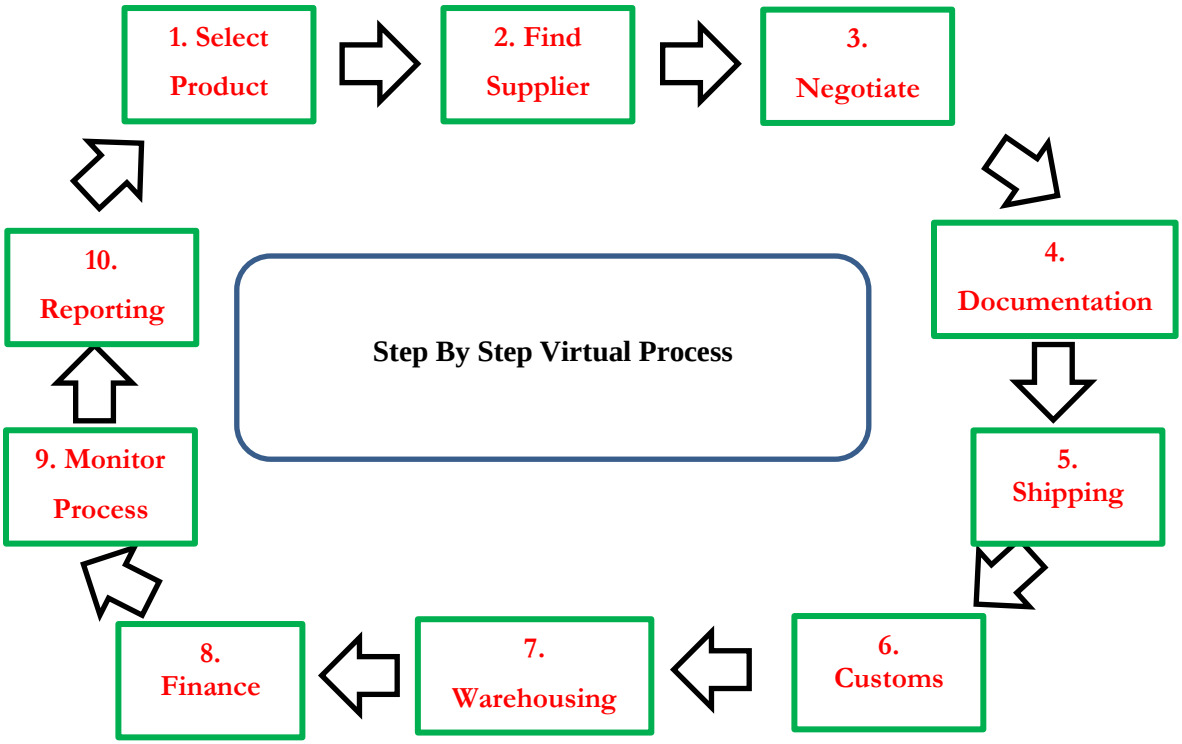
- Use supply chain management software to review and evaluate the efficiency of your virtual shipment.
- Identify areas for improvement in documentation flow, communication, and compliance to optimize future shipments.

Step 10: Documentation and Reporting:

- Collect and archive all virtual documents for record-keeping and future reference.
- Create reports that analyze the costs, time, and logistics efficiency of the virtual shipment.

Tools For Creating a Virtual Import-Export Shipment

- Document Management: Google Drive, OneDrive, Dropbox.
- E-signature Tools: DocuSign, Adobe Sign.
- Shipping and Tracking Platforms: ShipStation, CargoWise, Freightos.
- Customs and Compliance Software: TradeLens, Descartes, KlearNow.
- Communication Platforms: Zoom, Microsoft Teams, Slack for coordinating with stakeholders.
- Finance and Payment: PayPal, Wise, escrow services, or bank platforms.



The new generation of importers and exporters is characterized by their tech-savviness, adaptability, and focus on ethical and sustainable practices. They approach international trade with a more holistic and innovative mind set, leveraging technology and modern business strategies to succeed in a rapidly evolving global market.

Trends and Experiences in Running a Virtual Project

Real-life work experiences among the new generation of importers and exporters are being shaped significantly by modern technology, changing global trade dynamics, and evolving business practices. Here's an overview of key trends and experiences faced by younger professionals in this field:

1. Tech-Driven Operations:

- Use of Digital Platforms: The new generation heavily relies on digital platforms to facilitate international trade. Platforms like Alibaba, Amazon Business, and Global

Sources are popular for finding suppliers and buyers. E-commerce has become a dominant force in the export industry, especially for small and medium enterprises (SMEs).

- Automation and AI: Young importers and exporters use software for automating routine tasks, such as tracking shipments, generating invoices, and managing inventory. Artificial Intelligence (AI) is also used for demand forecasting and optimizing supply chain management.
- Blockchain and Trade Security: Blockchain technology is gaining traction for ensuring secure, transparent transactions. Young professionals are more willing to experiment with these technologies to streamline documentation and reduce the risk of fraud.

2. Agility and Adaptability:

- Adapting to Market Fluctuations: The new generation has learned to be agile in response to global market changes, such as trade tariffs, geopolitical tensions, and supply chain disruptions (e.g., those seen during the COVID-19 pandemic). They often use agile business models that allow them to pivot quickly.
- Managing Supply Chain Disruptions: Young professionals have gained experience navigating logistical challenges, like port congestion and container shortages, by using diversified suppliers or local sourcing strategies when necessary.

3. Focus On Sustainability And Ethics:

- Sustainability Initiatives: New-generation importers and exporters place a strong emphasis on environmental responsibility. They often prioritize suppliers who practice sustainable production and implement eco-friendly packaging solutions. This emphasis on sustainability is partly driven by consumer demand and global regulations.
- Ethical Sourcing: Many young professionals ensure their supply chains are transparent and that suppliers adhere to ethical labor practices. They frequently perform due diligence and work with third-party certification organizations to maintain ethical standards.

4. Entrepreneurial Mindset:

- Start-Up Culture: The new generation often brings a start-up mentality to the import-export world, characterized by risk-taking and innovation. Many young importers/exporters start their own businesses rather than working for established corporations. They leverage social media and digital marketing to reach global customers efficiently.
- Crowdsourcing and Funding: Crowdfunding platforms like Kickstarter or GoFundMe are used by some young entrepreneurs to secure funds for launching new products or expanding into new markets.

5. Digital Marketing and Branding:

- Social Media Presence: The new generation heavily relies on social media platforms like Instagram, LinkedIn, and TikTok to market their products and connect with clients. They use digital marketing strategies such as influencer partnerships and targeted ads to create brand awareness and drive sales.
- E-Commerce Integration: With the rise of online shopping, young exporters often integrate their products into e-commerce sites and use international shipping solutions that cater to global consumers.

6. Data-Driven Decision Making:

- Analytics Tools: Young professionals are proficient in using data analytics to make informed decisions. They use software like Google Analytics, Tableau, or custom-built dashboards to track market trends, analyze consumer behavior, and optimize pricing strategies.
- Market Research: They leverage online tools for market research, gaining insights into international consumer preferences, cultural considerations, and competitors.

7. Remote Work and Global Collaboration:

- Virtual Workspaces: The new generation is accustomed to working remotely, especially post-pandemic. They use collaborative tools like Slack, Microsoft Teams, and Asana to manage international teams and communicate with partners across time zones.
- Virtual Trade Shows and Networking: Instead of traditional trade shows, many now attend or host virtual trade fairs and networking events, which allow them to connect with suppliers and buyers worldwide without incurring travel costs.

8. Regulatory Awareness And Compliance:

- Understanding Global Regulations: Young importers and exporters must stay informed about international trade regulations, including tariffs, trade agreements, and compliance standards. They often use online resources and compliance software to keep up with changes and avoid penalties.
- Learning from Experience: Many young professionals gain hands-on experience dealing with customs processes, documentation, and regulatory hurdles, often learning through trial and error or mentorship.

9. Challenges Unique to The New Generation:

- Navigating Geopolitical Uncertainty: With increasing global tensions, such as U.S.-China trade conflicts and Brexit, young importers/exporters have had to learn how to adapt quickly and find alternative markets or shipping routes.
- Supply Chain Vulnerabilities: Experiences with supply chain disruptions, such as those caused by the pandemic, have taught them to develop contingency plans and consider nearshoring or local sourcing options.

10. Focus on Personal Development:

- Continuous Learning: Young professionals often participate in workshops, online courses, and trade seminars to stay updated with the latest trends and technologies in international trade.
- Networking and Mentorship: They actively engage in networking events and seek mentorship from experienced professionals in the field, both in-person and through digital communities.

Examples of Virtual Projects Done by Various Universities

These virtual projects leverage technology to provide global collaboration opportunities and hands-on learning experiences, even when participants are geographically separated. Here are some examples of virtual projects and initiatives run by various universities:

1. Virtual Exchange Programs:

- SUNY COIL (Collaborative Online International Learning): The State University of New York (SUNY) runs COIL programs that connect classrooms across different countries. Students work on joint assignments and projects with peers from other cultures, all facilitated virtually.
- Erasmus+ Virtual Exchange: European universities participate in this virtual program, promoting cross-cultural dialogue and collaborative online projects among students across Europe and neighbouring regions.

2. Online Research Collaborations:

- University of California's Digital Humanities Initiative: A project where researchers collaborate on digital humanities projects remotely, using tools like data visualization and text analysis.
- Harvard University's Data Science for Social Good (DSSG): A virtual summer fellowship that connects students with social organizations to work on data science projects aimed at addressing global challenges.

3. Virtual Hackathons and Innovation Challenges:
    - MIT Virtual Hackathons: MIT frequently hosts virtual hackathons, like "Hack for Inclusion," where students and professionals tackle social and technological challenges.
    - Stanford Code-In-Place: An online learning and coding event organized by Stanford University's computer science department, which includes a collaborative final project where students from around the world build applications.

4. Virtual Environmental and Sustainability Projects:
    - University of Queensland's Virtual Conservation Projects: Students participate in online conservation projects that use virtual platforms to engage in biodiversity analysis, wildlife conservation, and data collection.
    - Oxford University's Virtual Sustainability Lab: A project where students work on global environmental challenges using digital simulations and virtual collaboration.

5. Digital Education and Teaching Projects:
    - Columbia University's Virtual Reality in Education Lab: Research and development projects focusing on using VR for teaching purposes. Students design virtual learning environments and explore the impact on education.
    - University of Edinburgh's Distance Learning Hub: This project runs fully online degrees and research collaborations where students from different time zones participate in virtual research projects related to education and learning.

6. Online Cultural and Language Immersion Programs:
    - Virtual Language and Culture Program by Georgetown University: Students learn foreign languages and immerse themselves in the culture through virtual tours, guest speakers, and interactive assignments with native speakers.

- Australian National University's Digital Humanities & Culture Program: In this project, students use online archives and virtual resources to study different cultures and historical periods.

Challenges Faced in Virtual Projects and Proposed Solutions

These solutions aim to address the challenges by leveraging technology, promoting effective communication, and creating a cohesive and engaging virtual work environment.

Challenges	Solutions
Communication Barriers	Use reliable communication tools (e.g., Zoom, Teams)
	Schedule regular check-ins and updates
	Set clear expectations for communication (response times, etiquette)
Time Zone Differences	Use time zone converters to schedule meetings
	Adopt asynchronous communication methods (e.g., Slack, Trello)
	Rotate meeting times to accommodate different zones
Technology Limitations	Ensure participants have access to necessary technology
	Provide training and technical support
	Use lightweight, easily accessible platforms
Engagement And Motivation	Include interactive activities and gamification elements
	Set short-term goals and celebrate achievements
	Schedule social and team-building activities virtually
Cultural Differences	Promote cultural awareness through training sessions
	Encourage open discussions and respect diverse opinions
	Adapt project management practices to suit the team's cultural context

Data Security and Privacy	Use secure platforms and follow data protection policies
	Educate team members about data security practices
	Implement role-based access to sensitive information
Project Management Issues	Use project management tools (e.g., Asana, Jira) for tracking progress
	Define clear roles, responsibilities, and deadlines
	Conduct regular progress reviews and adjust as necessary
Building Team Cohesion	Schedule informal virtual coffee breaks or social hours
	Use icebreakers and team-building exercises
	Recognize and appreciate team contributions

Gradation For Virtual Project Assessment

Here's a suggested framework for grading or assessing virtual projects, taking into account key aspects of project execution and outcomes. This framework can be adjusted depending on the specific goals and nature of the virtual project, as well as the academic or professional standards expected.

Assessment Criterion	Description	Weightage (%)
Project Planning & Organization	Clarity and feasibility of project goals	15%
	Effective timeline and milestone setting	
	Use of project management tools for organization	
Communication & Collaboration	Consistency and effectiveness of communication with team members	15%
	Ability to collaborate and manage diverse opinions	
	Timeliness of updates and contributions	

Problem-Solving & Adaptability	Handling of unexpected challenges and issues	10%
	Flexibility and creativity in adapting to obstacles	
Use Of Technology	Effective use of digital tools for project execution	10%
	Proper documentation and presentation using virtual platforms	
Quality Of Work / Output	Achievement of project objectives and goals	25%
	Quality, originality, and impact of the final product	
Engagement & Participation	Level of active participation in meetings and activities	10%
	Contribution to group discussions and initiatives	
Reflection & Self-Assessment	Insights gained from the project and lessons learned	5%
	Quality of self-assessment and reflection on personal performance	
Presentation & Delivery	Clarity, engagement, and effectiveness of the final presentation	10%
	Use of visual aids and overall delivery skills	

Grading Scale

1. Excellent (90 – 100%): Outstanding execution in all criteria; innovative and impactful outcomes.

2. Good (80 – 89%): Strong performance with only minor areas needing improvement.

3. Satisfactory (70 - 79%): Adequate execution, but some areas lack thoroughness or quality.

4. Needs Improvement (60 – 69%): Meets basic requirements but falls short in multiple criteria.

5. Unsatisfactory (<60%): Fails to meet project expectations in several critical areas.

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SIRJODL: Volume 6 Issue 2 July 2025
ISSN 2582-9009

Strategic Innovation for High-Impact Learning: A Framework for Transformative Educational Outcomes

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Abstract

The contemporary educational landscape demands a fundamental shift from traditional models to approaches that foster deeper, more enduring, and relevant learning. While "innovation" is a common buzzword, its implementation often lacks strategic coherence, leading to fragmented efforts and limited impact. This paper argues for a strategic approach to innovation, conceptualizing it not as a series of isolated experiments but as an integrated, intentional process aimed at delivering high-impact learning outcomes. It proposes a comprehensive framework encompassing vision alignment, learner-centric design, technological integration, faculty empowerment, data-driven evaluation, and a supportive organizational culture. By adopting this strategic lens, educational institutions can move beyond incremental improvements to achieve transformative changes that truly prepare learners for complex global challenges.

KEYWORDS

Strategic Innovation, High-Impact Learning, Educational Transformation, Learning Design, EdTech, Faculty Development, Educational Leadership, Data Analytics in Education, Change Management.

Introduction

The 21st century presents unprecedented complexities, requiring individuals who are not merely repositories of information but critical thinkers, agile problem-solvers, creative innovators, and collaborative citizens. Traditional educational models, often characterized by passive knowledge transmission and standardized assessment, are increasingly insufficient to cultivate these essential competencies (Fullan, 2011; Wagner, 2012). In response, educational institutions globally are pursuing "innovation" – from adopting new technologies to experimenting with novel pedagogies. However, much of this innovation remains ad-hoc, siloed, and lacks a clear strategic direction, often failing to yield sustained, high-impact learning outcomes.

This paper posits that true educational transformation requires a strategic approach to innovation. Rather than merely adopting new tools or techniques, institutions must intentionally design, implement, and scale innovations that are deeply aligned with their core mission and explicitly engineered to maximize learning impact. High-impact learning, in this context, transcends rote memorization, fostering deep understanding, critical inquiry, application of knowledge in real-world contexts, and the development of transferable skills (Kuh, 2008).

The purpose of this paper is to outline a comprehensive framework for strategic innovation aimed at achieving high-impact learning. It will delineate the key components of such a strategy, discuss the underlying principles, explore enabling technologies, highlight the crucial role of human capital and organizational culture, and address the inherent challenges.

Conceptual Foundations

To build a framework for strategic innovation in learning, it is crucial to define its core components:

High-Impact Learning: High-impact learning refers to educational experiences that demonstrably lead to significant, long-lasting, and transferable gains in knowledge, skills, and dispositions. It is characterized by:

- Deep Understanding: Moving beyond surface-level recall to conceptual comprehension and the ability to synthesize, analyze, and evaluate information.
- Critical Thinking & Problem-Solving: The capacity to identify, analyze, and solve complex problems using reflective and reasoned judgment.

- Application & Transferability: The ability to apply learned knowledge and skills to new and varied contexts, both academic and real-world.
- Metacognition: Learners' awareness and understanding of their own thought processes, enabling them to regulate their learning effectively.
- Engagement & Motivation: Learning experiences that are intrinsically motivating, fostering curiosity and a sense of purpose.
- Equity & Inclusivity: Designing learning that caters to diverse needs, backgrounds, and learning styles, ensuring all learners can achieve success.

Strategic Innovation: Innovation is often defined as the introduction of something new or a new way of doing something. Strategic innovation, however, elevates this definition by embedding it within an organizational vision and mission (Christensen et al., 2003; Tidd & Bessant, 2013). In the context of education, strategic innovation means:

- Intentionality: Innovation is not ad-hoc but a deliberate choice guided by specific learning goals.
- Alignment: Every innovative effort is aligned with the institution's broader educational mission and strategic plan.
- Systemic Approach: Innovation considers the entire learning ecosystem – pedagogy, technology, assessment, faculty roles, student support, and organizational structures.
- Scalability & Sustainability: Innovations are designed with the potential for broader adoption and long-term viability, moving beyond pilot projects.
- Impact-Driven: The primary metric of success for any innovation is its measurable impact on learning outcomes, rather than mere adoption rate or novelty.

The Framework: Pillars of Strategic Innovation for High-Impact Learning

Achieving high-impact learning through strategic innovation requires a multi-faceted approach, integrating several interconnected pillars. This framework proposes six key pillars:

Pillar 1: Vision, Strategic Alignment, and Leadership

- Core Principle: Innovation must serve a clear purpose, articulated through an institutional vision for learning, and consistently championed by leadership.

- Components:
    - Articulating a Shared Vision: Clearly defining what "high-impact learning" means for the institution and its learners. This vision should be co-created with stakeholders.
    - Strategic Alignment: Ensuring all innovation initiatives directly support the institutional mission and strategic goals. This prevents fragmentation and resource drain.
    - Leadership Commitment: Senior leadership must champion innovation, allocate resources, provide psychological safety for experimentation, and model adaptive mindsets.
    - Stakeholder Engagement: Involving faculty, students, staff, administrators, and external partners in the visioning and planning processes.

Pillar 2: Learner-Centric Design & Transformative Pedagogies

- Core Principle: At the heart of high-impact learning is a deep understanding of how students learn best, leading to the adoption of effective pedagogical approaches.
- Components:
    - Research-Informed Pedagogy: Basing pedagogical choices on learning sciences (e.g., cognitive load theory, constructivism, social learning theories).
    - Active Learning: Shifting from passive reception to active engagement through methods like problem-based learning, project-based learning, inquiry-based learning, and collaborative assignments.
    - Personalized & Adaptive Learning: Tailoring learning pathways, content, and pace to individual learner needs, preferences, and progress.
    - Experiential Learning: Providing opportunities for learning through direct experience, such as simulations, internships, fieldwork, and service learning.
    - Competency-Based Education (CBE): Focusing on the mastery of specific competencies rather than seat time, allowing learners to progress at their own pace.
    - Authentic Assessment: Designing assessments that mirror real-world tasks and evaluate deep understanding and application of skills.

Pillar 3: Enabling Technologies & Integrated Learning Ecosystems

- Core Principle: Technology is a powerful enabler of high-impact learning when strategically integrated into a coherent learning ecosystem, not merely bolted on. This is possible when the following are taken into account:
- Components:
    - Strategic Technology Adoption: Selecting technologies based on pedagogical goals and learning outcomes, rather than adopting for novelty.
    - Integrated Learning Ecosystem: Creating a seamless environment where various technologies (LMS, collaboration tools, simulations, AI tutors, VR/AR, OER) work together to support learning.
    - Data Infrastructure: Establishing robust systems for collecting, analyzing, and acting upon learning data (see Pillar 5).
    - Digital Fluency: Ensuring learners and educators possess the necessary skills to effectively utilize digital tools for learning and teaching.
    - Scalability & Accessibility: Designing technological innovations with scalability in mind and ensuring equitable access for all learners, addressing the digital divide.

Pillar 4: Faculty Development & Empowerment

- Core Principle: Educators are the primary drivers of learning transformation; their continuous development, support, and empowerment are non-negotiable. The primary source of any information is reliability on the faculty and the ability of disseminating information. Such powerful minds need constant motivation wherein the following should be taken into account:
- Components:
    - Continuous Professional Development: Providing ongoing, research-informed training in innovative pedagogies, new technologies, and learning science.
    - Pedagogical Coaching & Mentorship: Offering personalized support for faculty in redesigning courses and implementing new approaches.
    - Incentives & Recognition: Rewarding faculty for experimenting with and successfully implementing innovative teaching practices.
    - Communities of Practice: Fostering environments where educators can collaborate, share best practices, and collectively solve challenges.

- Autonomy & Trust: Empowering faculty to experiment with new methods within a supportive framework, fostering a sense of ownership.

Pillar 5: Data-Driven Insights & Continuous Improvement

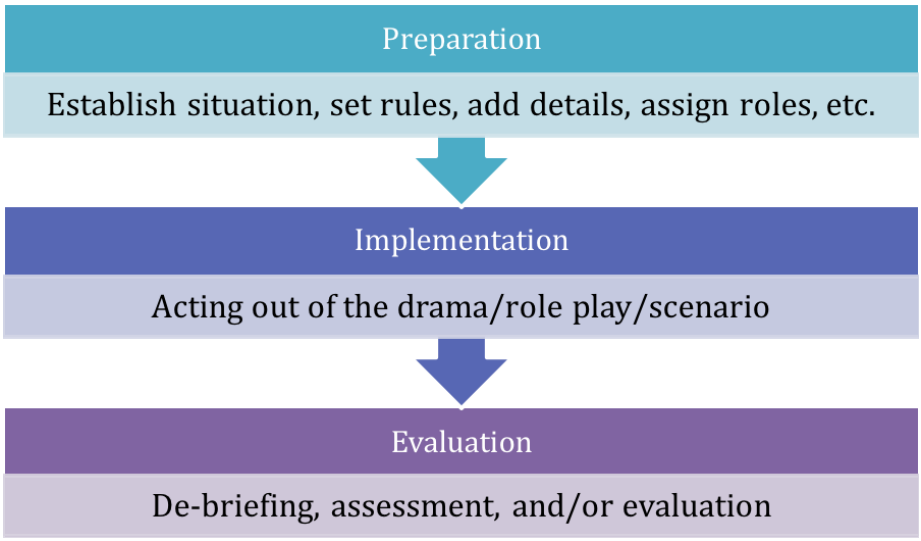
- Core Principle: Effective innovation is an iterative process, refined through systematic collection and analysis of data to measure impact and inform adjustments. Its components are:
- Components:
  - Learning Analytics: Utilizing data from learning platforms, assessments, and student interactions to gain insights into learning processes, engagement, and outcomes.
  - Formative & Summative Evaluation: Designing robust evaluation methodologies to assess the impact of innovations on desired learning outcomes.
  - Feedback Loops: Establishing systematic mechanisms for collecting feedback from students, faculty, and other stakeholders to inform iterative design.
  - Research & Scholarship of Teaching and Learning (SoTL): Encouraging and supporting faculty in conducting research on the effectiveness of their innovative practices.
  - Transparency & Accountability: Using data to demonstrate the value and impact of strategic innovations to internal and external stakeholders.

Pillar 6: Culture of Experimentation, Collaboration, and Adaptability

- Core Principle: A supportive organizational culture is the bedrock upon which strategic innovation can thrive, encouraging risk-taking, learning from failure, and interdisciplinary collaboration. Its components are as follows:

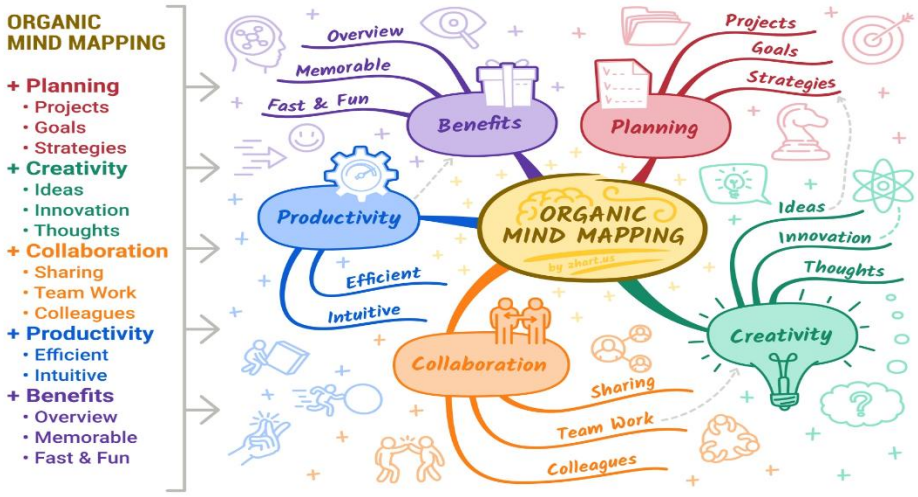
- Components:
  - Psychological Safety: Creating an environment where faculty and staff feel safe to try new things, make mistakes, and learn without fear of punitive action.

Examples like Brain-storming and role plays can be conducted as suggested below:



(Source: Coghlan, N. (2015) Role plays and simulations. The Dangling Modifier, 23. https://www.esl-lounge.com/blog/185/role-plays-and-simulations)

- Interdisciplinary Collaboration: Fostering partnerships across departments, disciplines, and even institutions to leverage diverse perspectives and expertise.



(Source: Gain Blog. Brainstorming Exercises to Spur Creativity in Your Marketing Team. Available Online)

- Learning from Failure: Viewing failed experiments not as setbacks but as valuable learning opportunities, promoting a growth mindset.

- Shared Responsibility: Distributing the ownership of innovation across various levels of the institution.
- Agile Mindset: Embracing flexibility, responsiveness, and iterative development in response to feedback and changing needs.

Challenges and Mitigations

Implementing strategic innovation for high-impact learning is not without its hurdles:

- Resistance to Change: Deep-seated traditions, fear of the unknown, and professional comfort zones can impede adoption. Accepting new innovations can be challenging for existing scholars. Strategic changes in the organisation also, sometimes, leads to dissatisfaction amongst trainers which lead to productivity challenges.
    - Mitigation: Transparent communication, early and continuous stakeholder involvement, demonstrating clear benefits, providing strong support and incentives, and addressing concerns proactively, conduction of personal SWOT analysis for current needs.
- Resource Constraints (Time, Funding, Staff): Innovation often requires significant investment. This process is time consuming and requires attention to detail which many a times comes in the way of attaining innovation and conducting research activities.
    - Mitigation: Strategic allocation of existing resources, seeking external grants, establishing partnerships, demonstrating ROI for long-term investment, and prioritizing initiatives based on potential impact.
- Scalability Issues: Successful pilot projects often struggle to scale across an entire institution. Such projects have a high dependency on the cause-effect relationship of their acceptance as well as their implementation. The understanding of this entire scenario is complicated and also tough to analyse and rectify.
    - Mitigation: Designing innovations with scalability in mind from the outset, developing robust support systems, modularizing approaches, and phased rollouts.
- Technological Infrastructure & Digital Divide: Unequal access to technology or inadequate infrastructure can hinder implementation. This is a hurdle which cannot be crossed in the easiest way. Building of infrastructure and digital innovation needs robust approach. Yet, certain functions in both these areas are expensive and time consuming.

- Mitigation: Prioritizing infrastructure upgrades, providing devices and connectivity support, designing for low-bandwidth environments, and offering blended learning options.

- Assessment & Measurement Difficulty: Quantifying "high-impact learning" can be complex process. Although certain parameters are available for the measurement of level of difficulty, their timely assessment and feedback is of crucial importance. This is one area which is ignored on a large scale by many organisations.
    - Mitigation: Developing clear rubrics and success indicators, utilizing diverse assessment methods (qualitative and quantitative), investing in learning analytics capabilities, and engaging in continuous research.
- Ethical Considerations (e.g., AI bias, data privacy): Emerging technologies present new ethical dilemmas which create a chaotic scenario. When these are merged with current needs, there is a high chance of certain individuals surpassing the ethical line, either knowingly or unknowingly, leading to consequences of its own. This can be avoided if proper guidelines are laid down for proper understanding.
    - Mitigation: Developing clear ethical guidelines and policies for technology use, ensuring data privacy and security, and promoting critical media literacy.

Implications and Recommendations

Following are few recommendations for educational institutions committed to high-impact learning:

- Leadership: Establish a dedicated office or committee for strategic learning innovation, reporting directly to senior leadership. Prioritize innovation in strategic plans and allocate dedicated resources.
- Faculty Development: Shift from one-off workshops to sustained, embedded professional development models. Recognize and reward innovative teaching practices.
- Infrastructure: Invest in flexible, scalable technological infrastructure and robust data analytics capabilities.
- Culture: Actively cultivate a culture of inquiry, experimentation, and collaboration. Celebrate learning and intelligent risk-taking.
- Partnerships: Forge partnerships with industry, research institutions, and other educational organizations to leverage external expertise and resources.

- Research: Fund and encourage the Scholarship of Teaching and Learning (SoTL) to build an evidence base for effective practices.

Conclusion

The pursuit of high-impact learning in an era of rapid change is not merely an option but an imperative. Achieving this requires moving beyond fragmented, ad-hoc attempts at innovation towards a deliberate, strategic, and integrated approach. The framework presented in this paper, encompassing vision and leadership, learner-centric design, enabling technologies, faculty empowerment, data-driven insights, and a supportive organizational culture, provides a roadmap for educational institutions to embark on this transformative journey. By strategically innovating, educators can create profound and lasting learning experiences that truly equip individuals to thrive in a complex and uncertain future, ultimately contributing to a more informed, skilled, and adaptable society.

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SIRJODL: Volume 6 Issue 2 July 2025
ISSN 2582-9009

AI Tools in Online Learning: Usage Patterns and Adoption Drivers

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Abstract

This study focused on the use of AI-enabled pedagogical approaches in distance education. Utilizing descriptive and analytical qualitative research methodology, survey data for 163 participant responses (students, faculty, staff, and administrator) were collected and analyzed to support a review of the use of institutionally provided AI tools in relation to usage, perceptions by role, adoption motivators, and intended ongoing practices. The data analyses revealed that reducing instructor workload was the main reason participants reported as motivations for adopting AI technology, while they also acknowledged significant differences in the interactions that participants had with AI based on their professional role. Plagiarism detection software appeared to be the mostly commonly used AI tool for participants in this study while advanced use of AI technology, including intelligent tutoring systems or AI tools to support adaptive learning, was minimal. In summary, the results of this study point to the necessity for professional

development focused on improving AI literacy, the need for recurring ethical oversight in relation to AI uses in educational contexts, and encouraging the equitable access to AI technology for all learners.

KEYWORDS

Artificial Intelligence, Distance Education, Adaptive Learning, AI Adoption, Teaching Technologies, Intelligent Tutoring Systems.

Introduction

Artificial Intelligence (AI) in distance education (DE) has the potential to revolutionize the possibilities for significant change while presenting challenges that will impact the nature of learning in the ecology for a long time to come. The opportunities to improve personalization of learning, increase educational efficiencies, and provide timely feedback to students, all through the use of AI is promising. In distance education modalities that rely heavily on digital infrastructures, AI usage comes at a good time considering that the technology-based processes and technology-based expectations (for Machine Learning ML and Deep Learning DL) support AI technologies. Further, the customization afforded by AI's adaptive algorithms not only facilitate learner personalization in the modification of educational content but increased learner engagement and academic achievement outcomes (Vieira et al., 2024; Franqueira et al., 2024). AI tools will automate the discrete instructors pre and post task related education actions, tremendously reducing round-the-clock instructors' workloads so that instructors may concentrate on higher-order teaching and assessing while still meaningfully assess (in-course/ongoing) (Sá et al., 2024). Predictive analytics will allow instructors to timely, intervene with students learning and engagement who are most at-risk for failing to earn academic credit, as well as help mitigate retention challenges down the road (Pedra et al., 2024).

Several potential barriers come with employing AI in distant education today. For AI to be successfully employed into current distance education practices, an adequate technological foundation is required, which is already lacking uniformity across most institutions (Franqueira et

al., 2024). Pragmatically, ethical concerns around data privacy and the use of students' data will almost always exist when employing any electronic means of communication (Pedra et al., 2024), and there is also an insufficient level of training for many educators on how to use AI appropriately in their courses (Sá et al., 2024; Tuczyński, 2024). The proliferation of the use of AI is perhaps going to be a bridge too far in the people-oriented aspects of teaching (their adaptability will come quicker) and in many cases we should think about adopting a general use of technology to manage what it adds to all educators, rather than replacing the educator. If there is a clear use for technology (Tuczyński, 2024). While there is much and plentiful research available globally, as demonstrated in the literature review, on the theoretical possibilities for AI in Education, there appears to be considerably less research that examines these educators, students and administrators' perspectives-how they see AI, what their adoption motivations are, and their knowledge or awareness of the potential roles AI could play in distant education. This study will help confront these challenges by examining the demographic description of Distance Education students', students' perception of AI, most commonly used tools, and the factors motivating its adoption. The findings of this research matter because they could inform educational organizations and policy decisions specifically to guide effectively. The findings offered more useful fact-based evidence on what created value for distance education stakeholders, using the responsible utilization of AI in distance education. AI in distance education (like reducing instructor burdens and increased learning outcomes), and what advocacy to use to position AI in distance education. Also, the study uncovered a significant range of understanding about AI depending on the role of person completing the survey, which highlights the importance of creating targeted trainings to mitigate knowledge gaps. Furthermore, knowing there is limited usage of advanced AI tools such as tools that run focused intelligent tutoring systems for advanced learners, the research also noted opportunities for expanding technology that may provide more learning advances. Lastly, while ethical concerns and outcomes, as well as privacy were ranked as less important by respondents, nevertheless, they were included in the study for creating trust in AI systems. The value of this study will contribute to implementing an inclusive, responsible and effective framework for

consideration for AI in distance education, and the equitable benefit of AI will only be beneficial to all involved.

Literature Review

Artificial Intelligence (AI)-driven pedagogical frameworks are defined as technology-enhanced frameworks for teaching and learning in the usages of machine learning, natural language processing and predictive analytics approaches to learner engagement, assessment and personalization in digital learning. In distance education, pedagogical frameworks have shifted the instructional design paradigm to encompass adaptive learning systems, intelligent tutoring systems, timely feedback, and increasingly personalized learning to meet the challenges of scale, variability of learners and retention and persistence (Mukkala et al., 2025). With the shift to online learning as an architectural aspect of distance learning, we still need to understand comprehensively how AI could address and systematically transform pedagogy to build equitable, personalized and scalable learning systems. Machine learning systems, specifically, use reinforcement learning algorithms that offer instant corrective feedback, consistent with behaviorist approaches to stimulus-response learning (Sarfaraj, 2025). Intelligent tutoring systems and chatbots are operationalizing problem solving and conversational dialogues, in support of constructivist approaches to knowledge-building (Mungai et al., 2024). AI-based predictive analytics and virtual assistants are supporting learning networks and connectivist learning theories about distributed learning in the digital ecosystem (Akintola, 2024). Intelligent tutoring systems (ITS) supported with conversational AI and diagnostic modelling capabilities offering specific personalized interventions for learners can develop learner autonomy and motivation (Sarfaraj, 2024). ChatGPT-based intelligent tutoring systems have made positive early strides, particularly in language learning environment development and writing skills, but scaling and learning outcomes relating to real-time assessment and feedback remain a challenge (Sumanasekara, 2025). Adaptive educational systems, such as DreamBox and Knewton, are capable of modifying the learning pathway taken by students to increase acquisition and retention of skills and knowledge (Akintola, 2024). Directly linked to the usage of generative AI is the use of automated assessment

and feedback provided by AI systems, which can be individualized to support higher-order thinking skills (Torre & Libbrecht, 2024). Machine learning models can identify students at risk of withdrawal and suggest actionable interventions to improve retention in distance education (Moore & Tsay, 2024). Chatbots add another level of interactivity to the LMS, and can offer on-demand support in real-time, reducing cognitive load and reinforcing personalized learning models to enhance gamification (Mungai et al, 2024) . Adaptive AI supports individual learning pathways and promotes self-regulated learning (Akintola, 2024). Emotion aware tutoring systems and gamified chatbots engage learners, engendering greater levels of motivation, engagement, and participation (Urbaite, 2025). Instructors shift roles from lectures to facilitation and mentorship roles while students are expected to assume greater responsibility for their own learning, and adapt dynamically to learning requirements & needs (Islam & Amiri, 2025). AI could offer insights into LMS-generated learning analytics that risk unauthorized use of student learning data (Mukkala et al., 2025). Given the cultural and linguistic biases in AI tools, marginalized populations may be less likely to benefit from AI tools (Ahmed & Elmahdi, 2025). Technology delivery systems and high-tech infrastructure to access the internet must be standardized to avoid ongoing linearly inequitable delivery of educational access (Islam & Amiri, 2025). Many educators remain fearful of adopting AI because of the fear education will become dehumanized (Torre & Libbrecht, 2024.) Only a handful of studies can demonstrate substantial evidence to prove learning outcomes over the long-haul due to adapting AI systems (Moore & Tsay, 2024). Very little evidence exists on collaborative teaching models that demonstrate the sharing of instructional labour between AI technology and a human instructor (Sumanasekara, 2025). Many systems focus on rote learning, not creativity and critical thinking (Torre & Libbrecht, 2024). AI frameworks are an innovation of teaching and learning in online distance learning as they present opportunities to personalize learning, deliver feedback in real time, and make data-informed decisions. At the same time, ethical issues, digital inequity, and need for human-centered models exist. In order for AI to be a true innovator in teaching and learning in online education, there must be an equilibrium between technology, equity, and pedagogy.

Research Design

The study follows a **descriptive and analytical research design** to understand the perception, usage, and impact of AI tools in distance education. Primary data was collected using a structured questionnaire from respondents engaged in online or distance learning.

Sampling Design

- **Sampling Method**: Non-probability convenience sampling
- **Sample Size**: 163 respondents from various roles (students, educators, administrators, and others)
- **Area of Study**: Participants with exposure to distance education

Data Collection Method

Data was collected through a structured online questionnaire divided into five sections: Demographics, Familiarity & Usage of AI, Perception of AI in Teaching, Ethical Concerns, and Behavioural Intentions.

Tools Used for Analysis

- **Percentage Analysis**: For demographic and tool usage patterns
- **Garrett Ranking Technique**: To rank factors influencing AI adoption
- **ANOVA (Analysis of Variance)**: To test differences in AI perception across roles
- **Chi-Square Test**: To test associations between role and AI familiarity

Limitations of The Study

- The study's use of non-probability convenience sampling restricts how well we can apply the results to other groups of people.

- The researchers collected data through an online survey with set questions getting self-reported answers at one point in time. Surveys like this can lead to biased responses.

Analysis

Table 1: Demographic Profile of the Respondents

Category	*Variable*	*Frequency*	*Percent*
AGE	18-24	40	24.5
	25-34	49	30.1
	35-44	18	11.0
	45 and above	34	20.9
	Below 18	22	13.5
	Total	**163**	**100.0**
GENDER	Female	68	41.7
	Male	95	58.3
	Total	**163**	**100.0**
EDUCATION	Diploma	37	22.7
	Doctorate	48	29.4
	High School	29	17.8
	Postgraduate	19	11.7
	Undergraduate	30	18.4
	Total	**163**	**100.0**
ROLE	Academic Administrator	40	24.5
	Educator	33	20.2
	Other	53	32.5
	Student	37	22.7
	Total	**163**	**100.0**

EXPERIENCE	Less than 1 year	34	20.9
	1-3 years	44	27.0
	4-6 years	34	20.9
	More than 6 years	51	31.3
	Total	163	100.0

Source: Primary Data

Interpretation

This table summarizes the demographic profile of the 163 survey respondents. The largest age group represented is 25-34 years old (30.1%), followed by 18-24 years old (24.5%), indicating a generally younger participant base, though a significant portion (20.9%) is 45 and above. The gender distribution shows a majority of male respondents (58.3%) compared to female respondents (41.7%). In terms of educational background, a notable proportion hold Doctorate degrees (29.4%), while Postgraduate degrees are the least common (11.7%). Regarding their role in distance education, the "Other" category forms the largest group (32.5%), followed by Academic Administrators (24.5%), suggesting a diverse professional background among participants beyond typical student or educator roles. Finally, the respondents exhibit varied experience with distance learning, with the highest proportion having "More than 6 years" of experience (31.3%), indicating a good representation of individuals with extensive involvement in the field.

Table 2: Garrett Ranking Analysis – Factors Encouraging AI Adoption in Distance Education

Factor	Total Garrett Score	Rank
Reduced Instructor Workload	9440	1
Improved Learning Outcomes	9128	2
Better Engagement	9056	3
Cost Effectiveness	9032	4
Data Security & Privacy	8984	5

Source: Primary Data

Interpretation

The Garrett Ranking Analysis indicates that Reduced Instructor Workload is perceived as the most crucial factor encouraging AI adoption in distance education, closely followed by Improved Learning Outcomes. Better Engagement holds a mid-tier position, while Cost Effectiveness and notably, Data Security & Privacy, are considered less significant drivers for AI integration.

Table 3: AI-Driven Tools Used in Distance Education

AI-Driven Tool Experienced/Used	Number of Respondents	Percentage
AI-based plagiarism detection	110	73.3%
Adaptive learning platforms	85	56.7%
Virtual teaching assistants/chatbots	81	54.0%
AI-based automated assessment/grading	45	30.0%
Intelligent tutoring systems	23	15.3%

Source: Primary Data

Interpretation

AI-based plagiarism detection is the most common tool in distance education (73.3% use it). Adaptive learning (56.7%) and chatbots (54.0%) are also widely used, focusing on personalized learning and student support. However, advanced AI tools like automated grading (30.0%) and intelligent tutoring systems (15.3%) are used much less often.

HYPOTHESIS 1:

H_0 (Null): There is no significant difference in AI perception between students, educators, and administrators.

Table 4: ANOVA

ANOVA					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	19.359	3	6.453	.328	.805
Within Groups	3129.917	159	19.685		
Total	3149.276	162			

Source: Primary Data

Interpretation

Since the p-value (0.805) is much greater than the common significance level of 0.05 we fail to reject the null hypothesis. There is no significant difference in AI perception among students, educators, administrators, and those in the "Other" role within distance education. This suggests that, despite their different roles, these groups tend to have a similar overall level of perception regarding AI in distance education.

HYPOTHESIS 2:

H_0 (Null): There is no statistically significant association between an individual's 'Role in Distance Education' and their 'Familiarity with AI'.

Table 5: Chi-Square Tests

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	29.245	9	.001
Likelihood Ratio	33.527	9	.000
N of Valid Cases	163		

Source: Primary Data

Interpretation

Since the p-value (Asymptotic Significance = <.001) is much less than the conventional significance level of 0.05 (or even 0.01), we reject the null hypothesis. This means that there is a statistically significant association between an individual's 'Role in Distance Education' and their 'Familiarity with AI'. In practical terms, this suggests that the level of AI familiarity is not the same across different roles within distance education; certain roles may be more or less familiar with AI compared to others.

Major Fındıngs

1. Demographic Profile of Respondents

- Largest age group: 25–34 years (30.1%) – indicating a younger participant base
- 58.3% of respondents are male
- A significant portion (29.4%) hold Doctorate degrees
- Roles are diverse: Academic Administrators (24.5%), Educators (20.2%), Students (22.7%), and Others (32.5%)
- 31.3% of respondents have more than 6 years of experience in distance education

2. Garrett Ranking – Factors Encouraging AI Adoption

- Top-ranked factor: Reduced Instructor Workload
- Followed by Improved Learning Outcomes and Better Engagement
- Cost Effectiveness and Data Security & Privacy ranked lower, suggesting lesser concern

3. AI Tools Used in Distance Education

- **Most used tool:** AI-based plagiarism detection (73.3%)
- **Other popular tools:** Adaptive learning platforms (56.7%)**,** Chatbots/Virtual TAs (54.0%)
- **Less used tools:** Automated grading (30%)**,** Intelligent tutoring systems (15.3%)

4. Hypothesis Testing

Hypothesis 1: Difference in AI Perception Across Roles

- **ANOVA p-value = 0.805 → Fail to reject null hypothesis**

- **Conclusion**: No significant difference in AI perception between students, educators, administrators, and others

Hypothesis 2: Association Between Role & AI Familiarity

- **Chi-square p-value = 0.001 → Reject null hypothesis**
- **Conclusion**: Significant association between role and familiarity with AI – familiarity varies with professional role

5. Other Findings

- Over **31% of respondents** have more than **6 years of distance learning experience**.
- Over **50% of respondents** use **adaptive learning platforms** and **virtual assistants**, indicating a strong preference for **personalized learning experiences** and **real-time interaction support**.
- With **73.3%** usage, plagiarism detection tools are almost **standard practice** in distance education settings.
- Only **15.3% of respondents** reported experience with ITS, suggesting these tools are still in **early stages of implementation** or are **available in niche settings** only.

Suggestıons

1. Encourage broader exposure to AI tools, especially among less familiar roles (e.g., students or administrators).
2. Prioritize AI tools that reduce instructor workload, as this is the most valued benefit.
3. Promote adaptive learning and virtual assistants, which have shown strong adoption and potential for engagement.
4. Address concerns around data security and ethics, even if they rank lower, to ensure trust in AI systems.

5. Invest in training programs to equalize familiarity levels across all roles in distance education.

Conclusıon

This research shows how AI can change distance education for the better. It can cut down on teaching work, boost learning results, and keep students involved through smart systems and chatbots. While tools that spot copied work are used the most more advanced AI systems like smart tutoring aren't used as much. How people see AI doesn't change based on their job, but how well they know AI does point to a gap in exposure and training across different work groups. These findings make it clear that we need to bring AI in and build up everyone's skills in digital learning spaces.

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SIRJODL: Volume 6 Issue 2 July 2025
ISSN 2582-9009

Enhancing Teaching Effectiveness in Distance and Online Education: The Impact of Micro-Teaching on Distance and Online Educators' Perceived Performance

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Abstract

The rapid expansion of education systems in recent decades has led to a significant shift from traditional, face-to-face instruction to more flexible modes such as distance education. With this transition, the role of educators has evolved, requiring the adaptation of core teaching competencies to suit a virtual and student-centric learning environment. Micro-teaching—once widely used in traditional teacher training—emerges as a potentially valuable tool to enhance the instructional effectiveness of distance educators. This study investigates the effect of micro-teaching on the perceived teaching effectiveness of educators engaged in distance education. Micro-teaching skills such as set induction, explanation, questioning, use of audio-visual aids, and classroom management are re-examined and adapted for application in remote learning contexts. Findings suggest that structured micro-teaching sessions significantly enhance educators' self-

perceived instructional competence and readiness to engage adult learners in a virtual setting. The research emphasizes the need to integrate micro-teaching-based training modules into distance education frameworks to improve instructional quality and learner engagement.

KEYWORDS

Distance Education, Micro-Teaching, Teaching Effectiveness, Adult Learners, Teacher Training, Online Pedagogy, Instructional Skills

Introduction

Distance Education refers to a method of delivering education where learners and instructors are separated by geographical distance. This mode of learning is particularly centered on adult education, targeting individuals who missed formal education earlier in life—often termed as "second-chance learners" (Moore & Kearsley, 2012). It offers these learners the flexibility to study from home or their workplace, eliminating the need for physical attendance at a specific location. This convenience makes it an attractive option for a large segment of adult learners.

In recent years, distance learning has evolved into a key educational strategy, witnessing rapid and sometimes unexpected growth. The digital revolution has significantly accelerated this expansion by overcoming traditional and geographical limitations through technological integration. Advances in digital tools and communication technologies have not only enhanced accessibility but also underscored the distinctions between distance education and conventional classroom-based learning.

Moreover, the decline in costs associated with telecommunications and information technology has contributed to the affordability and scalability of distance education (Allen & Ryan, 1969). Compared to traditional educational systems, distance education models incur relatively lower costs per student. There is an inverse relationship between infrastructure costs and student enrollment in distance education—while expenses related to infrastructure and maintenance decrease, the number of enrolled adult learners continues to rise.

Distance educators do not meet the students on face-to-face mode, rather the distance educational program is delivered through self-learning print material, live and recorded lectures and through the assignments in form of practical or internship programs.

1. Micro Teaching Skills

Teaching is a multifaceted process composed of several micro or specific skills. When integrated effectively, these skills help educators achieve the desired learning outcomes. This raises an important question in the context of distance education: What specific teaching skills are essential for distance educators, and can these skills truly enhance the effectiveness of the distance teaching–learning process?

In distance education, the teaching process relies heavily on certain adapted competencies. These include strong writing skills for developing high-quality self-instructional print materials, effective online delivery of lectures, and the ability to facilitate engaging and interactive communication through digital platforms such as chat or discussion forums. Consequently, the teaching skills required for distance education differ from those used in traditional classroom settings. The specific teaching skills relevant to distance educators are outlined in the following table.

Table 1: Teaching skills and its component associated with Distance and online Education

Sr. No	Teaching skills	Component teaching skills
1	Writing skills for the preparation of quality Self Learning Materials	a) Writing instructional objectives b) Selecting and writing the content c) Organizing the content
2	Skill of quality delivery of the lectures through Internet	a) Preparation of Power point slides b) Ease of handling the Internet c) Ability of explaining the topics with the Power points slides
3	Presentation skills	a) Use of computer application software b) Explanation skills c) Illustrating with examples
4	Managerial skills	a) Promoting students' participation b) Management of the Virtual Class
5	Closure skills	a) Planned repetition b) Giving assignments c) Getting feedback from the students

Brief descriptions of these skills are as follows –

1.1.1 Writing skills for the preparation of quality Self Learning Materials

Effective writing is a foundational skill for distance educators, particularly for developing quality Self-Learning Materials (SLMs). One of the primary elements is writing instructional objectives at the beginning of the unit. This provides learners with a clear understanding of what they are expected to achieve by the end of the lesson. In addition, content selection and writing must align with these objectives. The language used should be simple, clear, and self-contained to avoid dependency on external resources or direct teacher intervention (Moore & Kearsley, 2012). Equally important is organizing the content logically, supported by illustrations and explanations. This arrangement helps reduce the cognitive load for learners and minimizes the need for academic support.

1.1.2 Skill of quality delivery of the lectures through Internet

With advancements in computer technology, ease of handling the Internet has become an essential skill for distance educators. The Internet has transformed the delivery of education, making it crucial for educators to be proficient in its use. Preparation of PowerPoint slides plays a vital role in online lectures. Unlike traditional teaching, distance education relies heavily on well-designed presentations using features such as animations, sound, color, and multimedia to enhance learning. Furthermore, the ability to explain topics effectively using these slides is equally important. Slides should not be text-heavy; instead, they should incorporate visual elements like images, graphs, and tables to support instructionally designed content that facilitates better understanding.

1.1.3 Presentation skills

Distance educators must also demonstrate strong presentation skills. This includes the competent use of various computer application software to support their teaching. Given the physical separation between the learner and educator, explanation skills become crucial. Descriptions should be precise and should stimulate curiosity and motivation in learners. Another vital skill is the ability to illustrate abstract concepts with practical examples. Mastering this skill helps educators make complex content more relatable and understandable for distance learners.

1.1.4 Managerial skills

Managerial skills are especially important in a distance education setup. One of the key challenges is promoting learner participation. Since distance learning lacks face-to-face interaction, educators must adopt strategies that encourage interactive learning. This includes designing materials that include self-assessment questions and activity-based tasks. During live online sessions, posing questions that prompt discussion and critical thinking can help maintain learner engagement (Knowles, Holton, & Swanson, 2015). Another managerial skill is the efficient handling of virtual classes, which function similarly to video conferencing. Educators should be capable of conducting these sessions smoothly to create a productive learning environment.

1.1.5 Closure skills

Closure skills are equally important in distance education. Planned repetition at the end of a lecture or unit helps reinforce key concepts, directing learners' attention to crucial takeaways. Giving assignments in the form of activities further supports engagement and deepens learning. Moreover, obtaining feedback from learners enables educators to refine their teaching strategies. Constructive feedback is essential for continuous improvement and for adapting teaching methods to meet learner needs.

1.2 Objectives of the study

- To study the effect of Micro Teaching on perceived teaching effectiveness of distance educators
- To suggest action to improve the perception, if any

2. Literature Review

The transformation of educational delivery from traditional classroom settings to distance education has prompted a significant re-evaluation of teaching strategies and educator preparation (Moore & Kearsley, 2012). While distance education focuses on learner autonomy and flexibility, it also presents challenges in ensuring instructional effectiveness, particularly due to reduced face-to-face interactions and the absence of immediate feedback mechanisms (Anderson, 2008).

Micro-teaching, first introduced in the 1960s at Stanford University, is a scaled-down teaching encounter that allows educators to develop specific teaching skills in a controlled, supportive environment (Allen & Ryan, 1969). It focuses on discrete teaching behaviors such as set induction, explanation, questioning, reinforcement, and classroom management. Research has shown micro-teaching to be a powerful professional development tool for pre-service and in-service teachers, enabling skill refinement through practice, observation, and feedback (Fernandez, 2005; Kpanja, 2001).

Recent studies have explored the applicability of micro-teaching in online and distance learning environments. Wambugu, Barmao, and Ng'eno (2013) demonstrated that micro-teaching enhanced pre-service teachers' confidence and delivery, even when adapted to a virtual platform. Similarly, Panda and Mishra (2007) emphasized the need for specialized training in online pedagogies for distance educators, advocating the inclusion of micro-teaching strategies tailored to digital platforms.

In the context of adult education and distance learning, learners bring prior knowledge, self-direction, and goal orientation, requiring educators to employ more personalized and interactive methods (Knowles, Holton, & Swanson, 2015). Micro-teaching, when adapted to this learner profile, can help distance educators experiment with communication, engagement techniques, and learner motivation strategies that resonate with adult learners.

Furthermore, Ching and Hsu (2013) found that reflective practices embedded within micro-teaching enhance metacognitive awareness among instructors, contributing to long-term teaching improvement. This aligns with Mishra and Koehler's (2006) Technological Pedagogical Content Knowledge (TPACK) framework, which supports the integration of content, pedagogy, and technology for effective distance instruction.

Despite its proven benefits, literature also indicates limitations of traditional micro-teaching, including its reliance on in-person observation and immediate feedback (Amobi, 2005). However, technological tools such as video recordings, peer review platforms, and virtual simulations are now enabling its evolution into a suitable model for distance educators.

Furthermore, Ayodele Abosede Ogegbo and Mafor Penn (2024) state the use of virtual reality classrooms for micro-teaching practice for preservice science teachers' experiences.

In the International Journal of Higher Education, 2021, a research paper authored by Msimanga Mothofela Richard et. al. found that there is great impact of Micro Teaching Lessons on South African students.

3. Research Methodology

The present study adopts a Descriptive Approach within the broader framework of Conclusive Research, aiming to assess the effect of micro-teaching on the perceived teaching effectiveness of distance educators. The research is based on empirical observations and attempts to draw meaningful conclusions about the relationship between micro-teaching interventions and perceived instructional effectiveness.

A well-formulated research design is crucial for generating valid, reliable, and unbiased results. For this study, a Single Group Pre-test Post-test Design which is a form of pre-experimental design, was employed. This design was chosen to observe the effects of a micro-teaching training program (independent variable) on the teaching effectiveness of distance educators (dependent variable) by comparing participants' responses before and after the intervention.

This design is suitable for small-scale intervention studies where control groups are not feasible. It provides an initial understanding of the cause-effect relationship by measuring the change within the same group over time.

The symbolic representation of the design is as follows:

$$\mathbf{O_1 \rightarrow X \rightarrow O_2}$$

Where:

- O_1 = Pre-test (Baseline measurement of teaching effectiveness)
- X = Micro-teaching Training Program (Intervention)
- O_2 = Post-test (Measurement after intervention)

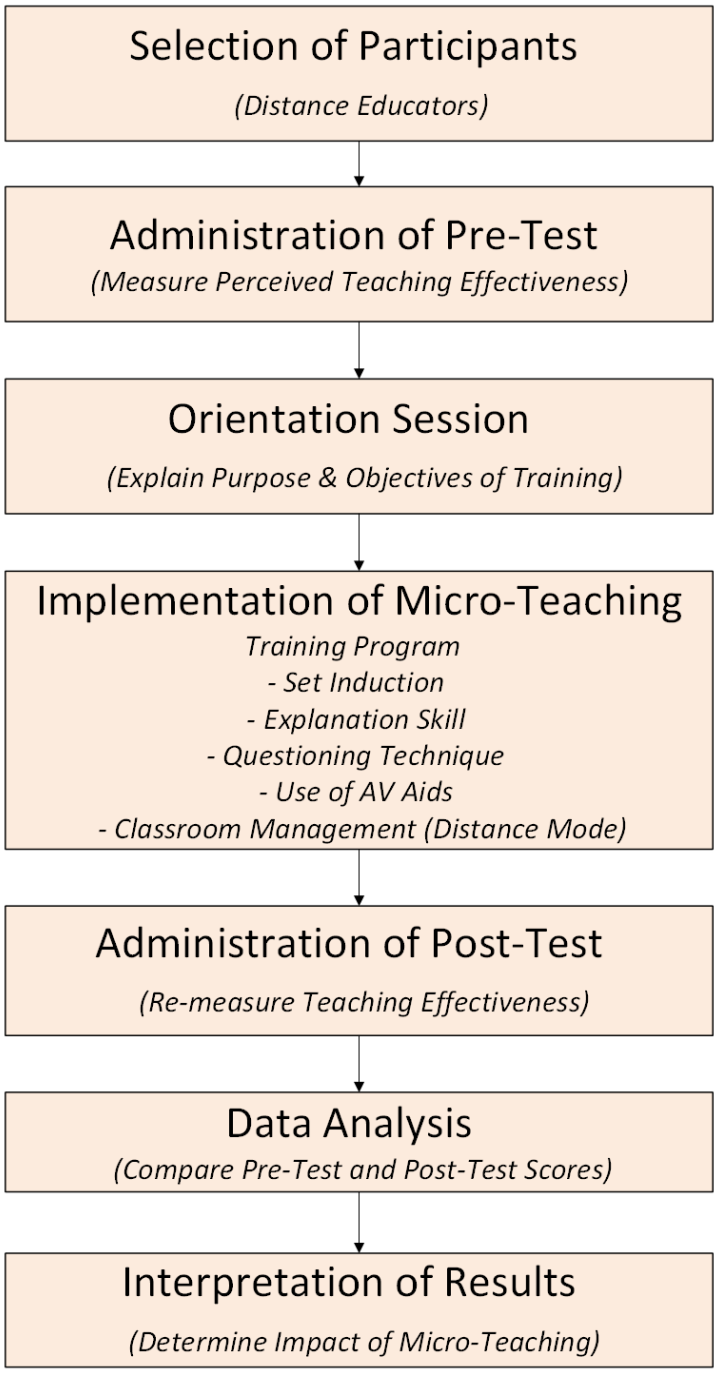

Figure 1: Research Procedure

4. Research Analysis

4.1 Tools of data collection

A group of 30 distance educators were selected for the study. These educators were teaching subjects like Management, Computers, Education and Law through Distance learning mode with little or no knowledge of teaching skills, but are experts in their domains. A questionnaire was developed and distance educators were given to complete it. The questionnaire was prepared with the following criteria –

(Questionnaire at the end of the paper in Appendix 1)

1. As a distance and on-line educator, for the preparation of quality self-learning material writing skills are necessary
2. Distance educators should be able to illustrate concepts with examples
3. A distance educator should be comfortable in handling Internet
4. A distance educator should be able to create power point slide shows for the classes held on the internet
5. Promoting students' interaction is difficult in a class through the internet
6. Planned repetition in the presentation of the class through the internet is necessary
7. Getting feedback is difficult from the distance education students

4.2 Analysis of the data

In the present study of perceived teaching effectiveness of distance educators, quantitative data analysis is done. Quantitative data analysis is done when variables being studied are measured along a scale that indicates "how much" of the variable is present. Quantitative data are reported in terms of scores. After instruments have been administered, scored and tabulated, the first step in quantitative data analysis is to describe it in the form of a summary using descriptive statistics and then interpreting these statistics.

The present study, quantitative analysis compromise of the following parts.

1. To test the "Effect of Micro Teaching on Perceived teaching effectiveness of Distance Educators"
2. Mean: Measures of central tendency
3. Each criterion will be compared on the mean values to evaluate the effectiveness of micro teaching on distance educators

The following analysis is based on questionnaire responses collected before and after the micro-teaching intervention from 20 distance educators. The goal was to measure the perceived teaching effectiveness across various teaching competencies.

Table 2: Mean Value Pretest and Posttest

Teaching Skill/Statement	Pretest Mean	Posttest Mean
Writing skills necessary	3.53	4.62
Illustrate with examples	3.67	4.27
Comfortable with Internet	3.62	4.27
Create PPTs for online class	3.50	4.27
Promoting interaction is difficult	4.31	4.33
Planned repetition is necessary	3.57	4.62
Feedback is difficult	3.27	4.07

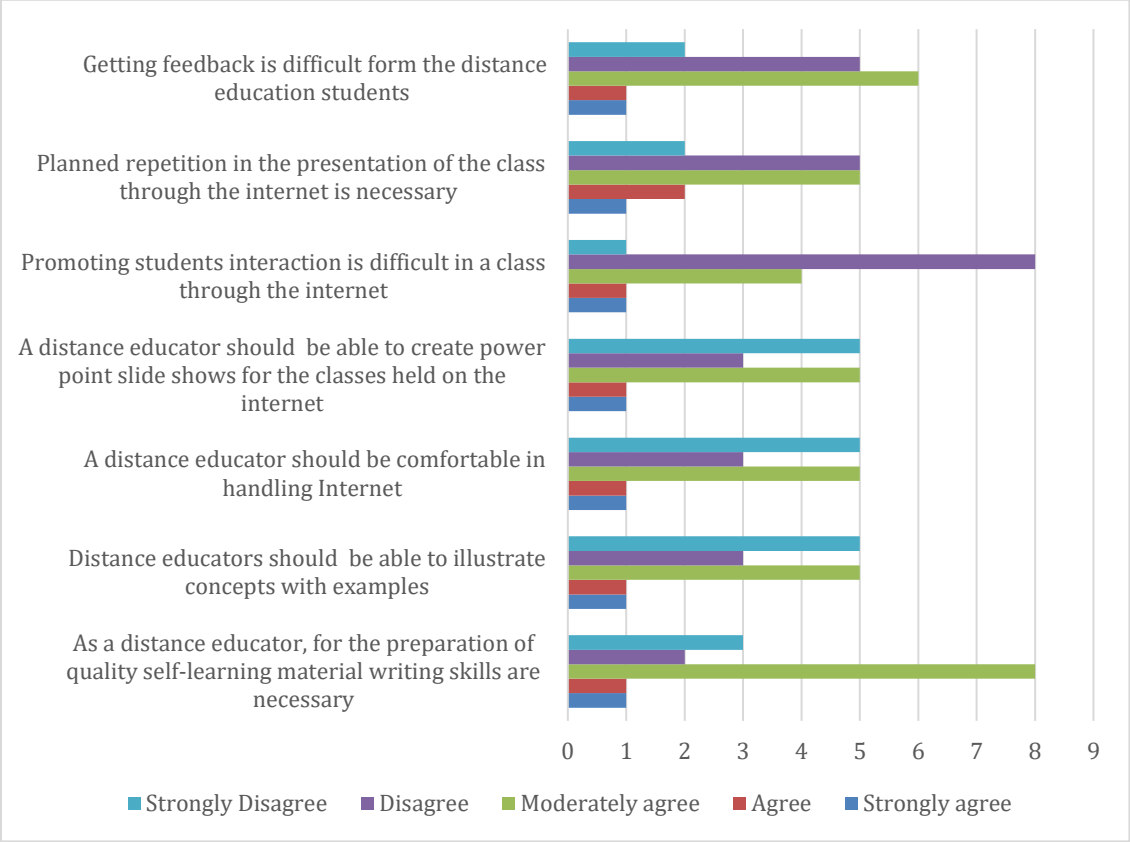

Figure 2 Pretest Data

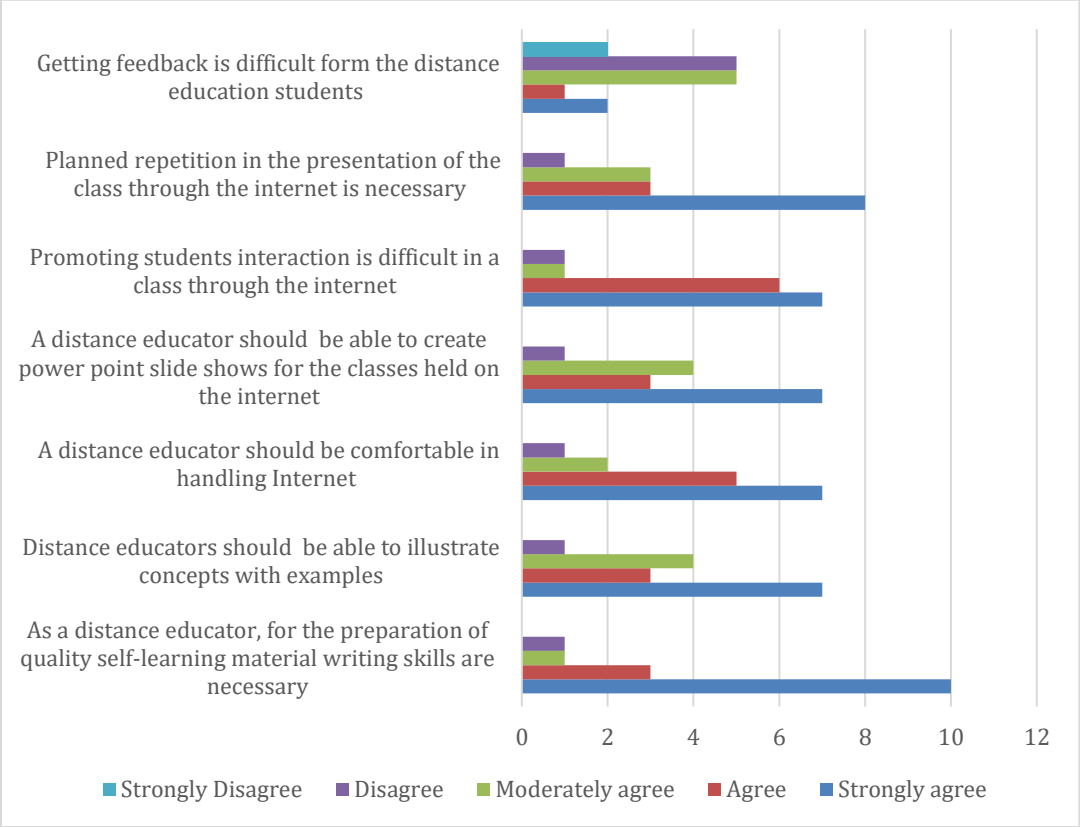

Figure 3 Post Test Data

The analysis of mean scores before and after the micro-teaching intervention reveals a significant improvement in the perceived teaching effectiveness of distance educators. Notably, there was a marked increase in competencies related to the preparation of quality self-learning materials, the use of relevant examples to explain complex concepts, and the ability to handle internet tools effectively. Educators also showed considerable enhancement in their skills to create and deliver PowerPoint presentations for online classes. These improvements suggest that micro-teaching sessions successfully strengthened essential teaching practices tailored to the needs of distance education.

However, some areas remained relatively challenging, particularly the promotion of student interaction and the collection of feedback in virtual learning environments. These skills showed only minimal improvement, implying that despite training, educators continue to face difficulties in fostering two-way communication and engagement with learners in the online mode. This highlights the need for further targeted interventions and expert-led guidance to address these persistent challenges.

Moreover, a noticeable shift in perception was observed across different academic disciplines. Educators, regardless of their subject domain like Management, Computers, Education, or Law acknowledged the importance of acquiring pedagogical skills for delivering effective instruction in the distance education format. This shift reflects a growing awareness among subject experts of the critical role that instructional strategies and learner engagement techniques play in enhancing teaching effectiveness in a digital learning environment.

Hypothesis Testing

To validate the effect of micro-teaching on perceived teaching effectiveness, we performed a **paired sample t-test** between pretest and posttest means for each of the 7 items.

Variables

- Independent Variable: Micro-Teaching Intervention
- Dependent Variable: Perceived Teaching Effectiveness of Distance Educators

Hypotheses

- H_0 (Null Hypothesis): There is no significant difference between pretest and posttest means.
- H_1 (Alternative Hypothesis): There is a significant difference between pretest and posttest means.

$$t = \frac{d}{s/\sqrt{n}} \text{.....(1)}$$

Where:

- d = Mean of the differences (Posttest - Pretest)
- s = Standard deviation of the differences
- n= Number of paired observations (n = 7 items/questions)

Table 3: T Test Calculations

Item	Pretest Mean (O_1)	Posttest Mean (O_2)	Difference ($d = O_2 - O_1$)	$(d_i - \bar{d})^2$	Standard Deviation	Calculated t-value	p-value
1	3.53	4.62	1.09	0.1431	0.3566	5.28	0.0018
2	3.67	4.27	0.60	0.0124			
3	3.62	4.27	0.65	0.0038			
4	3.50	4.27	0.77	0.0034			
5	4.31	4.33	0.02	0.4780			
6	3.57	4.62	1.05	0.1143			
7	3.27	4.07	0.80	0.0078			

Since the p-value (0.0018) < 0.05, we reject the null hypothesis. There is a statistically significant effect of the micro-teaching intervention on the perceived teaching effectiveness of distance educators.

From the above analysis it is indicated that the skills related to writing self-study material, skills of illustrating concepts with examples and skills of handling Internet with preparation of power point shows are highly recommended by the distant educators. Whereas the skills of procuring the feedback for distance learners seems to be difficult for the distance educators. Hence it is further recommended that suggestions should be acquired from the experts of improving this skill.

From the above analysis it is observed that the distance educators may be from any discipline / domain but he or she considers that teaching skills are necessary for effective teaching. The graphs acquired through the questionnaire indicated that the null hypothesis was rejected with the acceptance of declarative hypothesis, which is as follows – "There will be significant effect of Micro Teaching on perceived teaching effectiveness of distance educators".

Conclusion

Distance educators may come from diverse academic and professional backgrounds such as Management, Law, Information Technology, Education, or Social Sciences. However, regardless of their domain expertise, it is essential that they possess strong teaching skills—particularly the ability to communicate content clearly, structure lessons effectively, and engage learners

meaningfully. This study was undertaken to explore and emphasize the importance of micro teaching skills in enhancing the teaching effectiveness of distance educators.

Distance learning offers learners the flexibility to study at their own pace and convenience. For educators to deliver quality instruction in such a mode, mastery of micro teaching skills—such as clear presentation, content organization, use of examples, and integration of technology—is critical. In a rapidly evolving educational landscape, where continuous learning and upskilling are vital, equipping distance educators with pedagogical competencies ensures better learner engagement and improved educational outcomes. Ultimately, incorporating micro teaching skills in distance education not only empowers educators but also enriches the overall learning experience for students.

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Appendix- 1

Kindly rate yourself for the following statements. Your name and the ratings will remain confidential.

	Strongly agree	Agree	Moderately agree	Disagree	Strongly Disagree
1. As a distance educator, for the preparation of quality self-learning material writing skills are necessary					
2. Distance educators should be able to illustrate concepts with examples					
3. A distance educator should be comfortable in handling Internet					
4. A distance educator should be able to create power point slide shows for the classes held on the internet					
5. Promoting students' interaction is difficult in a class through the internet					
6. Planned repetition in the presentation of the class through the internet is necessary					
7. Getting feedback is difficult form the distance education students					

SIRJODL: Volume 6 Issue 2 July 2025
ISSN 2582-9009

Mindful Connection as Pedagogy: Designing an Institutional Framework for Enhancing Learners' Engagement in Online and Distance Learning

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Abstract

In the evolving landscape of education, especially in the realm of online and distance education, fostering meaningful connection is no longer a supplementary feature—it is central to learner's success. This paper argues that emotional connection and engagement are essential components in driving meaningful learning experiences. The paper, further presents a holistic and actionable framework that places mindful connection at the heart of the student journey, from pre-admission to alumni engagement. Analysing from global and Indian institutional practices, psychological insights, and on the basis of a decade of academic experience in online teaching, the authors of the research paper propose the framework for enhancing learners' engagement along with the touchpoints and strategies designed to address emotional, social, and academic disconnects. Through a multi-phase approach, the framework identifies how students can be made to feel seen, supported, and a part of the institution, even in the absence of physical classrooms.

The paper emphasizes the idea that institutional connection—when personalized and intentionally embedded—drives higher engagement, reduced attrition, and a sense of lifelong belonging. The authors conclude with practical recommendations for phased implementation, including faculty training, alumni integration, and system-wide accountability mechanisms.

The research ultimately positions student-cantered connection as a **strategic imperative** *in reimagining the future of online and distance learning.*

KEYWORDS
Online and Distance Education, Learner Engagement, Mindful Connection, Emotional Belonging, Institutional Framework,

Introduction

The effectiveness of education done not depend solely on 'What is Taught', its rather more about 'What is Learnt'. With this reality, something which can bridge the gap in teaching and learning is the connection present between student and teacher, student with other students and student with the institution at large. Connection can transform passive learning into active learning. Though learning is an intellectual process, its human process too. Therefore, any type of disconnection can result into the withdrawal of learning interest. On the other hand, due to presence of connection in teaching learning, all the stakeholders in the process feel emotionally connected, developing the sense of belongingness. Therefore, in education, having focused connection is not a matter of choice but it is highly essential.

If we look into the ancient education model of Gurukul system, we will realise that the central ideology of that education system itself was based on staying deeply connected in teaching learning journey. Gurukul, at its core was more than just a place of academics learning, it was the holistic collaborative learning, build on trust, interdependence, and emotional interactions possible through connection. Education should bring transformation in learner, which obviously not possible in isolation.

In case of school students and adult learner, there is one common thing observed in many psychological studies. All types of students flourish when they feel valued, heard and noticed.

Need of Connections in Online and Distance Education

If connection is so important in traditional, offline education, it has got more mindful role in online and distance education. In online education, due to the absence of physical presence, staying connected with your teachers, peers and the institution is more critical. The success of learning in online and distance education, completely depends on the connection felt and experienced by the learners.

Therefore, in online education this connection needs to be established and re-established again and again using multiple simple but effective exercises. This includes- caring voice by teachers during sessions, providing opportunity to stay connected with the peers through shared discussion, and involving or communicating all the students in all events of the institution. Further, encouraging and recognising the students' achievements helps to create a feeling of belongingness. In online and distance education the connection could be further cultivated through personalised learning, teachers' availability and visibility beyond lectures, strong and active Alumni network associated closely with the institution for multiple innovative and knowledge sharing programs.

In online and distance education, there should be intentionally designed system for developing the connection for geographically scattered learners. It is observed that due to this lack of connection, majority of the times the student engagement is not so high in the learning process. Therefore, instead of bringing real transformation, these online courses just become content.

The above justification concludes that the connection is a strategic priority for the institutions in online and distance education. It is as important as technology platforms, content and material shared and teaching learning and evaluation pedagogy. Therefore, these institutes should prioritise the investment in creating inclusive and mindful connections, to create learners who belong, trust and transform.

Higher education institutions across India and the globe are increasingly adopting thoughtful practices to nurture emotional engagement and a sense of belonging among learners in online and distance modes.

Indian institutions such as IGNOU, SCDL, and Amity Online have implemented various learner-centric approaches—ranging from regional meetups, mentorship circles, identity-building activities during orientation, live interactions and digital cultural programs. These efforts promote sustained connections between students and their institutions while addressing both academic and emotional needs.

Global universities like the University of Phoenix, The Open University (UK), and Southern New Hampshire University have established initiatives that prioritize student well-being and inclusive engagement. These include access to emotional support services, peer-buddy networks, faculty-led informal sessions, and recognition of personal milestones through social media or virtual celebrations.

These initiatives of institutions, demonstrate a global shift toward more human-centred distance education that values emotional connection as much as academic achievements.

Literature Review

1. Amanda Kassandrinou, Christina Angelaki [cangelaki@yahoo.com], Ilias Mavroidis [imavr@tee.gr], Hellenic Open University, School of Humanities [www.eap.gr], Patras, Greece (2014) published their paper titled 'Transactional Distance Among Open University Students: How Does It Affect the Learning Process?' in European Journal of Open, Distance and e-Learning Vol. 17 / No. 1 – 2014 DOI: 10.2478/eurodl-2014-0002.This study examines the presence of transactional distance among students, the factors affecting it, as well as the way it influences the learning process of students in a blended distance learning setting in Greece. The Study involved 112 postgraduate students of the Hellenic Open University (HOU). Qualitative research was conducted, using information collected via individual semi-structured interviews. Content analysis of the gathered information provided evidence regarding the existence of student-student transactional distance for several reasons, such as geographical and relatively limited face to face interaction. The role of the tutor as well as of the course provider were also examined in this respect. Finally, the study indicated that the

existence of perceived transactional distance among the students has a negative effect on their learning process.

2. Liangliang Xia 1, Lianghui Wang 2 (2024),* and Changqin Huang 2, in their study on 'Implementing a Social Presence-Based Teaching Strategy in Online Lecture Learning', which is published in Eur J Investing Health Psychology Educ, 2024 Sep 21;14(9):2580-2597. DOI: 10.3390/ejihpe14090170. Their research refers to the previous studies which are focused on the design of video lectures to improve students' social presence by enhancing instructor presence for learners in lecture-based online courses; however, there has been limited emphasis on the peer presence in which learning from video lectures takes place. The first objective of this study was to develop a social presence (SP)-based teaching strategy to design online learning activities aimed at improving students' social presence by providing social clues about peer presence and encouraging peer communication. The second objective was to compare students' social presence, social interaction, and academic performance from lecture-based online learning supported by either a conventional teaching strategy or an Social Presence-based teaching strategy. Using a quasi-experiment,

81 Chinese university students were selected to participate in a ten-week online course. The participants were randomly assigned to either an experimental group (EG) (N = 43) or a control group (CG) (N = 38). This study revealed that the Social Presence-based strategy enhanced EG members' social presence in online learning and that EG members achieved better academic performance than CG members. A significant correlation was found between the EG members' academic performance and their social presence. The researchers also identified more concentrated social network sociograms with more cohesive subgroups in the EG members' online interactions. The results indicate the necessity of applying an Social Presence-based teaching strategy in lecture-based online courses to promote students' social presence, social interaction, and academic performance.

Based on the extensive experience in online and distance learning, the justification given in the introduction and the literature review findings, the authors want to propose the detailed phase wise Framework for creating mindful connection in online and distance education.

The framework is based on few observations, by the authors while working with the online and distance education format for more than 10 years duration.

1. When students sense connection with their teachers, there is more possibility of engagement and open interaction.
2. There are many incidents of silent dropouts in online and distance education. The students drop out even without raising the concern for their disengagement. This mainly happens due to the lack of trust and connection either at institution level or at faculty level.
3. On the other hand, if faculty members know their learners personally, they can take continuous feedback on student's concerns, recommend resources, and adapt their teaching style to suite it for the different types of the student.
4. The students who feel emotional connection to their institution, are found connected with their institution beyond graduation. They found re-visiting their institutions frequently through strong alumni programs. They not only advocate the institution brand, but also re-enroll in other courses for further upskilling and reskilling in future.

Before giving the framework, authors want to share the touchpoints identified during their journey as a faculty member with online and distance institution. Touchpoints in this context refer to every interaction, whether small or big, especially during learners' association with the institute. For the sake of clear relevance, these touchpoints are categorised based on the below mentioned phases.

1. Pre-Admission Touchpoints
2. Admission & Onboarding Touchpoints
3. Academic Journey Touchpoints
4. Emotional support and Engagement Touchpoints
5. Administrative Support Touchpoints
6. Post Diploma & Alumni Touchpoints

I. Pre-Admission Touchpoints: these touchpoints should be designed to create easy access to the institute and courses details, enhancing the familiarity, building trust.

1. Reception/Customer care interaction- We all know that the first impression is last impression. When student is contacting the institute for the very first time, they interact either with receptionist or with customer care staff. Students experience during this conversation act as hygiene factor. Though this conversation may not be completely responsible for motivating the callers to take the admission, but it may certainly demotivate if not taken care. Therefore, the detailed training and review of their interactions is very important to deal positively with this touchpoint.
2. Institution Website & Program Pages – the website of the institute is the first virtual touchpoint. The philosophy of first impression also applies to the website. Therefore, the impact created by the institute website play significant role in creating that first impression for the students who visited the website with many expectations. The content, design and layout of the website should be such that the student can navigate to all the related pages without facing any problem. The webpages should include the multiple opportunities to interact either through chats, or strategically developed videos about the institutions, and other contact details.
3. Digital Brochures / Prospectus – should be downloadable even on Mobile and interactive versions of the same complement the student experience.
4. Online Webinars / Demo Classes – Hosted by senior faculty and alumni.
5. WhatsApp or Phone Counselling Support – Quick, responsive, and personalized assistance.
6. Email Campaigns with Success Stories – Featuring actual alumni of the program.
7. Instagram, LinkedIn & YouTube Videos – Behind-the-scenes campus culture, testimonials, and FAQs.
8. One-to-One Pre-admission Counselling Call – the exact student's learning needs should be understood and the relevant career advice to be given.

II. Admission & Onboarding Touchpoints- the purpose of these touchpoints should be to create the feeling of belongingness in the first interaction.

1. Welcome Email from the Director – With a message of pride and encouragement.
2. Digital Student Handbook – Includes academic calendar, LMS navigation, contact list.
3. Online Orientation Ceremony – Includes virtual campus tour and overview of program and teaching pedagogy.
4. Onboarding Checklist on LMS – Easy navigation to complete first-week activities.
5. Digital Welcome Card – Celebrating their entry into the institute family.
6. Know your mentor/Program co-ordinator- one session of mentor/program co-ordinators to strengthen their confidence in the institute selection.

III. Academic Journey Touchpoints: the purpose of these touchpoints should be to maintain the academic support, giving the clarity on learning and setting realistic evaluation system to know the real progress.

1. Weekly LMS Announcements – From faculty with updates and encouragement.
2. Live Interactive Sessions – Real-time engagement opportunities with professors.
3. Recorded Video Lectures – Available with note-taking tools and captions.
4. Assignment Reminders & Tips – Shared via app notifications or email.
5. Discussion Forums – Moderated by faculty, with peer-to-peer learning.
6. Midterm Survey – Collecting feedback on faculty, pace, and clarity.

IV. Emotional & Social Engagement Touchpoints: The objective of these touchpoints is to strengthen motivation, connection and creating opportunities for peer interaction.

1. Faculty informal Sessions – Non-academic, personal sharing sessions with professors. If faculty remember remembers the names and important details like which city the learner is from, where is working and in what position, using those details, while interacting or giving the examples can help the faculty member to make the strong bond with the student.

2. Student Achievement Wall on website – Featuring promotions, toppers or creative contributions by existing students.
3. Birthday and Festival Greetings on student mobile– Automated, yet warm and personalized.
4. Virtual Celebrations – virtual celebration of some important events like Independence Day, Diwali, Women's Day, etc.
5. Talent Showcases – platform to showcase the extracurricular talent like Poetry, music, or painting competitions held virtually.

V. Administrative & Support Touchpoints: to ensure the smooth Communication and single window system for various administrative formalities.

1. Automated Fee Reminders with Support Links – Polite, clear, and actionable.
2. Query Management Portal – Ticket-based system with resolution status.
3. Live Chat on Website or App – Real-time human or AI assistance.
4. Schedule of Exam Notifications – Calendar updates with SMS and email reminders.
5. Helpline Numbers for Tech Issues – For login, exam proctoring, etc.
6. End-of-Semester Feedback Collection – Use insights to refine the next cycle.

VI. Post Diploma/Degree Touchpoints: to Sustain belonging beyond the course and foster loyalty

1. Virtual Convocation or Certification Event – With music, alumni speakers, and director's message.
2. Thank You Note from Faculty or Mentor – Sent via email with a digital memento.
3. Alumni Wall on Website – Featuring career updates, quotes, and photos.
4. LinkedIn Alumni Endorsements – Recommendations given for active contributors.
5. Invitation to Join Alumni Network – With access to job boards or continued learning.
6. Guest Speaker Invitations – Alumni called to speak with current learners.

Framework for Mindful Connection and All-inclusive Engagement:

Preparations of integrating the institutional processes in the Framework.

1. Map touchpoints to each academic phase
2. Assign ownership to departments (e.g., Academic, Tech Support, Student Services)
3. Create facilities to use automation where possible (e.g., birthday emails, assignment reminders)
4. Personalise critical milestones (e.g., welcome, mentoring, farewells) to make each student feel that he is not just a database but he feels seen, supported and a part of the institution.

Below are further initiatives to be taken as a part of Framework.

1. Personalised Onboarding & Orientation to reduces anxiety and build familiarity and sense of belonging.

- Create and use a special welcome video from faculty and other staff to be sent to every student on the first day of that batch.
- The virtual tours of the campus and LMS could also add further to become one step closer to the institution.
- Identify the successful alumni from the recent batches (2-3 from each program); make their interactive videos about their incredible experience during their association with SCDL. Share these videos during the orientation as well as frequently during other events.
- During the student interaction with any teaching or not teaching staff, the inclusivity through language sensitivity can make a lot of difference. Use of few words of regional language is very simple but effective tool during the interactions, particularly in the online classes. But excessive use should definitely be avoided as it may be interpreted as less professional on broader landscape.

2. Faculty as facilitators and Mentors, Not Just Tutors- to Promotes holistic learning environment.

- Allocate faculty mentors/ Program co-ordinators to all programs.
- Prepare the schedule of Weekly/monthly informal non-academic interactions to discuss their experiences, suggestions and challenges.
- Faculty members can share additional inputs of the program related domain trends, career advice and other required skills through periodically scheduled bridge courses, webinars, career continuation programs.

3. Peer Bonding Opportunities – to feel connected with other similar co-learners going through the same experience.

- Virtual clubs like Specific domain specialisation club, case study discussion club, career advice and placement related clubs, etc for formal and informal discussions
- Group assignments or minor projects using tools like Google Docs.

4. Institute-Wide Engagement & Recognition- to create the sense of pride for being associated with the institute's legacy.

- To showcase of students' professional or academic achievements, announcement of important events, or special talents of students, the special issues of monthly or quarterly e-newsletters should be prepared and circulated to all the active students.
- T-Shirts with the institute names could be sent to every student and the students could be motivated to wear it while socialising in their cities or for institute events.
- At institute level the student councils or student clubs like, placement committee, e-newsletter committee, guest lectures committee, could be formed, with real responsibilities, irrespective of any program.
- An inspiring Anthem of the Institute, portraying institute's values and legacies could reinforce the collective mindset.
- Celebrate some important Indian and international cultural festivals, days of national pride like, independence day or republic day virtually, with teachers and students.

5. Use of Technology to Create Proximity – to Enhance and improve the virtual presence in a digital setting.

- Having the all-inclusive single user-friendly LMS for all interactions of academic and non-academic interactions.
- Interactive dashboards communicating progress and feedbacks.
- Learning analytics dashboards can be used to track: Student login frequency, Participation in forums, Video watch time, Responsiveness to feedback. These metrics help identify disengagement early and trigger intervention touchpoints. Learning analytics can be integrated to detect early signs of disengagement, enabling proactive outreach through personalized messages, or mentor support—thus restoring connection before dropouts occur.

6. Alumni Participation- to inspires students, build trust and positivity, give the realisation of challenges in their career journeys.

- Alumni could be frequently invited to speak in even day to day virtual classes as a surprise element to give guidance and practical tips to optimise the outcomes of their learning efforts.
- The network of alumni could be best used by allowing them to organise one grand event annually and small events either monthly or quarterly.

Recommendations for Implementation

While implementing the above framework the institutions can be flexible to accommodate changing requirements as per the institution format on the basis of types of programs delivered, scale of delivery, technology proficiency, etc, that too not everything in the same year but in a phased manner. By analysing their strengths and weaknesses, the institutions are free to decide the sequence and priority of the above tasks.

During implementations there would be lots of Challenges & Limitations which should be understood, evaluated and then resolved depending on its urgency, importance and relevance.

In the process of application of the framework, the continuous monitoring, evaluation and control is needed to sustain the improvements. The institute can form the separate core committee and the sub-committees to divide the work and create accountability. The frequency of these committee meeting could be decided by the core committee, depending upon the current phase of the framework. In the first phase, author advise the weekly meetings to keep the close controls on any deviation in the outcomes. In second phase the meeting could be either fortnightly or monthly and in the third phase quarterly meetings are suggested.

The training of academic and non-academic staff is equally crucial in this overall implementation phase. Detailed training and division of accountabilities and responsibilities should be clear and communicated to all concerned staff of the institution.

The participation of Alumni for the framework needs more strategic approach. They should not be just blindly invited to this game. All the necessary details, background, rationales and expectations from them should be clearly communicated to them. Their agreement of long-term association is the key in this process. Accordingly, the standard processes to be designed. The reciprocal benefits of this association should be clearly informed to the alumni.

Conclusion

As digital education continues to expand across boundaries, the need for institutions to move beyond transactional delivery toward transformational engagement has never been more urgent. This paper has argued that, building mindful connections is not merely desirable but essential in ensuring the emotional and academic success of online and distance learners. The proposed mindful engagement framework offers institutions a practical roadmap to build **emotional proximity and institutional trust**—from the first inquiry call to alumni reintegration. It serves as a strategic guide for institutions to develop personalized, inclusive, and sustainable engagement ecosystems.

Effective implementation of this framework requires systemic alignment, committed faculty members, empowered support teams, and clear communication with all stakeholders, especially

alumni. Ultimately, through these mindful, student-centred connections, the online and distance education institutions can truly bridge the distance and transform lives.

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SIRJODL: VOLUME 6 ISSUE 2 JULY 2025
ISSN 2582-9009

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