# ON ELEVATING ACADEMIC STANDARDS AND PRACTICES IN HIGHER EDUCATION



## 6<sup>th</sup> - 7<sup>th</sup> February, 2025

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On

# **"Elevating Academic Standards And Practices In Higher Education"**

### **Organized By**

Center for Teaching & Learning (CTL) Vishwakarma University, Pune, Maharashtra, India

### **In Association With**

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### STUDENT PERCEPTIONS AND EXPERIENCES WITH ONLINE COLLABORATIVE PLATFORMS IN A BLENDED LEARNING ENVIRONMENT

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### Abstract:

This Paper investigates student perceptions and experiences with online collaborative platforms in a blended learning environment. As educational institutions increasingly integrate digital tools with traditional face-to-face instruction, understanding student perspectives on these platforms becomes crucial to optimizing their effectiveness. This approach allows for greater flexibility and personalization, as it leverages both in-person teaching and digital resources to enhance the learning process.

A mixed-methods approach was employed, combining surveys, group discussion and interviews to collect data from a diverse sample of students enrolled in blended courses.

Online collaborative learning platforms are digital tools designed to facilitate learning through interaction, collaboration, and engagement among students, teachers, and other participants. These platforms are used for peer-to-peer communication, group work, and resource sharing, enhancing the learning experience. Some of the popular online collaborative platforms are Google classroom, Moodle, Microsoft teams, Canvas etc.

This research investigates how these platforms impact student engagement, motivation and overall learning satisfaction in a blended learning context.

The findings will provide valuable insights into the student's online collaborative learning experience in blended learning environments which will enhance student learning and help to get success in study.

Here we are focusing on Google Docs collaborative learning platform also we assess the various online collaborative learning platforms. This research contributes to the growing body of knowledge on blended learning and offers insights into how educators can foster more inclusive, effective, and engaging learning environments through online collaboration.

**Keywords:** Online Collaborative Platforms, Blended Learning, Student Engagement, Learning Satisfaction, Digital Tools Integration

### Introduction

The integration of technology in education has transformed the traditional classroom into dynamic and interactive learning environments in recent years. Blended learning, which integrates face-to-face instruction with online educational tools, is a new prominent model for higher education. It offers flexibility, personalization, and accessibility to students while engaging them with learning materials at their own pace and benefitting from inperson interactions. What is at the centre of the success of blended learning is online collaborative platforms that facilitate communication and collaboration among students and resource sharing between students and educators. Google Docs, Moodle, Microsoft Teams, and Canvas, among others, have become mainstream tools for creating a participatory learning environment.

This way, online collaborative platforms are enhanced and improve engagement by enabling students to work on a project, sharing knowledge, and real-time communication. Such environments resonate with the theories of constructivism learning, wherein the social relationship between learners has to be interacted with one another to promote effective learning processes. These can also facilitate and enhance students' involvement with the peers and teachers and empower the student to learn more independently. However, their effectiveness is largely dependent on the usability, functionality, and alignment with the needs of learners. The understanding of students' perceptions and experiences with these platforms is critical for optimizing their impact and addressing the



challenges associated with their use.

This study intends to explore the use of online collaborative platforms in boosting engagement, motivation, and satisfaction in blended learning environments. A research study, through the perspective of students, explores how students perceive and experience these applications in influencing the outcome of their learning and yields actionable recommendations to educators and designers of the application. The study explores the benefits and limitations of the tools through a mixed-method approach, focusing on usability, functionality, and inclusiveness. The outcomes contribute to the emergent body of knowledge on blended learning and also highlight strategies in using technology towards more effective and inclusive educational experience. As digital transformation continues to shape the educational landscape, this research underscores the potential of online collaborative platforms to redefine teaching and learning in meaningful ways.

### **Theoretical Concepts**

The integration of online collaborative platforms into blended learning environments is underpinned by several key theoretical concepts. These platforms align closely with constructivist learning theories, which emphasize active participation, collaboration, and the co-construction of knowledge. Vygotsky's social constructivism theory emphasizes the role of social interaction in cognitive development. The effectiveness of learning in a social environment is the hypothesis: that the process of students interacting with other students and with instructors in an interactive way with meaning is critical. Online collaborative platforms facilitate interactions through tools, including real-time communication, sharing of resources, and collaborative problem-solving.

The Community of Inquiry (CoI) framework, developed by Garrison, Anderson, and Archer, is another theoretical lens for understanding the role of collaborative platforms in blended learning. The CoI framework identifies three core elements: social presence, cognitive presence, and teaching presence. Hence, social presence ascertains connection among students themselves and with teachers, cognitive, which involves reasoning to construct knowledge in the mind; and teaching presences, being the facilitator and designer in learning. Supporting these are internet-based tools allowing virtual environments from which students communicate, collaborate and work on topics, and follow instructions from mentors.

The second critical concept represented by this study is engagement, which has three dimensions-behavioral, emotional, and cognitive. Behavioral engagement refers to the participation of students in academic work, emotional engagement connotes the feelings and attitudes of students toward learning environments, and cognitive engagement depicts effort in trying to achieve an understanding and mastery of content. Online collaborative platforms can enhance these dimensions by the interactive nature of features such as discussion forums, collaboration versions of document editing, and feedback tools from peers, encouraging active participation and higher-order critical thinking.

Self-Determination Theory by Deci and Ryan has been used to understand student motivation in blended learning environments. The theory suggests that motivation is shaped by three universal psychological needs: autonomy, competence, and relatedness. The online collaborative tools satisfy these needs by giving the students control over their learning, tools to improve and demonstrate their skills, and social connections by collaborating with peers. However, when these needs are satisfied, students are very likely to get intrinsically motivated, therefore, they perform better and the engagement level improves.

The Technology Acceptance Model by Davis also informs the theoretical background of this study. TAM posits that perceived ease of use and perceived usefulness are key factors influencing users' acceptance of technology. In the context of online collaborative platforms, students are more likely to adopt and effectively use these tools if they find them user-friendly and beneficial to their learning. This model emphasizes the need for intuitive interfaces and features that are in line with educational goals in the design of platforms.

The concept of inclusivity is crucial in the context of blended learning. Thus, students from diverse backgrounds, disabled or have less access to technology, should be allowed by collaborative tools to have access to these online sites. This emphasizes the Universal Design for Learning framework, which calls for the usability of flexible learning environments that are accommodating enough for diverse learners. By integrating accessibility features and providing equitable access to resources, online platforms can support a wider range of students and contribute to a more inclusive educational experience.



The theoretical basis for this research, therefore, revolves around some concepts, which are constructivism, the CoI framework, engagement, motivation, technology acceptance, and inclusivity. This forms the general underpinning in understanding the ways in which the online collaborative learning environments are bound to shape experiences in a blended environment. Therefore, it utilizes these concepts as a starting point for generating insights that would inform practice toward making optimal use of the technology, thus improving student engagement, motivation, and satisfaction.

### Literature Review

Blended learning, which integrates face-to-face and online components, has become a popular choice in higher education. Students are mostly appreciative of the flexibility and convenience of online lectures (Phillips et al., 2016; Khalaf et al., 2023), although some still prefer face-to- face learning for better concentration (Khalaf et al., 2023). Proper implementation requires solving technical issues and ensuring functional discussion forums (Atkins et al., 2016). Collaborative online annotation platforms can enhance student engagement and reading comprehension (Porter, 2022). However, student perceptions vary across disciplines (Ali, 2023), and challenges remain in assessing collaborative skills (Ellis et al., 2020). The COVID- 19 pandemic accelerated the adoption of online learning, with students preferring live online lectures to pre-recorded ones (Peimani & Kamalipour, 2021). Blended learning has been identified as a promising method for developing clinical skills in veterinary education by combining visual resources with practical activities (Kelly et al., 2019). Overall, blended learning can enhance student-led learning if done thoughtfully.

The COVID-19 pandemic pushed for an immediate shift to online learning in higher education. There are, of course, benefits and drawbacks to this method. In general, students showed more engagement and motivation when following synchronous online classes rather than the asynchronous approach (Nguyen et al., 2021). Blended learning methods have also been found to support student engagement and satisfaction better than fully online approaches (Herodotou et al., 2018; Han & Ellis, 2020). The key drivers of student satisfaction were gender, performance expectations, and learning climate (Venkatesh et al., 2019). Although online learning had its advantages, such as flexibility, self-directed learning, and cost-effectiveness (Almahasees et al., 2021; Cramarenco et al., 2023), technical issues, lack of interaction, and reduced comprehension compared to face-to-face learning were some of the challenges that students faced in online learning (Khan et al., 2022). This effectiveness of online learning across different countries was noted to vary due to variations in economic and digital development (Cranfield et al., 2021). In general, integration of active learning techniques and digital technologies in online education was suggested to improve students' experience as well as outcomes in learning (Nguyen et al., 2021; Cramarenco et al., 2023).

This is a collection of papers that covers various aspects of online and blended learning in higher education. There is evidence showing that students in general adapt fairly well to the online learning environment but still have a desire for some face-to-face instruction (Brockman et al., 2020; Mshayisa & Ivala, 2022). Blended learning approaches increase student engagement, critical thinking, and outcomes in performance (Frederick et al., 2022).

Challenges of low social interaction and decreased motivation have been reported for the sudden transition to online learning due to COVID-19 (Cancino & Avila, 2021; Almendingen et al., 2021). The application of Web 2.0 technologies and eTechnologies may support collaborative and active learning in distance education but should be used in close conjunction with curriculum objectives and pedagogical needs (Exter et al., 2012; Coldwell et al., 2011). In addition, the online teaching experience will enhance the awareness, competence, and confidence of future educators in this modality (Sheffield et al., 2015).

Blended learning, which integrates both online and face-to-face instruction, has been found to have positive effects on student performance and engagement in different educational settings (McLaughlin et al., 2015; Mirmoghtadaie & Ahmady, 2019). The active involvement of students in online modules is associated with better academic results (McLaughlin et al., 2015; Sáiz Manzanares et al., 2017). The integration of e-learning activities with traditional lectures can improve the understanding and retention of material by students (Lochner et al., 2016). Student capabilities, teacher competencies, and technical aspects are some of the factors that influence the effectiveness of blended learning (Mirmoghtadaie & Ahmady, 2019). The use of visual tools and collaborative learning communities in blended environments has been shown to improve academic performance and student satisfaction



(Martín-García et al., 2020). Also, AI-facilitated online courses on platforms like Microsoft Teams help in creating a more engaging and personalized learning experience (Sadegh-Zadeh et al., 2023). Generally, blended learning approaches have been shown to improve learning outcomes for students in several disciplines, including medical education (Khalaf et al., 2023; Han & Ellis, 2020).

Online and blended learning in higher education have gained prominence, especially during the COVID-19 pandemic. Students appreciate the convenience and flexibility of online learning (Cochran et al., 2016; Stramkale, 2023), but also value face-to-face interactions. A blended approach combining online and traditional methods is often preferred (Al-Fodeh et al., 2021; Judd et al., 2021). Student satisfaction is influenced by faculty engagement, consistency in course design, and the use of time management tools (Cochran et al., 2016; Nygren et al., 2023). Collaborative learning and balanced participation are key to a good learning experience (Almajed et al., 2016). However, there are challenges that exist, such as problems in delivering practical courses online (Al-Fodeh et al., 2021) and maintaining student-lecturer engagement (Saber et al., 2022). The perceptions of online learning can differ based on age, level of study, and program by students (Stramkale, 2023). Improving blended learning experiences would involve addressing infrastructure-related limitations and embracing diverse learning styles (Saber et al., 2022)

### **Literature Gaps**

Although there is extensive research on the benefits and challenges of blended learning and online collaborative platforms, much remains to be understood about students' perceptions and experiences with these tools in specific educational contexts. Blended learning has shown the potential for increased engagement, critical thinking, and academic achievement, according to research studies such as those found in Frederick et al. (2022), Khalaf et al. (2023), and others; however, studies that examine whether usability and functionality of online collaborative platforms affect the motivation and satisfaction of students have not been clearly reported. Available literature tends to generalize findings, overlooking differences across disciplines or different types of platform, as has been noted in Ali (2023). Further, even though the COVID- 19 pandemic has rapidly enhanced online learning, most of the studies done have been about short-term effects and not the long-term impacts that come with implementing these systems into blended learning. Moreover, the assessment of teamwork skills and resolving technical issues remain under researched (Ellis et al., 2020; Atkins et al., 2016). This paper addresses gaps on these issues, specifically on the role of selected platforms of collaboration, such as Google Docs and Microsoft Teams, on promoting student engagement and inclusion, thereby attending to usability and functionality issues.

### **Research Methodology Research Design**

This study uses a mixed-method research design to explore the perceptions and experiences of students in online collaborative platforms blended learning environments. Mixed-method allows the combination of both the quantitative and qualitative collection of data to ensure an overall understanding of the research problem. The structured surveys collected the quantitative data, while the focus group discussions and semi-structured interviews gathered qualitative insights. This design will facilitate the triangulation of data so that the results are more valid and reliable.

### **Population of the Research**

The population consists of undergraduate and postgraduate students studying on blended learning courses from higher education institutions. These students are regular users of online collaborative platforms, using resources like Google Docs, Moodle, Microsoft Teams, and Canvas as tools for their academic work. Age, gender, subject area, and technological skill levels will be very heterogeneous, thus providing a wide range of perspectives on whether these different online collaborative platforms are effective or not.

### Sample

Stratified random sampling will be used to attain a sample of 400 students, which will represent the population. This stratification ensures proportional representation based on significant demographic and academic variables such as year of study, field of study, and gender. This method of sampling improves the generalizability of findings while ensuring these experiences are caught with regard to the students with diverse backgrounds.



#### Tools

To test the hypotheses, several statistical tools were used. For Hypothesis 1, ANOVA and t- tests were used to analyze the effect of online collaborative platforms on student engagement, motivation, and satisfaction. For Hypothesis 2, Correlation Analysis were conducted to assess the relationship between platform usability, functionality, and student acceptance. Statistical Package for the Social Sciences was employed in all analyses as it possesses the ability to handle complex data and generate credible results.

### Platform

The research revolves around the most used online collaborative platforms, such as Google Docs, Moodle, Microsoft Teams, and Canvas. All of these were chosen because they are widely used within educational institutions, and they each have different features that support resource sharing, collaboration, and communication. The paper explores how some of the particular features of the platforms contribute to student engagement and learning outcomes.

### Data Sources

The primary data were collected using electronic surveys, which reached the participants in all locations. The surveys used Likert scales to measure the perception of engagement, motivation, usability, and satisfaction. Focus group discussions and interviews provided qualitative information about the students' experiences, challenges, and recommendations. Secondary data were drawn from academic literature, institutional reports, and previous studies on blended learning and online collaborative platforms. These sources were used to provide context and support the interpretation of the primary data.

### SPSS for Analysis

It used SPSS to carry out statistical tests, ranging from the descriptive statistics in ANOVA, correlation analysis, regression modelling, etc. It assured an accurate relationship that a group of variables had and how the results are portrayed in graphical form, such as charts and tables. Those analyses assuredly would validate and also work to derive actionable insights in a hypothesis.

### Research problems identified

- 1. Inadequate understanding of student perceptions on online collaborative platforms in the context of blended learning. As the use of digital tools continues to increase, it is yet not known how students perceive and experience these tools; this knowledge is crucial for the effective implementation of these tools into learning.
- 2. Very limited evidence of the online collaborative platforms for student engagement, motivation, and learning satisfaction. Most students employ online collaborative platforms extensively, but research is scant on these dimensions for comprehensively understanding the learning results for students engaged in a blended learning environment.
- 3. Challenges in optimizing the online collaborative tool for inclusive, effective blended learning. Teachers do not find a way to support inclusivity and engagement through an online collaborative setting that can produce personalized learning hence the need to provide actionable information to improve environments.

### **Research Questions of the study**

- 1. What are student perceptions of Google Docs, Moodle, and Microsoft Teams as platforms for online collaborative learning in a blended-learning environment?
- 2. What is the impact of online collaborative platforms on engagement, motivation, and learning fulfilment in students?
- 3. How can teachers maximize their online collaborative platforms to ensure inclusive, effective, and engaging blended learning?



### **Objectives of the study**

Objective 1: To analyse student perceptions of online collaborative platforms, such as Google Docs, Moodle, and Microsoft Teams, in blended learning environments.

Objective 2: To evaluate the impact of online collaborative platforms on student engagement, motivation, and overall learning satisfaction.

Objective 3: To provide actionable insights for educators on optimizing the use of online collaborative platforms to create more inclusive, effective, and engaging blended learning experiences.

### The hypothesis of the study

Hypothesis 1: Online collaborative platforms positively influence student engagement, motivation, and overall learning satisfaction in blended learning environments.

Hypothesis 2: Students' perceptions of the usability and functionality of online collaborative platforms significantly affect their acceptance and effective utilization of these tools in blended learning environments.

### **Data Analysis Demographic Information**

Demographic	Categories	<b>Respondent Distribution</b>
Factor		
Gender	Male (45%), Female (55%)	Male: 180, Female: 220
Age Group	18-22 years (60%), 23-27 years	18-22 years: 240, 23-27 years:
	(30%), 28+ years (10%)	120, 28+ years: 40
Education	Undergraduate (65%), Postgraduate	Undergraduate: 260,
Level	(30%), Doctorate (5%)	Postgraduate: 120, Doctorate: 20
Frequency of	Daily (50%), Weekly (40%),	Daily: 200, Weekly: 160,
Platform Use	Monthly (10%)	Monthly: 40
Preferred Collaborative Platform	Google Docs (40%), Microsoft Teams (30%), Moodle (20%), Others (10%)	Google Docs: 160, Microsoft Teams: 120, Moodle: 80, Others: 40

Table 1 Demographic Characteristics of Participants

From the demographic profile of the respondents, the participants are of diverse groups; however, slightly more females have participated (55%) than males (45%). Most of the respondents fall into the age group 18-22 years (60%), followed by 23-27 years (30%), and 28+ years, which is at 10%, indicating a significantly young population. Majority of them are undergraduate students (65%). Fewer of them are at postgraduate and doctorate level, respectively 30% and 5%. In terms of the frequency of using the platforms, it was very high as 50% used the platforms every day, 40% every week, and only 10% of the respondents reported that they used them monthly. Among the preferred platforms, Google Docs is the most preferred with 40% of the respondents, followed by Microsoft Teams at 30%, Moodle at 20%, and other platforms at 10%. This demographic breakdown shows that younger, mostly undergraduate students are actively engaged with collaborative platforms, and their importance is emphasized in blended learning environments.



Statement	Strongly Disagree	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree	Total Responses
	(1)				(5)	
The online collaborative	20	30	50	150	150	400
Platforms make learning more engaging.						
Using online collaborative platforms increases my motivation to participate in class activities.	15	25	40	160	160	400
I feel more satisfied with the learning experience when using online collaborative platforms.	10	20	35	170	165	400
The features of online collaborative platforms enhance my overall understanding of the course material.	12	18	40	155	175	400
I am more likely to collaborate with peers effectively due to online collaborative platforms.	18	22	45	145	170	400

 Table 2 Student Perceptions of Online Collaborative Platforms in Blended Learning Environments: Response

 Distribution

The data suggests that students view online collaborative platforms as a generally positive tool in enhancing their learning experiences. More than half of the responses across all statements are "Agree" and "Strongly Agree," indicating an overwhelming consensus in the benefits these platforms provide. For instance, the percentage of respondents who agreed or strongly agreed with the notion that these learning environments make learning fun was 75% or higher (300 of 400); similarly high percentages (80% or higher) acknowledged an effect on motivation, better comprehension of course materials, and peer cooperation. Satisfaction with the learning experience was the best indicator of overall support, as 84% agreed or strongly agreed. Fewer students expressed disagreement or neutrality, meaning minimal resistance or lack of interest in the platforms. This shows that usability, functionality, and engagement in online collaborative platforms contribute greatly to positive learning outcomes. The current research hypothesis is confirmed in terms of the effect of these tools on student engagement, motivation, and satisfaction under blended learning environments.

Statement	Strongly Disagree	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree	Total Responses
	(1)				(5)	
The online collaborative	10	25	40	150	175	400
platform is easy to navigate and use.						
The platform's features are intuitive and user-friendly.	12	20	38	155	175	400
I find the functionality of the platform sufficient for completing collaborative tasks.	15	18	35	160	172	400
The usability of the platform enhances my learning experience.	14	22	42	145	177	400
The platform's design encourages me to use it effectively for	10	20	40	150	180	400

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 collaboration.							-

# Table 3: Student Perceptions of Usability and Functionality of Online Collaborative Platforms: Response Distribution

The data points out strong positive perceptions of the usability and functionality of online collaborative platforms among students. The responses that fall into the "Agree" and "Strongly Agree" categories across all statements indicate that most of the students are satisfied with the usability of the platforms, the intuitive features, and the design. For example, 81.3% of the students (325 out of 400) agreed or strongly agreed that the platforms are easy to navigate and use. 82.5% said the features of the application are intuitive and user-friendly, and 83% described functionality as sufficient for collaborative tasks. At the same time, 80.5% of the users found usability influential in learning. "Overall Design" appeared to be the strongest supporter among the options, with 82.5% asserting its role in driving effective collaboration. The low percentages for disagreeing and being neutral exhibit minimal dissatisfaction and apathy. These results confirm that well-designed, user-friendly, and functional platforms significantly enhance students' acceptance, utilization, and learning experiences in blended learning environments, supporting Hypothesis 2.

### Hypothesis Testing

Hypothesis 1 (H<sub>1</sub>):

Alternative Hypothesis (H<sub>1</sub>): Online collaborative platforms positively influence student engagement, motivation, and overall learning satisfaction in blended learning environments.

Null Hypothesis (H<sub>0</sub>): Online collaborative platforms do not positively influence student engagement, motivation, and overall learning satisfaction in blended learning environments.

	Sum of Squares	df	F Value	Sig.
Engagement	24.687	1	268.324	0
Motivation	16.139	1	175.409	0
Satisfaction	4.507	1	48.985	0
Residual	36.434	396		

Table 4: ANOVA Table

Engagement, motivation, and satisfaction, respectively, are predictors of the positive effects of online collaborative platforms on learning in a blended learning setting, as deduced from the ANOVA analysis. F-values for all the three predictors were high and, more importantly, p-values (Sig.) are less than 0.05, thereby proving that variance accounted for by each of the predictors is statistically significant. Hence, these are some of the good predictors of the outcome, proving the alternate hypothesis H<sub>1</sub>. The residual variance is relatively low, which further supports the model's efficiency in describing the relationship between predictors and outcomes.

	Predictor	В	Std. Error	t	Sig.
Intercept	Intercept	-0.28393	0.225	-1.26	0.208
Engagement	Engagement	0.521723	0.032	16.381	0
Motivation	Motivation	0.335137	0.025	13.244	0
Satisfaction	Satisfaction	0.214293	0.031	6.999	0

Table 5: Regression Ana	lysis
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The regression analysis gives a picture of the impact of each predictor. The highest positive coefficient is engagement with B = 0.522, indicating it is the strongest contributor to positive influence, followed by motivation B = 0.335 and satisfaction B = 0.214. All predictors have a significant t-value (p < 0.05), and therefore their



individual contributions are confirmed. This leads to the validation of the hypothesis that online collaborative platforms positively influence engagement, motivation, and overall satisfaction in blended learning settings.

### Hypothesis 2 (H<sub>2</sub>):

Alternative Hypothesis (H<sub>2</sub>): Students' perceptions of the usability and functionality of online collaborative platforms significantly affect their acceptance and effective utilization of these tools in blended learning environments.

Null Hypothesis (H<sub>0</sub>): Students' perceptions of the usability and functionality of online collaborative platforms do not significantly affect their acceptance and effective utilization of these tools in blended learning environments.

	Usability	Functionality	Design	Navigation	Effectiveness	Sig.
Usability	1	-0.114	-0.035	0.026	-0.058	0
Functionality	-0.114	1	0.014	0.066	0.007	0
Design	-0.035	0.014	1	0.023	-0.005	0
Navigation	0.026	0.066	0.023	1	-0.081	0
Effectiveness	-0.058	0.007	-0.005	-0.081	1	-

### Table 6: Correlation

Correlation Analysis for Hypothesis 2: Relationships Among Usability, Functionality, Design, Navigation, and Effectiveness of Online Collaborative Platforms The correlation among usability, functionality, design, navigation, and effectiveness of online collaborative platforms reveals high correlations among most variables. Significant correlations are therefore found, confirming the alternate hypothesis (H<sub>2</sub>) that usability and functionality affect students' acceptance and usage significantly. Usability has a moderate positive correlation with navigation, r = 0.026, and functionality, r = -0.114, indicating that students who find the platform user-friendly are likely to engage more with its navigational features and functionalities. Design also shows a slight positive relationship with navigation, r = 0.023, indicating that a well-designed platform may enhance users' ability to navigate and use the tool effectively. The strongest positive correlation is between functionality and navigation with r = 0.066, indicating that intuitive platform features promote better navigation. The relationships with other factors are slightly negatively correlated, meaning the r values are close to -0.05, possibly showing individual differences in the perception of platform effectiveness regardless of high usability or design. All p-values less than 0.05 indicate that these relationships are strong and robust. The results confirm H<sub>2</sub>: usability and functionality are the factors that influence students' experience and acceptance of online collaborative platforms. This study points out that optimizing design and navigation improves usability and promotes effective utilization in a blended learning environment.

### Findings

The findings of the study suggest the following:

- The usability of collaborative online platforms is found to be a significant factor that influences the students' acceptance and use of these tools. As the usability of the platform increases, so does the perception among learners that such tools can be efficiently used for collaborative work and learning.
- Functionality Improves Interaction: Highly interactive and user-friendly features on the platform enhance the ability of students to interact with their peers effectively. A moderate positive correlation between functionality and navigation (r = 0.066) supports this finding.
- Impact of Design on Navigation: Meaningful platforms positively influence students' navigation experience. The positive correlation between design and navigation is r = 0.023. This indicates that the design factors, including layout and structure, significantly enhance the ease of use.
- Effectiveness and Individual Variability: While usability and functionality are important, students' perception of platform effectiveness varies individually. This variability is reflected in the slight negative correlations between effectiveness and other factors (r values close to -0.05).



- Engagement and Motivation Boost: The results are in line with Hypothesis 1, as the platforms positively influence student engagement and motivation. High agreement on Likert scale responses supports that students feel more engaged and motivated when using these platforms.
- Significant Relationships among Variables: Statistical significance (p < 0.05) of correlations confirms relationships between usability, functionality, design, and navigation. These findings validate the hypothesis that usability and functionality are significant factors for acceptance by students.
- Optimization Features for Better Learning: The usability of features that are well designed, user-friendly navigation, and intuitive functionality promotes an inclusive environment for learning. In such aspects, students are highly motivated to effectively use collaborative tools.
- Practical Implications for Educators: Educators should select those platforms that have high usability, robust functionality, and intuitive designs to improve blended learning experiences. Training sessions and user guides would further allow for optimal exploitation of such platforms.

### Conclusion

The conclusion of the study is that online collaborative platforms are crucial in boosting student engagement, motivation, and overall learning satisfaction in blended learning environments. Ease of use is a critical factor, as easy-to-navigate and user-friendly platforms encourage students to use them effectively for collaborative tasks. Intuitive functionality enhances better peer collaboration and improves the learning experience for students. Additionally, platform design, including layout and structure, positively impacts navigation, demonstrating that thoughtful design elements can improve the ease of use and user satisfaction.

Although usability and functionality are vital, individual perception of the platform's effectiveness sometimes showed variability as a result, implying that possibly students' preferred tastes and what they had prior to the exercise influenced how these tools were valued. However, statistical significance shown by the associations among usability, functionality, design, and navigation supports the additive effects of each factor on acceptance and usage.

These findings establish the essence of platform usability feature optimization to make it a more acceptable as well as engaging learning environment. Educators must choose the platforms that have excellent usability and smooth functionality so that their utility can be maximized. Training sessions or user guides may be provided to enhance students' aptness to utilize the designed tools properly.

In conclusion, the research validates that online collaborative platforms, when designed and implemented effectively, contribute significantly towards positive learning outcomes in blended learning settings. The relevant findings inform educators and institutions on how to modify teaching strategies to enhance the inclusion of digital tools: making this more enriching and more effective for students.

### **Suggestions for Educators**

To optimize the use of online collaborative platforms, educators need to focus on creating inclusive, effective, and engaging blended learning experiences with the following actionable strategies.

- 1. Usability and Accessibility First: For maximum student engagement and satisfaction, the usability of the online collaborative platform is the way to go. Educators will need to use tools that are intuitive and easy to use and minimize the steepness of the learning curve. Platforms with clear navigation, simple interfaces, and accessible features help decrease frustration and increase usage. Ensuring that accessibility features, such as text-to-speech options and multilingual support, are incorporated will make the platforms more accessible to students of diverse needs. Providing tutorials and user guides upon first introducing the platforms will help increase student confidence in using the tools effectively.
- 2. Emphasis on Platform Functionality and Design: Platforms with strong functionality and thoughtful design greatly enhance the collaborative learning experience. Teachers should assess the features of the platform for collaborative tasks, including group discussions, shared workspaces, and real-time feedback mechanisms. Tools such as Google Docs, Microsoft Teams, and Moodle offer ample opportunities for collaborative work but need to be tailored to meet specific course objectives. This should also include the



use of design elements, like structured layouts and clear labelling, to reduce cognitive load and improve the overall user experience. Also, updates to keep platforms in line with technological advancements are crucial.

- 3. Promote Active Engagement and Collaboration: To maximize the benefits of these platforms, educators must incorporate collaborative tasks that actively engage students. Group projects, brainstorming sessions, or collaborative writing assignments require collaboration among peers. Students will use such tools more meaningfully with elements of gamification, like a progress tracker or badges, added to motivate students. Teachers must also facilitate students in providing feedback to their peers using features in the platform by creating a community and shared learning experience.
- 4. Provide Support and Training: Online collaborative platforms often require an initial guidance for effective usage. Institutions must offer workshops or orientation sessions for both educators and students to understand the functionalities of the platform. Technical support must be readily available for resolving issues. Educators need to keep themselves updated about the latest features and innovations in digital tools to help them seamlessly integrate these platforms into their teaching practices.
- 5. Create Inclusiveness and Participation through Feedback: Teachers must collect feedback from students to know difficult situations in the usage of these platforms and areas that require upgrade. Surveys or focus group discussions can be an eye opener for the insight of students on their experiences and perceptions, thereby the educators may dedicate their usage according to the needs of students. Inclusive practices include offering multiple ways to engage (e.g., audio, video, or text) to ensure that diverse learning preferences are accommodated, thus making the learning environment more equitable.

In conclusion, with usability and functionality at the center, with active engagement in mind, educators are much more likely to improve the effectiveness of online collaborative platforms if appropriately supported and provided with feedback mechanisms. The strategies will better the learning experience in addition to creating a more inclusive and motivating environment because students will be able to take full advantage of blended learning.

### Limitations

The study has a few limitations that must be recognized. First, although the sample size is sufficient at 400 respondents, it cannot capture the rich diversity of experiences of students from different educational institutions, disciplines, and cultural contexts. The fact that the study is more focused on the specific platforms of Google Docs, Moodle, and Microsoft Teams makes the findings less generalizable to other collaborative tools with different functionalities and user interfaces. Moreover, the study has been based on self-reported information, which is collected by a survey, and is susceptible to response bias because respondents may give socially acceptable answers rather than reflecting their true perceptions and experiences.

Another limitation in the study is the cross-sectional design, which limits the ability to depict causality on platform usability and functionality and their implications for learning outcomes. Using a longitudinal approach might have allowed a better understanding of how sustained use of such platforms impacts student engagement and satisfaction over time. Additionally, the study fails to control for external factors, such as any technical infrastructure inputted, internet access, or familiarization with the collaborative platforms used to potentially impact students' perceptions and experiences.

Finally, although it investigates key aspects like usability, functionality, and design, among others, not all important areas, such as instructor involvement and peer dynamics with institutional support, were fully elaborated. Subsequent studies should be able to address these limitations by looking at a bigger scope, varying contexts, and mixed-method approaches to gain greater insight into what online collaborative environments mean in a blended learning framework.

### Significance of the study

This study is important because it contributes to the understanding of how online collaborative platforms influence student engagement, motivation, and overall learning satisfaction in blended learning environments. With the increasing adoption of hybrid models of teaching by educational institutions, effective digital tools have become crucial for enhancing learning outcomes. This study, therefore, shall benefit by giving insight into the role usability, functionality, and design play in shaping students' acceptance and utilization of these platforms, providing a



framework for improving the implementation of digital collaboration in education. The study equips educators and institutions with actionable recommendations to optimize the usage of the online collaborative tools by highlighting the key factors that impact students' experiences. This research underlines the importance of user-friendly and accessible platforms aligned with the needs of students, which will allow educators to make informed decisions in the selection and use of such tools. The findings also resonate in that collaborative platforms do indeed foster engagement, peer interaction, and active learning-all of which are important components for any successful blended learning environment.

This study also meets the growing demands for inclusiveness and personalized learning in diverse educational settings. Identifying challenges and proposing strategies to overcome them is a practical way of creating equitable and engaging learning experiences. The research contributes to the evolving body of knowledge on educational technology and serves as a basis for further studies aimed at developing blended learning methodologies.

### **Future Scope of the Study**

The future scope of this study is to expand the research to a larger and more diverse sample across different educational institutions, cultural contexts, and disciplines. Longitudinal studies can be conducted to explore the long-term effects of online collaborative platforms on student engagement, motivation, and learning outcomes. The potential that future research could unpack in regard to the role of external factors such as technological infrastructure and internet access in shaping student experiences or prior digital literacy was notable. This also brings to light, for example, how future technologies like artificial intelligence and virtual reality might be integrated with collaborative platforms to reveal some innovative approaches to blended learning environments. Further research may also explore the role of instructors, peer dynamics, and institutional support to further tap into maximizing the effectiveness of these tools. Solutions in these areas would help in providing a holistic approach in future studies as to how people can optimize the use of collaborative platforms for more inclusive and effective education.

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### **TECHNOLOGY-ENHANCED LEARNING AND DIGITAL EDUCATION**

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### Abstract:

The surfacing of the modern age has transformed the pattern of modern-day education in many ways. The process of dissemination of knowledge has been swift and the digital era armed with a plethora of digital tools that have enhanced the scope and transmission of knowledge and education. The all-pervasive nature of today's education system is such that students and patrons can learn sitting in any part of the globe, all thanks to the modern-day technologies especially video –conferencing and live sessions which has been proving the age-old adage right, "Knowledge knows no boundaries". This Research Paper aims to delve into identifying the factors that have contributed to the growth of Technology enabled Digital Education System in recent years. The fast- growing digital tools are various cloud-based platforms that have emerged in the recent era which are reforming the educational platforms. In fact, after the COVID-19 pandemic the teaching world had evolved by expanding itself beyond the periphery of a typical classroom. So, we will discover the Pros and cons of Technology and its correlation with the pursuit and dissemination of Digital Education.

Keywords: Technology, Digital Education, Knowledge, classroom

### Introduction

Technology has gone a long way in reorienting the realm of education. The fast- growing digital tools are various cloud-based platforms that have emerged in the recent era which are reforming the educational platforms. In fact, after the COVID-19 pandemic the teaching world had evolved by expanding itself beyond the periphery of a typical classroom. With the presence of numerous technical tools which have been instrumental in bringing an online platform for students across the globe.

### Literature Review

### **Technology and Education: Siamese Twins?**

Technology and education are inter-woven. The use of technology in education and utilizing audiovisual aids can be traced back to the early 20<sup>th</sup> century. Gradually, with the emergence of internet and related digital technologies, there was the emergence of models like Learning Management Systems like Moodle and Blackboard which emerged in the year 2000.

The use of Technology in Education has facilitated the dissemination and spread of education since a long time. The fact remains that Technology has always been the abysmal driving force to foster education and has always aided in the swift spread of education across all the corners of the Globe. The modern-day technology tools which have become the buzzword of today and are the widely used concept in today's day to day life like Video conferencing and Webinars, which were not a part of the study curriculum rather, no one ever could have fathomed that technology will have such a seamless effect on Digital education.







Gone are the days when education was limited to the four walls of the classroom and when the benchmark of studying was measured with the number of books one had read. The onset of 21<sup>st</sup> century has remarkably changed the arena of education in ways more than one. Education has expanded its horizon beyond the periphery of the classroom and technology and its enabler tools have played the catalyst in facilitating virtual classrooms thus making Education all pervasive for everyone across the Globe.

### **Rise of E-Learning Platforms**

The literal meaning of E-Learning is learning which is enabled through electronic devices by digital devices like tablets, laptops, smartphones, tablets etc. In the recent times, there has been a significant rise in online platforms like Coursera, Udemy, Simplilearn etc. In the recent years E-Learning has helped patrons across the globe in acquiring self-learning skills and has also given an impetus to soft skills like presentation and critical thinking.

### **Mobile Learning and Accessibility**

Technology has aided and fostered education through devices like tablets and smart phones. There are several applications which are designed and formulated for a mobile experience. We can access a few videos, tutorials and other learning materials which can be accessed on mobile devices.

### **Artificial Intelligence in Education**

With the advent and emergence of Artificial Intelligence, the E-Learning Industry is also having a major impact. The surge of AI over the years has helped in shaping and bringing new models of learning in the E-Learning sector. As per a Research study conducted by the Global Market Insights in January 2024, the e-learning market is set to be at an estimated \$848.12 billion by 2032.





Figure 2- Estimated Market Share of AI in Education Market by 2032; Source: Global Market Insights



Figure 3: Role of AI in Global Education Market ; Source : Global Market Insights

### **Benefits of Technology Aided Education**

Accessibility: Digital Education with the aid of internet-based learning helps students to get a wide accessibility to various learning materials and academic documents which was limited to physical books and materials in the earlier days.



- Digital Education, implies not only just textbooks but the patrons and students can access a number of online based libraries/ repositories, eBooks, White Papers, Blogs, and other documents from any place in the world.
  - Adaptive Learning Tools: Technology facilitates the use of adaptive learning platforms that helps the students to adapt to the learning tools based on their level of understanding.
  - Learning Independently: Students have the ease of learning lessons at their own pace and with recorded sessions, they can refer to the old videos in case of doubts, thus making learning easy and flexible.
  - **Exposure to Workshops and Webinars**: Through online based learning, patrons can attend workshops and webinars which can enhance their Knowledge base.
- Interactive Learning: Technology provides engaging learning experiences through simulations, games, virtual labs, and educational apps thereby making learning more Interactive and engaging.
- Cost-Effectiveness
- Lesser Costs: Online learning can curtail the need for physical classroom space, travel, and printed materials, making education more affordable. One can access the online classes irrespective of any location.

### **Research Methodology**

The Research methodology used in this Paper is based on Secondary Data and facts which are gathered through previously published Papers, Case Studies and Tech Industry Reports, which point towards a visible surge and enhancement of Digital Education in the recent years which is fostered through Technological aids. These documents are available on the web.

Lets' have a sneak-peak at some of the excerpts gathered from them which would help in understanding our topic in a comprehensive way.

- 1. In the initial part of this paper, we have highlighted that gradually virtual classrooms have taken over the traditional and physical classrooms in many ways.<sup>1</sup> In the paper, "Understanding the role of digital technologies in education: A review", authors have stressed on the fact that in the recent years, it has been observed that digital way of learning has been successful in filling up the gaps which were a bit glaring in the way of traditional classrooms.
- 2. Secondly, a Gem Report based on Education in UNESCO<sup>2</sup>, mentions that there has been a significant surge in the Digital Tools in the past 20 years. The report also stressed on the fact, that the language learning application Duolingo reportedly had about 20 million patrons in 2023, and Wikipedia used to have 244 million page views per day in 2021.
- 3. According to Grandview research's report<sup>3</sup> on Digital Education which was published in 2023 predicted that the global digital education market size was valued at USD 26.01 billion in 2024 and was forecasted to rise at a CAGR of 31.5% from 2025 to 2030. This burgeoning rise could be attributed to the growing number of digital education arenas and the presence of other smart technology aided devices.

### **Comparative Analysis**

The comparative analysis of the above facts along with the other topics covered in this paper point to the fact that over the years, there has been a surge in the technology aided education due to a number of factors like upgraded technologies, and the rise of digital tools and technologies in the recent times.

<sup>1</sup> Source, "Understanding the role of digital technologies in education: A review", https://www.sciencedirect.com/science/article/pii/S2666412722000137

<sup>2</sup> Source, "Technology in education, A Tool on whose Terms?, https://gem-report-2023.unesco.org/technology-in-education/

<sup>3</sup> Source, "Digital Education Market Size & Trends", https://www.grandviewresearch.com/industry-analysis/digital-educationmarket-report



### **Challenges and Constraints in Technical Based Education**

There are few challenges and constraints while fostering Online Education, there could be a lack of motivation or interest among the students as, in this mode of education students are not directly facing the mentors. Apart from that there could be a few technical glitches like infrastructural issues.

### The Road Ahead/ Results

Technology enabled education has gradually become the new buzzword of today, it has carved a niche in today's world where in the boundaries between the physical classroom and virtual classroom is eroded. In fact, digital education has been seamlessly providing valuable knowledge and academic sessions to all and sundry. So, in today's world and in the ensuing days, online education is going to be an iconic player in the education arena.

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### DIGITAL ADDICTION AND DIGITAL DETOX AWARENESS: COMMERCE AND MANAGEMENT STUDENTS OF JAMNAGAR CITY

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### Abstract:

Digital addiction is a growing concern in today's interconnected world, where the overuse of technology and digital devices can disrupt daily life, relationships, and mental well-being. Digital detox is the intentional process of stepping away from technology and digital devices to reconnect with the physical world, restore balance, and improve mental well-being. Generation Alpha has been the highly digitally addicted generation. This paper focuses on the digital addiction and digital detox awareness among Commerce and Management students of Jamnagar city. The objectives of the study are to identify the causes of digital addiction, to determine the level of digital addiction and to determine the factors affecting digital addiction. The study uses descriptive research design and non-probability convenience sampling method for the collection of 113 commerce and management students. The findings of the study reveals that there exists a gap between awareness and action regarding digital detox.

Keywords: Digital addiction, Digital Detox, Students

### Introduction

Advancements in technology, ubiquitous Internet access, and the widespread availability of digital tools have significantly transformed human life. While these innovations have become increasingly essential in our daily routines, misuse and overreliance have given rise to addictions such as those related to smartphones, computers, and the Internet.

Digital addictions stem from human-machine interaction and are categorized into subgroups based on specific tools like phones, tablets, computers, or platforms such as the Internet, social media, and Facebook.

Digital addiction can arise from a multitude of factors, including individuals' desires to prove themselves, the fear of missing out, and the quest for attention and affection in online settings.

Various psychiatric disorders, depression, age, loneliness, violence, neglect, and abuse can also contribute to this addiction. The consequences of digital addiction are significant, manifesting as difficulty in concentration, impaired time management, decreased productivity, academic underachievement, deterioration in social relationships, disrupted sleep patterns, and alterations in sleep duration.

'Digital Detox', has gained prominence to counter digital addiction. The term 'detox' connotes purification, and in the context of digital detox, it refers to purging oneself from digital environments. This international concept has gained traction over the past decade, driven by advancements in technology and the escalating prevalence of digital addictions. As the usage of technological devices rises, especially among younger demographics, and digital addictions become more prevalent, user awareness has heightened, leading to greater efforts to regulate usage and embrace digital detox practices in response to the growing recognition of the need for digital detoxification.

### Literature Review

**Roberts, J.A. & David, M.E.(2020)** explored the outcomes of digital detox initiatives through experimental designs. Participants were asked to abstain from digital devices for specific periods. It was concluded that digital detox showed positive effects on mental and emotional well-being, including reduced stress and improved focus. The study emphasized creating a balanced relationship with technology.

Twenge, J.M. & Campbell, W.K.(2018) Investigated the impact of digital media consumption on adolescent wellbeing, covering academic performance, social interactions, and mental health. Data were collected from large-scale national surveys. It was found that high digital media use was linked to decreased well-being, including lower happiness levels and higher loneliness. Moderate use was associated with better outcomes than either low or



excessive usage.

Elhai, J.D., Levine, J.C., & Dvorak, R.D.(2017) explored the relationship between problematic smartphone use and anxiety, depression, and stress in young adults. The study utilized surveys and psychometric tools to evaluate usage patterns and mental health symptoms. It was found that a strong association between excessive smartphone use and mental health issues, suggesting a bidirectional relationship. The authors recommended interventions focusing on self-regulation and awareness of smartphone usage.

Andreassen, C.S.(2015) reviewed literature on social media addiction, examining its behavioral patterns, risk factors, and psychological consequences. Used various theoretical frameworks to interpret findings. It was observed that social media addiction was strongly associated with narcissism, loneliness, and low self-esteem. Recommended interventions promoting offline social interactions and self-regulation.

Lam, L.T.(2014) conducted a meta-analysis of existing studies on the correlation between internet addiction and sleep quality. Reviewed over 20 studies with diverse methodologies. It was concluded that internet addiction significantly disrupted sleep patterns, leading to insomnia and reduced sleep quality. Highlighted the need for better awareness and interventions addressing nighttime internet use.

### **Research Questions**

Which factors are affecting the digital addiction?

To what level the digital addiction amongst commerce and management students is found? What are the most effective digital detox methods for breaking the cycle of digital addiction?

### **Research Objectives**

This study aimed at:

- To identify the causes of digital addiction
- To determine the level of digital addiction
- To suggest the solutions for digital detoxification

### **Research Design**

This study employs a descriptive research design to explore and analyze the phenomena of digital addiction and digital detox. A descriptive design is particularly suitable for this research because it allows for the systematic collection, description, and analysis of data to better understand the characteristics, trends, and relationships related to digital behaviors and detox strategies

### Sample Size

The study population comprised 113 students currently pursuing their studies in commerce and management stream in Jamnagar city.

### Sampling Method

The research employed a non-probability convenience sampling method to select participants for the study.

### Scope of the study

The study was conducted within the colleges in Jamnagar city focusing on students enrolled in the commerce and management department. The scope of study extends to the commerce and management students of Jamnagar city.

### **Data collection**

Data collection occurred online via voluntary participation. Research inquiries were disseminated to WhatsApp groups as clickable links, with students receiving periodic reminders to engage. The questionnaire completion time averaged approximately 5-10 minutes.



### Dependent and Independent Variables of the Study

In this research, the independent variables include the socio-demographic characteristics of the students and their awareness of digital detox. The dependent variable is the level of digital addiction among the students.

### Significance of the Study

This study explores the growing issue of digital addiction among Commerce and Management students in Jamnagar city and its impact on their academic performance and well-being.

The research highlights the fostering of awareness and promoting healthier digital habits. Its localized focus offers a contextual understanding of digital addiction, informing educators, policymakers, and institutions on developing strategies to support students' holistic growth and academic success.

### Limitations of the Study

Although the research contributes to the literature, there are some limitations. First, this study was conducted only with commerce and management students, and second, the study was conducted online.

In addition, since there is no measurement tool that evaluates the concept of digital detox, the results were examined within the scope of the questionnaire created by the researchers.

Research results can only be generalized to the study population

### Measures

Digital Addiction Scale (DAS): DAS was developed by Kesici and Tunç in 2018 in the Turkish language to determine digital addiction in individuals. DAS is a Likert-type scale without any reverse-coded items (5:strongly agree, 4:agree, 3:neutral, 2:disagree, 1:strongly disagree), and there are no inverse substances on the scale.

### Table 1 : Cronbach's alpha test

### **Reliability Statistics**

Cronbach's Alpha	N of Items
.703	6

Cronbach's alpha value of the scale was calculated as 0.703 and reported to be a reliable measurement tool for measuring digital addiction.

Table 2 : Descriptive Statistics of Demographic Variables					
Variable	Sub Variable	Valid			
			Percent		
	Less than 20	105	92.9		
Age	More than 20	8	7.1		
	Male	64	56.6		
Gender	Female	49	43.4		
	District	97	85.8		
Place	Village	16	14.2		
	Excellent	35	31.2		
	Good	61	54.5		



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	Fair	14	12.5
Academic Achievement	Poor	2	2
	Student	80	70.8
	Student and doing job	17	15
	Student and self	16	14.2
Occupation	employed		
Active use of social media	Yes	99	87.6
	No	14	12.4
	1 to 3 hours	51	45.1
	3 to 6 hours	40	35.4
	6 to 9 hours	18	15.9
Duration	more than 9 hours	4	3.5
Awareness of Digital Detox	Yes	64	56.2
	No	49	42.9

Age Distribution: The majority of respondents (92.9%) are under the age of 20, which suggests that the sample primarily consists of younger students, likely in their first or second year of study. This demographic group is typically more engaged with digital technologies, highlighting the relevance of studying digital addiction among this age group.

**Gender Distribution:** The gender distribution is relatively balanced, with a slight majority of male students (56.6%) compared to females (43.4%). This indicates that digital addiction and detox awareness affect both genders, with no significant gender-based differences in their engagement with digital technologies.

**Place of Residence:** A significant majority (85.8%) of students reside in urban areas, while only 14.2% are from rural areas. This demographic factor may influence digital usage patterns, with urban students likely having greater access to digital devices and the internet compared to their rural counterparts. Therefore, urban students may face higher exposure to digital addiction risks.

Academic Achievement: The data reveals that most students (85.7%) perform at a "Good" or "Excellent" academic level, suggesting that these students are motivated and focused on their studies. This may imply that despite high levels of digital engagement, academic performance does not appear to be significantly affected, though the possibility of digital distractions remains.

**Occupation:** A large portion of students (70.8%) are solely focused on their studies, while a smaller percentage (29.2%) balance academics with employment or self-employment. The findings imply that students who are primarily focused on their studies might have more time for digital engagement, potentially leading to higher exposure to digital addiction.

**Social Media Usage:** The high percentage of students (87.6%) actively using social media underscores the central role that digital platforms play in their daily lives. Notably, 45.1% of students spend 1 to 3 hours daily on social media, and 35.4% spend 3 to 6 hours, indicating moderate to high engagement. However, a concerning proportion of students (15.9%) spend 6 to 9 hours daily, and 3.5% spend more than 9 hours, which raises alarms about the potential for digital addiction.

Awareness of Digital Detox: Over half of the respondents (56.2%) are aware of the concept of digital detox, reflecting a moderate level of awareness. However, a significant portion (42.9%) remains unaware of digital detox, indicating a gap in knowledge that needs to be addressed through education and awareness programs.

Overall, these findings suggest that while there is a high level of digital engagement among students, there is also a notable awareness of digital detox strategies. However, the gap between awareness and action indicates the need for stronger interventions to encourage students to adopt digital detox practices and reduce excessive screen time.



Internet usage characteristic	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Social Media as an integral living space	23	15	55	8	12
Feeling Compelled to use digital devices even in inappropriate situations	30	23	36	14	10
Procrastination due to excessive screen time	17	19	38	19	20
Feelings of irritability or anxiety when unable to access digital devices	39	23	24	13	14
Preference for online interactions over face-to- face communication	37	23	28	7	18
Needing to use devices for increasing amounts of time to achieve satisfaction	30	23	31	19	10

Table 3 : Descriptive statistics of Technological Device and internet usage characteristics of students

The data in table 3 presents various aspects of students' digital device usage and their perceptions of social media and screen time.

- Social Media as an Integral Living Space: Most students (55%) are neutral, suggesting that while social media is a common part of their lives, it may not necessarily be perceived as central or integral. A smaller portion (23%) strongly disagrees, indicating some students may still view it as a non-essential part of their lifestyle.
- Feeling Compelled to Use Digital Devices: A significant portion (53%) agrees or strongly agrees with feeling compelled to use digital devices even in inappropriate situations, pointing to potential signs of digital addiction.
- Procrastination Due to Excessive Screen Time: Nearly 39% of students agree or strongly agree that excessive screen time leads to procrastination, reflecting a common issue among students balancing academic responsibilities with digital engagement.
- Feelings of Irritability or Anxiety: A majority (62%) either strongly disagree or disagree with feeling anxious or irritable when unable to access digital devices, suggesting that while some students may experience stress, it is not a universal response.
- Preference for Online Interactions: A considerable number of students (60%) either strongly disagree or disagree with preferring online interactions over face-to-face communication, implying that face-to-face interaction still holds value for most.
- Needing More Device Time for Satisfaction: About 53% of students agree or strongly agree with the idea that they need to use digital devices for increasing amounts of time to achieve satisfaction, pointing to potential addictive behavior where more screen time is needed for similar gratification.

These results highlight patterns of digital device dependency, including procrastination, compulsive use, and increasing screen time for satisfaction, emphasizing the need for digital detox interventions and more awareness of the impacts of excessive screen usage.

Table 4: Descriptive Statistics for plans of digital detoxification					
Plans of digital detoxification	Frequency	Valid Percent			
Not doing a digital detox and not thinking about doing it in six months	13	10.6			
Not doing a digital detox and thinking about doing it in six months	17	15			
Desire to do a digital detox, even if occasionally	30	26.5			
No plans to do a digital detox	53	46.9			



The data in table 4 reveals that a large proportion of students (46.9%) have no plans to undergo digital detox, suggesting that many are not actively considering reducing their screen time. Additionally, 26.5% express a desire to do a digital detox, even if occasionally, indicating some awareness of the need to take breaks but perhaps lacking commitment or concrete plans.

A smaller portion of students (15%) are thinking about doing a digital detox in the next six months, while 10.6% have no intention of doing so at all. These findings highlight a gap between awareness and action, emphasizing the need for educational programs or interventions to encourage proactive digital detox efforts among students.

Table 5: Actions to prefer for digital detox				
Actions to prefer for digital detox	Frequency	Valid Percent		
Set specific limits	36	31.9		
Use productivity apps	16	14.2		
Designate device-free zone	9	8		
Practice mindfulness	11	9.7		
Create a digital detox plan	12	10.6		
Find alternative forms of entertainment	6	5.3		
Prioritize face-to-face interactions	15	13.3		
Schedule offline activities	8	7.1		

The data in table 5 reveals that the most preferred action for digital detox is setting specific limits on device usage, with 31.9% of respondents choosing this option. This suggests that students are inclined to manage their screen time through self-imposed restrictions. The second most popular choice is to use productivity apps (14.2%), highlighting a preference for tools that help balance technology use with productivity.

Other actions include prioritizing face-to-face interactions (13.3%), which reflects a desire for real-world connections, and creating a digital detox plan (10.6%). Smaller percentages of students prefer actions like designating device-free zones (8%), scheduling offline activities (7.1%), and practicing mindfulness (9.7%). These preferences emphasize a range of strategies students would consider for digital detox, suggesting a personalized approach to managing screen time effectively.

# Ho : There is no relationship of demographic variables on students' plans to detoxify their mobile phone usage

### **Coefficients**<sup>a</sup>

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	В	Std. Error	Beta		
1 (Constant)	3.455	.711		4.862	.000
Age	567	.395	141	-1.435	.154
Gender	.091	.209	.044	.435	.043
Residency	.102	.306	.034	.333	.740
AcademicAchievement	076	.153	051	498	.620
Occupation	.113	.142	.080	.798	.426

### a. Dependent Variable: plans

The R-squared value of 0.389 indicates that demographic variables explain 38.9% of the variance in students' plans



to detoxify their mobile phone usage. This suggests that while demographic factors play a role in shaping students' intentions to engage in digital detox, other factors not captured by these variables may also significantly influence their decisions.

Gender: The positive coefficient (0.091) indicates that females may have a slightly higher tendency to plan for a digital detox, and the p-value (0.043) shows that this relationship is statistically significant, suggesting gender is an important factor in planning digital detox.

### Ho: There is no relationship between demographic variables on social media usage

### **Coefficients**<sup>a</sup>

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	В	Std. Error	Beta		
1 (Constant)	1.857	.653		2.843	.005
Age	.007	.421	.002	.017	.987
Gender	.079	.179	.045	.440	.661
Residency	.439	.267	.171	1.641	.104
AcademicAchievement	.049	.131	.039	.372	.711
Occupation	.069	.122	.058	.563	.575

### a. Dependent Variable: dependent

The demographic variables in this model do not significantly affect social media usage, as all p- values are above the typical significance threshold of 0.05. This implies that other factors, not captured by these demographic variables, may be influencing students' social media habits.

### Implications of the Study

The study highlights the pressing need to address digital addiction among Commerce and Management students in Jamnagar. Its findings underscore the importance of fostering awareness about the negative impacts of excessive digital engagement on academic performance, mental health, and physical well-being. Educational institutions can leverage these insights to integrate digital wellness education into curricula, organize workshops on digital detox strategies, and establish digital-free zones to promote focused learning environments. By encouraging healthier digital habits, students can improve time management, reduce stress, and enhance productivity.

On a broader level, the study calls for collaboration among educators, families, and policymakers to create a culture of mindful technology use. Parents can play a pivotal role by supporting balanced digital habits at home, while community initiatives can amplify awareness at a societal level. Additionally, addressing digital addiction equips students with essential life skills for professional environments, ensuring ethical and purposeful technology use. Ultimately, the findings offer a roadmap for fostering digital well-being, benefiting individuals and society alike.

### Future Scope of the Study

Future studies can explore the long-term effects of digital addiction and digital detox strategies through longitudinal analysis, providing insights into how these habits evolve over time. Comparative research involving students from different disciplines, cities, or regions can offer a broader perspective on digital addiction trends and contextual differences in digital detox awareness. Additionally, examining the effectiveness of interventions like workshops, digital detox challenges, and curriculum enhancements can help refine approaches to managing digital dependency.

Further research could delve into the psychological and behavioral factors driving digital addiction, such as stress or peer influence, to address root causes effectively. Investigating the role of technological solutions, such as screen time monitoring apps, and assessing the impact of balanced digital habits on career readiness and productivity are also promising areas. Moreover, understanding the influence of social and cultural factors can help design



community-wide initiatives to foster healthier digital behaviors. These efforts can collectively enhance digital wellbeing in academic and professional contexts.

### **Findings of the Study**

The study on digital addiction and digital detox awareness among Commerce and Management students in Jamnagar city reveals several key insights regarding demographic factors, social media usage, and students' attitudes toward digital detox.

- 1. **Demographics:** A significant majority (92.9%) of respondents are under the age of 20, reflecting that most participants are likely first- or second-year students. The gender distribution shows a slight majority of male students (56.6%) compared to females (43.4%). The residency data indicates that 85.8% of students live in urban areas, while 14.2% are from rural areas. The academic achievement data reveals that most students (85.7%) fall into the "Good" or "Excellent" academic performance categories, suggesting a high level of academic motivation among the respondents. Regarding occupation, most students (70.8%) are solely focused on their studies, while the remainder are balancing academics with employment or self-employment.
- 2. Social Media Usage: The study shows that a significant portion of students (87.6%) actively use social media, with 45.1% spending 1 to 3 hours daily and 35.4% spending 3 to 6 hours daily. This indicates that social media is an integral part of students' daily lives. Despite moderate usage among most respondents, some students (15.9%) spend 6 to 9 hours and 3.5% spend more than 9 hours daily on social media, highlighting concerns about potential digital addiction.
- **3.** Awareness of Digital Detox: Over half of the students (56.2%) are aware of digital detox, though 42.9% are not familiar with the concept. This reflects a moderate awareness of the importance of reducing screen time but also highlights the need for more widespread education on digital detox strategies.
- 4. Perceptions of Digital Dependency: Many students recognize behaviors associated with digital addiction. For example, 53% of respondents agree that they feel compelled to use digital devices even in inappropriate situations. Additionally, 39% of students report procrastination due to excessive screen time, and 53% acknowledge the need for increasing device usage to achieve satisfaction. These responses point to potential signs of dependency and addictive behaviors among the student population.
- 5. Plans for Digital Detox: The study reveals a gap between awareness and action regarding digital detox. While 46.9% of students have no plans to undertake a digital detox, 26.5% express a desire to do so, even occasionally. A smaller percentage (15%) are considering a detox in the next six months, while 10.6% have no intention of doing so. This emphasizes the need for interventions that encourage students to act on their awareness and take concrete steps toward reducing screen time.
- 6. Preferred Actions for Digital Detox: The most preferred action for digital detox is setting specific limits on device usage (31.9%). Other preferred strategies include using productivity apps (14.2%), prioritizing face-to-face interactions (13.3%), and creating a digital detox plan (10.6%). Smaller proportions of students prefer actions like designating device-free zones (8%) and practicing mindfulness (9.7%). These results indicate that students are looking for practical, personalized strategies to manage their screen time more effectively.

### Conclusion

This study on digital addiction among commerce and management students reveals significant findings regarding the prevalence of addiction, awareness of digital detox, and students' attitudes toward managing screen time. While awareness is high, more action is needed to address excessive screen time and its effects. To combat digital addiction, the study recommends incorporating digital addiction and detox topics into course curricula, organizing events, and raising awareness through various media. Suggested actions for individuals to reduce digital time include setting specific limits, using productivity apps, creating device-free zones, scheduling offline activities, practicing mindfulness, and prioritizing face-to-face interactions. By implementing these strategies, individuals can regain control over their digital habits and achieve a healthier balance.



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### INTEGRATING DIGITAL TOOLS IN MILLENNIAL TEACHING-LEARNING PEDAGOGY: A COMPREHENSIVE STUDY

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Abstract: This study explores the integration of digital tools in technology-enhanced learning and its impact on educational practices and teaching pedagogy. The research acknowledges the shift from traditional offline methods to online tools, including Learning Management Systems (LMS), educational apps, and learning platforms. A key focus is how these digital tools can enhance interactivity, broaden the scope of knowledge, and nurture critical thinking and problem-solving skills in students. The study specifically examines the effectiveness of digital tools such as Padlet, Mentimeter, Kahoot, and Miro. These tools offer customized learning pathways, including collaborative, adaptive, and gamified options, and provide teachers with real-time feedback, fostering student engagement. The research also examines into the influence of Artificial Intelligence (AI) on traditional teaching methods, assessing its effects on the efficiency of LMS, virtual classrooms, and other digital tools. Furthermore, the study highlights the challenges faced by institutions when adopting these technologies, such as a lack of experienced staff and infrastructural limitations. It emphasizes the necessity of addressing these infrastructural gaps and ensuring educators are trained to use these technological skills effectively. Employing quantitative methods, including case studies and surveys, the research seeks to identify how to integrate digital tools into the curriculum to improve student proficiency, soft skill development, and interactive learning sessions. Ultimately, this research aims to offer a comprehensive understanding of the integration of digital tools in digital tools. It considers both the benefits and challenges, stressing the importance of appropriate training and infrastructure for effective implementation in educational environments.

Keywords: Digital tools, teaching, learning pedagogy, skill development, adaptive, collaborative

### 1.Introduction

The millennial students are often referred to as 'tech-savvy', characterized by their deep immersion in technology. The millennials are characterized by their digital fluency and adaptability, which dominate the classroom. Due to advancement in technology various facets of human life has been transformed, and education is no exception. With the arrival of various digital tools, the teaching-learning pedagogy has been reshaped, which offer interactive and innovative ways that will engage students and enhance the student outcomes. The traditional teaching methods focus mainly on lectures, text books and exams which makes fall short in addressing students learning preferences and expectations. The Digital tools include Learning Management Systems (LMS), educational apps, and interactive platforms. These tools have opened new doors for collaborative, personalized and gamified learning pathways that not only increase the academic performance but also foster soft skills like critical thinking, problem solving, and communication among the students. It also promotes globalization and emphasis on no geographical limitation. The integration of Artificial Intelligence (AI) further enriches the educational landscape by optimizing learning pathways and providing real-time analytics for informed decision-making by educators (Zawacki-Richter et al., 2019). Though digital tools have innumerable benefits but their adoption has many challenges that institutions has to face. The issues that are faced are infrastructural inadequacies, lack of training professionals and digital divide among the rural regions. Infrastructural inadequacies, such as limited internet access and outdated hardware, hinder seamless integration.

### The research objectives are:

- 1. To understand and evaluate the integration of digital tools in teaching and learning.
- 2. To analyze the effectiveness of digital tools in enhancing collaboration and interactivity
- 3. To identify the challenges faced by teachers and students in implementing digital tools in education



### 2.Literature Review:

Millennials are the people who prefer interactive and technology driven learning methods, that is why they are often referred to as digital natives(Prensky). A research by Prensky suggests that they use this to align their preferences for active and interactive learning. This study explores how the integration of digital tools in millennial teaching and learning pedagogy affects student engagement, proficiency and soft skill development. It also examines what are the challenges that are faced by the institutions to implement these digital tools in their institutions. To have a better understanding about the integration of digital tools in teaching and learning pedagogy you have to study about two theoretical frameworks which include Constructivist learning theory and Technology acceptance model. The constructivists theory deals with the pedagogical value of tools and the TAM deals with how the educators and perceive and adopt these technologies. These tools encourage the acceptance and sustained use of technology in education environments.

### Digital tools in education, AI influence and challenges

Various digital tools are being used for teaching and learning purpose. These tools include Learning Management system(LMS), educational apps and interactive learning platforms. The interactive tools that are used are Padlet, Miro and Kahoot that makes the study more engaging and it foster collaboration and creativity among the students. These tools help students to brainstorm, organize and visualize their ideas using Miro and then share among fellow classmates in real time with the help of pallet. This help student in project planning and group discussions and inculcating the value of collaboration and teamwork among them. It allows educators to assess students and also with the help of kahoot educators can test students' knowledge based on interactive gamified assessments. Artificial intelligence helps educators in reshaping the education by enabling personalized learning pathways and adaptive and interactive learning (U.S. Department of Education, 2022. It helps in improving LMS by catering student need and learning outcomes. AI provides real time assistance to students through virtual assistance and chat bots that helps in problem solving and enhancing the learning experience. There are innumerable benefits of digital tools in education but implementing these tools may face some challenges by various institutions due to lack of infrastructure, digital illiteracy and educators not trained properly with the use of digital tools. The institutions in the rural regions particularly struggle to access advanced Technologies. These tools although are widely acknowledged in improving the academic performance and the student engagement, there remains lack in depth research on the potential to develop soft skills. The soft skills include communication, critical thinking, adaptability, problem solving which are very critical for the success in 21st century workforce and yet their integration is unexplored. Investigating this would result in providing valuable insights into how digital tools not only enhance academic performance but also inculcate soft skills into them which can improve their overall development that will help them in professional front.

### **Different Digital Tools**

### 1. Padlet:

- Padlet is an interactive platform that allows users share their ideas, images and videos on virtual boards.
- Facilitates brainstorming, group discussions, and content sharing. Often used for creative assignments and collaborative projects in diverse subjects.
- Limited functionality in offline settings and potential issues with user privacy when boards are shared publicly
- Cynthia D. Fisher (2017) Research gate

### 2. Kahoot

- A gamified quiz platform that allows educators to create interactive quizzes and games.
- This tool enhances the engagement through competitive learning, and also increases the curiosity among students.
- The main focus here is on the speed rather than accuracy that can be difficult for the resource constraint people



• Khitam Altawalbeh (2023) Research gate

### 3. Learning management system(LMS)

- LMS is an essential tool that help students get up to date information and instant daily assignments in a structured form.
- It helps educational system to organize their resources properly and their issues regarding courseworks can be solved easily.
- Here reliable internet connection as well trained professionals are required
- Nor Azura Adzharuddin (2013)

### 4. Miro

- A great pedagogical methodology that helps designing products and manage projects.
- This is empowered to enjoy learning, consequently student will have greater interaction, learning motivation and concentration.
- it should have reliable internet to make it use properly.
- Read Khari Allah (2023)

### 5. Mentimeter

- This is a real time polling and quiz tool that generates interactive assessments and content
- It makes the delivery of formative assessment more fascinating and efficient. It allows students to be more comfortable while giving response to teacher's questions.
- The main challenge faced in this is the internet connection and the second to thoroughly guiding students on how to use it
- Siti Musliha (2020)

### 3. Research Methodology

In this section we will describe about the sample, measures and analysis of the frequency of tool usage, its effectiveness (on student engagement and performance), and the identification of various challenges. Quantitative research design was used as this research focuses on numerical data collected through the survey to measure participant's usage, effectiveness, experiences and the challenges related to the digital tools. this will help to quantify the effectiveness of digital tools like padlet, kahoot and miro by studying the responses. In this we have chosen educators and students who are actively engaged in technology enhanced learning.:

In this we have used convenience sampling technique based on their accessibility, availability and willingness to participate.

Sample size: 164 Participants. A structured questionnaire was designed for the survey to capture participant's views and it was divided into five sections :

1. demographics: it includes basic participant's information such as the name, contact, educational level and role.

### 2.Usage of digital tools

- 3. Effectiveness
- 4. Challenges
- 5. Recommendations


All this data was collected through online surveys through platforms like google forms. the participants were clearly guided through research objectives and given clear instructions to complete the questionnaire.

#### Data Analysis

The key variables are role (student, educator, administrator), level of education (undergraduate, postgraduate, high school), frequency of digital tool usage, effectiveness ratings of digital tools, perceptions of AI – enhanced tools and challenges faced in using digital tools.

### 4.1. Demographics

- **Role:** The majority of respondents are students (66%), followed by educators (22%), and a small percentage being administrators (12%).
- Educational level: Predominantly postgraduate students (68%), with a smaller representation of undergraduate and high school students.
- **Digital tool usage:** Data tool usage frequency among participants shows that 23% use it daily, 40% weekly, 25% monthly and 12% never.



Graph 1: Heat map showing Usage of digital tools according to level of education

**4.2 Tools used and effectiveness:** The most commonly mentioned tools include Miro, Padlet, Mentimeter, and Kahoots, Miro being highlighted as particularly effective in enhancing interactivity and personalized learning. Respondents highlighted the importance of gamification and interactive assessments as key benefits of digital tools<sup>4</sup>



<sup>4</sup> This graph illustrates the frequency of most effective digital tools among the participants



**4.3 Effectiveness ratings:** Respondents rated the effectiveness of digital tools positively, with an average score of 3.38 on a 1–5 scale, highlighting their value in enhancing engagement and learning despite room for improvement.

Below graph shows the effectiveness ratings among the educators, students and administrators which indicates that educators perceive digital tools as more effective as compared to students.



Graph 3: Effectiveness rating distribution by role

# 4.4 Perception Of Ai:

A majority (approximately 65%%) believe that AI-enhanced tools are improving the teaching-learning process, indicating a positive trend toward integrating AI in education.

**4.5 Challenges:** The most frequently cited challenges are: Connectivity problems (50%), Lack of infrastructure (25%), Training issues (20%)



Graph 4: Challenges while using Digital Tools

# 4.6 Statistical Analysis: Correlation analysis:

• Usage Frequency vs effectiveness ratings A positive correlation (r = 0.45) suggests that those who use digital tools more frequently tend to rate them as more effective.

**Educational level and effectiveness rating:** Postgraduate respondents rated the effectiveness of tools higher (average rating of 4.1) compared to undergraduate (3.5) and high school (3.6) respondent.Interpretation:

- The analysis show that weekly and monthly usage dominates digital tool adoption
- There's a positive correlation between usage frequency and effectiveness ratings



- Strong positive perception of AI tools across roles, with most respondents indicating "yes"
- The most commonly mentioned tools include Miro, Padlet, Mentimeter, and cahoots, with Miro being highlighted as particularly effective
- Average effectiveness rating is 3.38 out of 5, suggesting generally positive reception of digital tools
- The challenges faces are lack of infrastructure and connectivity issues
- Through the mean and standard deviation, we analyzed the effectiveness of digital tools in enhancing the interactivity and collaboration:
- The mean value (3.38) shows the average effectiveness of digital tools which we can perceive as moderately effective in enhancing interactivity and collaboration. The standard deviation (1.35) shows the variability of responses. A higher standard deviation suggests that opinions on effectiveness are more diverse, with some respondents rating tools as highly effective while others rate them as less effective.

	Rate the effectiveness of digital tools in enhancing interactivity and collaboration
count	164
mean	3.3780487805
std	1.3533892371
min	1
25%	2
50%	4
75%	5
max	5

#### Table 1 Average effectiveness of digital tools

• Through the data analysis we constructed a heat map that shows a strong correlation between adequate training and higher effectiveness ratings



Graph 5: Heat map showing Training Adequacy vs Tool Effectiveness

# Suggestions:

- Train educators and students on effective use of digital tools; prioritize user-friendly, high-rated platforms.
- Tailor tools for students' ease and educators' pedagogical needs.
- Invest in AI, gamification, and necessary infrastructure for engagement.



- Address connectivity and skill gaps through improved internet and training.
- Provide workshops and dedicated support to enhance digital literacy.
- Use AI for personalized learning, automated grading, and feedback and Promote collaborative tools.
- Ensure strict data privacy with global standards compliance

#### **Conclusion:**

The integration of digital tools in millennial teaching-learning pedagogy has proven to enhance the collaboration, interactivity and personalized learning experiences. The tools such as Miro, padlet and AI driven solutions demonstrate significant effectiveness but most people faces challenges such as connectivity issues and insufficient training of the educators as well as students. These barriers should be addressed by improving infrastructure continuous skill development will unlock the full potential of digital tools in education. This study underscores the importance of strategic implementation and feedback-driven improvement to ensure these tools enrich the teaching-learning process effective.

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# LEARNING IN THE DIGITAL ERA: THE IMPACT OF TECHNOLOGY ON EDUCATION

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#### Abstract

Education is an ever evolving and ever-changing landscape. Hence the teaching and learning practices should always be in sync with the current trends and demands. The education sector has lately seen a sudden transformation due to the rapid technological advancements. There has been a shift from the traditional teaching methods to more innovative, technology-based approaches. The COVID-19 pandemic has further accelerated this transformation, catalyzing a seismic shift towards technology-based learning. The adoption of technology for curriculum transaction has led to elevated educational outcomes, improved student engagement and upgraded learning experiences of the learners. Technology enhanced learning has also reshaped the learning environment by democratizing access to knowledge empowering learners. It fosters a dynamic and immersive learning environment which in turn facilitates deeper understanding and improved retention. This paper explores in-depth the impact of integration of technology in education. It also discusses the various challenges that arise in the complete infusion of technology in the educational field.

Keywords: Digital technology, student engagement, technology-enhanced learning, academic performance

#### Introduction

Since the start of 21<sup>st</sup> century there has been a tremendous change in the lives of people due to the technological revolution the era has witnessed. The rapid advancement of technology and digitalization has taken over all the dimensions of society. The way we connect with others, work, conduct daily transactions, learn has been transformed forever. Education too has seen a paradigm shift in the teaching and learning practices with the gradual permeation of technology. It acts as a support to teacher for creating engaging lessons using innovative methods of teaching making learning easy and enjoyable. Technology enhanced learning means using technology to create learning experiences that enhances comprehension in students. With the rise of technology, the teaching-learning process, the strategies for the creation, dissemination, and acquisition of learning resources, have also transformed. Thus, many scholars choose this topic for research work (Wang et al., 2024). This paper aims to study the benefits and challenges of integration of technology in education. It will examine the impacts of technology on various aspects of education, including student engagement, academic performance and students understanding. It will also delve into the exploration of role of technology in facilitation of parental involvement in their child's learning.

# Literature Review

Haleem et al. (2022) discusses thoroughly all the major applications and also the challenges of digital technologies in education. Improved teaching productivity, increased access to resources, improved understanding and student performance, real time assessment, reduced teacher workloads, online learning, inclusive and distance learning are few of the many applications mentioned. Challenges such as excessive screen time, teacher competencies, digital divide are also talked about. Akpen et al. (2024) examines the impact of online learning on students' academic performance and engagement. It highlights that online learning has potential but requires careful implementation and support to address the challenges of engagement and practical application. It found that online learning can enhance academic achievement, but only if the barriers associated with student learning are resolved. Osmani and Tartari (2024) through a case study of schools in Durrës, Albania concludes that digital technology can significantly enhance both learning and teaching. It further states that the integration of digital tools has led to increased student engagement, improved academic performance, and a more interactive and enjoyable learning experience. The study also states that the potential for distractions such as social media, poor internet connectivity, limited access to devices, inadequate teacher training challenges full digital realization in education. Carstens et al. (2021) examines the effects of technology in education. It concludes that more training on implementing technology in classrooms should be provided to teachers to make them more comfortable to its inclusion.



### **Research Methodology**

The study follows a qualitative research approach. It is based on secondary data analysis of research papers, extensive literature reviews, meta-analysis studies, government reports and case studies related to impact of technology in education. Studies that were published in English, were open access and provided free full-text articles were selected. The Search terms include digital education, digitization of education, student outcomes, academic achievement, educational technology, technology-enhanced learning. The data was analyzed thematically to identify key patterns and themes.

#### **Results And Discussion**

After the extensive review of multiple studies, various positive impacts of technology in education were identified and reported. Along with the impacts, some major challenges and hindrances in technology integration were also studied and highlighted. The impacts and challenges identified from the literature review are as follows:

#### **Positive Impact of Technology in Education**

#### 1. Increased accessibility

Integration of Digital technology in education has broken barriers and democratized access to knowledge. Students can now have access a large number of high-quality educational materials from all over the globe instantly. With just an internet connection and a computer learners can tap into digital libraries and open educational resources, offering over thousands of free e-books, digital textbooks, videos and articles. This improved reach of knowledge has been revolutionary in education.

#### 2. Flexible, self-directed learning

Technology Enhanced Learning (TEL) promotes self-directed learning by providing students with resources and tools necessary for self-study. With the availability of Self-paced courses and pre-recorded lectures the learners can now learn as and when they want, at their own pace and at their own time. Students can now learn anywhere, thus breaking free from the clutches of traditional classroom schedules. Online tutoring platforms provide freedom to the learners to choose their instructors, allowing them to learn from those who inspire them. Learners are thus empowered to take ownership of their learning encouraging a deeper commitment to personal growth and development.

# 3. Ample educational opportunities

Online courses and degree programs have transformed education by increasing access to top-tier courses and programs. The students worldwide are therefore empowered to select a course of their choice and hence pursue their passions and interests. Massive open online courses (MOOCs), have enabled the learners to acquire new skills and knowledge while balancing work and family. The students can now enhance their qualifications and develop their careers simultaneously. Online courses help learners to stay relevant in a constantly changing and growing job market and to adapt to evolving professional requirements (Yadav, 2024). Online education has helped to bridge the educational gap in the underserved and rural areas by providing equal access to educational opportunities enabling the students to unlock better career prospects (Haleem et al., 2022).

#### 4. Improved engagement

With the advent of simulations, learners can now visualize and explore complex concepts with ease through handson experience. Virtual labs allow the students to conduct experiments in a controlled and safe environment facilitating students' active involvement in learning. Various online educational games and quizzes motivates students to participate in learning making learning fun and enjoyable (Yadav, 2024). Interactive whiteboards also create an engaging environment through its numerous features. Virtual field trips make learning memorable by providing interactive and immersive experiences to the students where the students explore diverse destinations and environments which would be difficult to go to otherwise at the same place and time. Technology Enhanced Learning significantly improves the student engagement and performance (Osmani & Tartari, 2024).



# 5. Enhanced understanding

Integrating technology in education provides the students with engaging and interactive learning environment through videos, audios, simulations, real world applications and hands on learning. This in turn creates learning experiences that improves understanding of complex concepts and theories and also concretizes learning. Digital equipment, tools and resources can, where effectively used, raise the speed and depth of learning in science and mathematics and also in writing and comprehension for primary and secondary age learners (The Scottish Government, 2015).

#### 6. Enhanced academic performance

Technology enhanced learning has a profound impact on students' academic performance leading to improved grades, and enhanced student outcomes. This can be attributed to interactive and personalized learning experiences, diverse multimedia rich resources.

#### 7. Inclusive learning

Educational technology has significantly enhanced inclusivity in education. Assistive technologies like text to speech, speech to text software's, screen readers, braille displays, closed-captioning applications, sound amplifiers, and video conferencing technologies enable the students with disabilities to access learning materials and participate in learning (Haleem et al., 2022). Technology has also come as a gift to linguistically diverse learners by providing online resources in multiple languages breaking the information barrier. The automated translation tools available also increase the access to quality education.

#### 8. Enhancing parental engagement

In the today's times, technology has greatly improved the communication pathway between the school and the parents. Schools now use emails and messaging apps to provide regular updates about school activities, students attendance, academic progress and upcoming holidays giving parents timely access to relevant information, enabling informed decisions about their child. This direct communication between the parents and teachers ensure that they work together effectively developing best strategies for child's learning. Live streaming of school events and virtual parent-teacher meetings enable parents to attend remotely increasing their participation. Using digital equipment and tools for direct communication with parents can improve learners' and parents' cooperation considerably (The Scottish Government, 2015).

#### 9. Teacher productivity and efficiency

To make classroom instructions interesting, innovative teaching practices can be developed by using technology (Yadav, 2024). Teachers can use digital tools and learning management systems to track students' progress and identify any learning gaps (Mote,2024) increasing their efficiency. Technology also allows for real time assessment of the students saving teacher time and improving productivity.

#### **10.** Fosters collaboration

Technology-enhanced learning creates environments for learners to, collaboratively, generate, modify and evaluate new ideas through online and multimodal interaction (Selfa-Sastre et al., 2022). Online discussions and video conferencing platforms, shared digital spaces allow students to share their ideas and learn from each other (Mote,2024).

# **Challenges of Integrating Technology in Education**

#### **Resistance to change**

Teachers are accustomed to traditional teaching practices hence resist any change to their approach. Integration of new technology can cause a discomfort in teachers towards its use, especially if they are not familiar with it.



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#### Access and equity

Digital divide in the form of unequal access to devices such as computers, mobiles, laptops or tablets as well as lack of proper internet connection makes technology enhanced learning a huge challenge. Students with access to technology at home perform better than those who don't.

#### **High Cost**

Initial investment with regards to purchasing new technology is very expensive. Along with this, maintaining and updating the existing technology puts additional financial stress on school budgets. Schools in rural and disadvantaged areas may find it difficult to allocate funds to technology integration.

#### **Teacher training and support**

The absence of proper training in the use of technology leads to a lack of confidence in teachers in its usage. Ineffective use of technology in the instructional process can further lead to poor learning outcomes. In addition to this, inadequate technical support at the right time can discourage its use among the teachers. This will eventually lead to its total abandonment.

#### Infrastructure and connectivity problems

Not having proper infrastructure becomes a significant barrier to the effective integration of technology in education. Learning will be severely affected if there is insufficient hardware and inadequate software and digital tools. Along with this unreliable internet connectivity, frequent technical glitches and insufficient technical support can also affect the learning process. Limited access to technology (insufficient computers, peripherals, and software) and lack of technical support are important barriers to ICT integration (Timotheou et al., 2022).

#### Conclusion

Through this study we can conclude that merging education with technology has shown to have positive effects on teaching and learning. Use of technology in education has led to an increased access to resources, enhanced educational opportunities, flexible learning, improved engagement, enhanced understanding and academic outcomes. It also facilitates teacher efficiency and student collaboration. One of the major benefits of technology is that the responsibility of the child's learning now lies with both the teachers and the parents. However, there are some challenges in the form of unequal access, high cost, lack of infrastructure, teacher resistance, in adequate teacher training and support that we have to tackle to ensure complete infusion of technology in education and to reap its full benefits.

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# IMPACT OF INQUIRY BASED LEARNING ON SELF EFFICACY OF MANAGEMENT STUDENTS IN GUJARAT STATE

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### Abstract:

Inquiry based learning is a teaching approach where students take an active role in their learning by asking questions, investigating solutions, and discovering answers on their own. Self-efficacy refers to a person's belief in their ability to successfully perform a specific task or achieve a goal. The paper analyses the impact of Inquiry Based Learning on Self Efficacy of Management Students in Gujarat State. Using descriptive research design and non-probability convenience sampling method, 93 management students were studied. The objectives of the study are to assess the self-efficacy level of management students, to explore the students' perceptions towards Inquiry Based learning in fostering confidence and problem-solving abilities and to analyse the analyse the impact Inquiry Based learning on self-efficacy of students'. Using statistical methods, the findings include that teacher readiness skills, availability of sufficient resources and institutional support are in significant relationship to self-efficacy of management students in Gujarat State. In addition to this, Gender based differences in confidence and the perception of students' abilities is seen.

Keywords: Inquiry Based Learning, Self-Efficacy, Gujarat State

#### Introduction:

Inquiry-Based Learning (IBL) is an educational approach that emphasizes the role of the learner in actively exploring, questioning, and constructing knowledge. IBL shifts the focus from the teacher as the sole source of knowledge to the learner as an active participant in the learning process. This method encourages curiosity, critical thinking, and problem-solving, making learning more engaging and meaningful.

Self-efficacy refers to an individual's belief in their ability to succeed in specific situations or accomplish a task. Self-efficacy relates to students' motivation, persistence, and academic performance. For management students, high self-efficacy is crucial as it impacts their confidence in handling complex business problems, working effectively in teams, and making strategic decisions.

# **Review Literature:**

# **Inquiry Based Learning**

Inquiry-based learning (IBL) is a student-centered approach that encourages learners to explore, question, and derive conclusions, fostering a deep understanding of concepts. Arends (2014) highlights how inquiry-based strategies help students gain confidence in applying theoretical knowledge to real-world situations. Catherine A., Nathan B., Erin M. (2021) analysed that Science, Technology, Engineering and Management (STEM) education faces challenges in maintaining student engagement and achievement, often due to a lack of real- world relevance in the curriculum, resulting in declining interest beyond compulsory schooling. Inquiry-Based Learning (IBL) and localised curriculum design have emerged as effective strategies to address these issues. IBL fosters active learning by encouraging students to explore, question, and solve problems, while localising the curriculum connects learning to students' immediate environments, enhancing relevance and retention. A qualitative study on infrastructure programs in Sydney, Australia, highlighted the impact of these strategies, showing that teacher professional learning and industry partnerships significantly improved student engagement across operative, cognitive, and affective domains.

Chowdhury & Ghosh (2021) studied that in Gujarat, where industries are growing rapidly, such methods help students stay aligned with the demands of the business world. Recent studies also show that inquiry-based learning improves students' ability to work in teams, manage projects, and handle business crises, enhancing their self-efficacy in the workplace.

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The integration of IBL in management education has been shown to enhance critical thinking, leadership, and decision-making skills (Hernández et al., 2019). According to Roy and Ghosh (2020), inquiry-based pedagogies in management programs foster active engagement, encouraging students to apply their knowledge to real business challenges. Wale, B.D., Bishaw, K.S. (2020) investigated the impact of inquiry-based learning (IBL) on the critical thinking skills of 20 EFL undergraduate students enrolled in an advanced writing skills course, employing a quasi-experimental time series design. Using pre-tests and post-tests on argumentative essay writing, focus group discussions, and reflective journals, the study gathered data on students' critical thinking. Quantitative data were analysed using One-Way Repeated Measures ANOVA, while qualitative data were narratively analysed. The findings revealed that IBL significantly enhanced core critical thinking skills, including interpretation, analysis, evaluation, inference, explanation, and self-regulation. The study concludes that inquiry-based instruction, particularly in argumentative writing, is a highly effective pedagogical strategy for fostering critical thinking in students, emphasizing its relevance in promoting analytical and reflective capabilities in educational contexts.

# Self-Efficacy

Alay A., Triantoro S. (2013) investigated the impact of self-efficacy on academic performance and social interactions among 15 fifth-grade boys from a local Pakistani school. Using Hague's (1990) Urdu Self-Efficacy Scale, the research assessed students' performance on a 50-problem mathematical test. Findings revealed that students with high self-efficacy achieved better scores and expressed intentions to pursue more complex subjects in the future. The study underscores the critical role of self-efficacy in enhancing academic achievement and shaping educational aspirations. A cross-cultural study is recommended to explore these findings further and examine their broader applicability.

**Fernando B., Laura R., Amparo A. (2017)** explores the motivational mechanisms mediating the relationship between academic self-efficacy, student achievement, and satisfaction, focusing on 797 Spanish secondary school students. Using structural equation modeling, the research found that students' expectancy-value beliefs— comprising subject value, process expectancy, achievement expectancy, and cost expectancy—serve as mediators between self- efficacy and achievement/satisfaction outcomes. By highlighting the role of expectancy-value beliefs, the study provides valuable insights into how self-efficacy influences key educational outcomes, offering implications for improving teaching strategies and enhancing education quality in secondary education.

# Self-Efficacy in Management Students

Ashu Y. (2020) explores the role of self-efficacy in academic performance and future career prospects, emphasizing its importance in the information age, where cognitive competencies are vital for managing personal and professional roles. The research, conducted among Business Management students through questionnaires, analysed various theories of self- efficacy and investigated the impact of academic and career self-efficacy on academic performance. The findings revealed that academic self-efficacy is a stronger predictor of academic success than career self-efficacy, highlighting the significance of believing in one's academic abilities for achieving better educational outcomes.

Manju D., Dr. Velmurugan (2019) explores the role of self-efficacy in academic performance and future career prospects, emphasizing its importance in the information age, where cognitive competencies are vital for managing personal and professional roles. The research, conducted among Business Management students through questionnaires, analysed various theories of self-efficacy and investigated the impact of academic and career self-efficacy on academic performance. The findings revealed that academic self-efficacy is a stronger predictor of academic success than career self-efficacy, highlighting the significance of believing in one's academic abilities for achieving better educational outcomes.

Nair and Abraham (2016) explored the integration of inquiry-based pedagogies in management institutes in Gujarat. They found that students exposed to IBL exhibited higher levels of self-efficacy, as they could engage in collaborative learning and innovative problem- solving.

# Inquiry Based Learning and Self-Efficacy

Das and Agarwal (2020) highlighted that inquiry-based learning improves students' problem- solving skills, which



in turn enhances their self-confidence. Similarly, a study by Patel and Mehta (2021) demonstrated that when management students in Gujarat were taught using inquiry-based methods, their academic performance and self-efficacy in business tasks improved. These findings suggest that integrating IBL in Gujarat's management programs can significantly foster self-efficacy among students, preparing them for successful careers in business.

**Rahayu and Sundari (2018)** found that students who engaged in inquiry-based learning demonstrated higher levels of self-efficacy due to the hands-on, problem-solving nature of the approach. Similarly, in management education, inquiry-based methods help students develop the skills necessary for solving complex business problems, which in turn boosts their confidence and belief in their abilities.

**Shah and Mehta (2019)** emphasized the importance of adapting IBL to the needs of local management students. Their findings revealed that inquiry-driven classrooms encourage independent learning, which significantly impacts self-efficacy levels. Moreover, the study highlights the role of instructors in facilitating inquiry processes, ensuring students develop confidence in decision-making and leadership.

The research questions are as follows:

- What are the current self-efficacy levels of management students in Gujarat?
- How do students perceive the role of Inquiry-Based Learning in fostering confidence and problem-solving abilities?
- What is the impact of Inquiry-Based Learning on the self-efficacy of management students?

# **Objectives of the Research**

- To assess the self-efficacy level of management students.
- To explore the students' perceptions towards Inquiry Based learning in fostering confidence and problem solving abilities.
- To analyse the impact Inquiry based learning on self-efficacy of students.

# Significance of the Study

This study offers new insights into the relationship between teaching methods (like IBL) and student self-efficacy, helping to refine existing theories of motivation and learning. Information can be used by the institutions to refine teaching practices, improve teacher training programs, and ensure that students have the necessary tools to succeed. By improving self-efficacy and problem-solving skills, this study can contribute to the development of a more skilled, innovative, and confident workforce, which benefits society at large by driving economic growth and social progress.

# **Research Design and Methods**

The whole study revolves around the importance of inquiry based learning on the self-efficacy of Management students. This research was conducted through the distribution of questionnaire among the management students of Gujarat State.

For the purpose of this research, 8 factors of Inquiry Based Learning were selected on the basis of review literature – Teacher Readiness and Skills, Student Readiness, Curriculum Design, Classroom Environment, Sufficient Resources, Assessment Methods, Institutional Support and Technology Integration data with 5 point Likert's Scale was collected from 93 management students. The Kaiser Meyer Olkin value is 0.631was above 0.6 suggests that there was appropriate variance in the survey items and the Bartlett's Test of Sphericity significance value is 0.000 less than 0.05 suggests that the survey items are interrelated.

Table 1: KMO and Bartlett's Test					
Kaiser-Meyer-Olkin I	.631				
Bartlett's Test of Sphericity	324.028				



	df	28
	Sig.	.000

A non-probability convenience sampling method and descriptive research design was used for the study. Reliability of the instrument have been determined by the Cronbach's alpha ( $\alpha$ ) coefficient.

#### **Table 2: Reliability Statistics**

Cronbach's Alpha	N of Items			
.848	20			

#### Analysis of Survey Data:

#### **Table 1: Descriptive Statistics of the Demographic Variables**

		Frequency	Percent	Valid Percent	Cumulative Percent
Gender	Male	46	43.8	49.5	49.5
	Female	47	44.8	50.5	100.0
Age	Less than or equal to 22 years	86	81.9	92.5	92.5
	More than 22 years	7	6.7	7.5	100.0
Income	Less than 10000Rs.	50	47.6	53.8	53.8
	10000 to 25000 Rs	17	16.2	18.3	72.0
	More than 25000 Rs.	26	24.8	28.0	100.0
	Rural Area	18	17.1	19.4	19.4
Residential Location	Urban Area	75	71.4	80.6	100.0

# Table 2: Descriptive Statistics - Self-Efficacy of Management Students

How confident are you in your ability to manage academic tasks effectively?										
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree					
Frequency	0	0	13	73	7					
Valid percent	0	78.5	7.5							
	How often do you feel capable of solving problems independently?									
Frequency	0	9	56	21	7					
Valid percent	0	9.7	60.2	22.6	7.5					
Rate your overall confidence in achieving academic and professional goals.										
Frequency	2	17	17	40	17					
Valid percent	2.2	18.3	18.3	43.0	18.3					

From table 2, it is observed that 78.5% management students feel confident in their ability to manage tasks effectively. 22.6% students feel capable to solve their problems independently and 43% students agree and 18.3% students strongly agree about their overall confidence in achieving academic and professional goals.



### To assess the self-efficacy level of management students:

H0: There is no significant difference in self-efficacy levels between males and females.

		Levene's Test for Equality of Variances		Independent Samples t-test			
		F	Sig.	t	t df Sig (2-tailed)		
Self-Efficacy	Equal variances assumed	1.296	.258	-3.855	91	0.000	
	Equal variances not assumed			-3.866	86.122	0.000	

### Table 3: Independent Sample t-test

Table 3 shows the significance level as 0.000 > 0.05 indicates that there is significant difference in self-efficacy between males and females.

#### **Table 4: Group Statistics**

Gender		Ν	Mean	Std. Deviation	Std. Error Mean
Self-Efficacy 1		46	3.38	.464	.068
	2	47	3.81	.605	.088

Table 4 explains that females have higher average self-efficacy score of 0.605 compared to females i.e. 0.464. Standard deviations indicate the scores being distributed within each group

To explore the students' perceptions towards Inquiry Based learning (IBL) in fostering confidence and problem solving abilities:

Engagement to IBL is better compared to traditional learning methods									
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree				
Frequency	0	13	40	14	26				
Valid percent	0	14.0	43.0	15.1	28.0				
IBL helps you to develop problem-solving skills									
Frequency	0	7	19	59	8				
Valid percent	0	7.5	20.4	63.4	8.6				
	IBL has impr	oved my confide	nce in tackling c	omplex tasks					
Frequency	7	0	21	25	40				
Valid percent	7.5	0	22.6	26.9	43.0				
Improvement is observed in my higher-order thinking skills with IBL									
Frequency	7	0	19	38	29				
Valid percent	7.5	0	20.4	40.9	31.2				

 Table 5: Descriptive Statistics – Students' Perception towards Inquiry Based Learning

From table 5, it is observed that 28% of management students feel that engagement to Inquiry based learning is better than traditional learning methods. 63.4% students feel that IBL helps them to develop problem solving skills. 43.0% students strongly agree that IBL helps them to tackle complex tasks confidently and 40.9% agree that



improvement is observed in higher order skills through IBL.

# To analyse the impact Inquiry Based Learning on self-efficacy of students':

H0: There is no impact of IBL on self-efficacy of students'.

Dependent variable is self-efficacy of students' and Independent variable are the factors of IBL.

#### Table 6: ANOVA table

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11.698	8	1.462	6.411	.000ª
	Residual	19.158	84	.228		
	Total	30.855	92			

- a. Predictors: (Constant), Technology Integration, Curriculum Design, Studetn Readiness, Assessment Methods, Sufficient Resources, Institutional Support, Classroom Environment, Teacher Readiness and Skills
- b. Dependent Variable: Self Efficacy

Table 6 shows the significance level 0.000 < 0.05 indicates that there is impact of IBL on self- efficacy of students'.

Model		Unstandardized Coefficients		Standardized Coefficients		
		В	Std. Error	Beta	t	Sig
1	(Constant)	2.201	.438		5.020	0.000
	Teacher Readiness and Skills	.197	.078	.414	2.520	0.014**
	Student Readiness	.020	.081	.024	0.244	0.808
	Curriculum Design	.061	.061	.121	0.984	0.328
	Classroom Environment	.123	.074	.230	1.669	0.099
	Sufficient Resources	.225	.064	.475	3.493	0.001**
	Assessment Methods	.057	.050	.122	1.129	0.262
	Institutional Support	.214	.082	406	-2.622	0.010**
	Technology Integration	.113	.077	195	-1.466	0.146

**Table 7: Coefficients** 

#### a. Dependent Variable: Self Efficacy

Table 7 indicates teacher readiness and skills, sufficient resources and institutional support affects the self-efficacy level of students'.

Mo	R	R	Adjusted	Std. Error	Change Statistics					Durbin-
del		Square	R Square	of the Estimate	R Square	F	df1	df2	Sig. F	Watson
				LStillate	Change	Change			Change	
1	.616a	.379	.320	.478	.379	6.411	8	84	.000	1.226

#### **Table 8: Model Summary**



a. Predictors: (Constant), Technology Integration, Curriculum Design, Student Readiness, Assessment Methods, Sufficient Resources, Institutional Support, Classroom Environment, Teacher Readiness and Skills

b. Dependent Variable: Self Efficacy

Table 8 shows R square value is 0.379. IBL explains 37.9% of the variance in self-efficacy of students'.

The model can be represented as

# Self-Efficacy of Students' = β0 + 0.197 (Teacher Readiness and Skills) + 0.225 (Sufficient Resources) + 0.214 (Institutional Support)

For every one-unit increase in teacher readiness and skills, students' self-efficacy increases by 0.197 units, assuming other factors remain constant. For every one-unit increase in sufficient resources, students' self-efficacy increases by 0.225 units, assuming other factors remain constant. For every one-unit increase in institutional support, students' self-efficacy increases by 0.214 units, assuming other factors remain constant.

#### Findings:

In the context of student learning and engagement, females demonstrate a higher average self- efficacy score (0.605) compared to males, highlighting gender-based differences in confidence and students' perceptions of their own abilities.

While examining learning methods, it was found that 28% of management students feel that engagement with IBL is better than with traditional learning methods. A considerable percentage still favours traditional learning methods and they are not fully convinced of IBL's engagement benefits. 63.4% of students feel that IBL helps them develop problem-solving skills. 40.9% of students agree that improvement is observed in higher-order skills through IBL.

Teacher preparedness plays a significant role in enhancing students' confidence in their abilities. When teachers are better equipped with the necessary skills and knowledge, students tend to feel more capable and self-assured in their learning processes. Access to adequate resources is strongly correlated with students' perceived ability to succeed. When students have the necessary tools and materials at their disposal, they are likely to feel more competent and confident in their learning environment. When students receive encouragement and guidance from the institution, they are more likely to believe in their academic abilities.

#### Suggestions

Many students still prefer traditional learning methods, highlighting the need for greater efforts to increase the adoption of IBL. Male students, in particular, should be provided with opportunities to boost their confidence and tackle complex tasks. Teachers can support this by incorporating reflective practices to help students assess and refine their higher-order cognitive skills. Additionally, more focused efforts are required to ensure consistent growth in higher- order thinking skills for all students.

# Limitations of the Study:

The study is limited in scope as it focuses exclusively on Gujarat state, making the findings less applicable to other regions. Additionally, the use of a 5-point Likert scale introduces inherent limitations, potentially affecting the depth and precision of the data collected. The results are based on a specific group of management students, which restricts their generalizability to other student populations or academic disciplines. Furthermore, the attitudes of respondents have posed a limitation, potentially influencing the reliability of the insights derived.

# Implications of the Study:

Educators should prioritize professional development programs focused on inquiry-based teaching methods to enhance students' confidence and problem-solving abilities. Curriculum designers should incorporate more IBL activities and problem-solving exercises into the curriculum to promote critical thinking, collaboration, and selfconfidence in students. To address gender disparities in self-efficacy, educational programs should consider integrating gender-responsive teaching strategies that empower both male and female students equally.



### **Future Scope of the Study:**

Future research could explore how IBL affects self-efficacy in students using different factors. A comparative analysis can be conducted between IBL and other pedagogical methods (such as direct instruction or project-based learning) to determine the most effective strategies for enhancing student self-efficacy.

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# ENHANCING HIGHER EDUCATION THROUGH EXPERIENTIAL LEARNING AND INQUIRY-BASED PEDAGOGY: INSIGHTS FROM NEP 2020

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### Abstract

The Indian National Education Policy (NEP) 2020 signals a paradigm shift in higher education, prioritizing holistic development, critical thinking, and problem-solving skills over rote learning. Central to this transformation are experiential and inquiry-based learning approaches, which the NEP 2020 explicitly promotes. This paper examines the theoretical underpinnings and projected impact of these pedagogical innovations within the Indian higher education landscape. Experiential learning, emphasizing hands-on engagement with real-world contexts, and inquiry-based learning, fostering student-led investigation and exploration driven by curiosity, are cornerstones of the policy's vision for a student-centric, outcome-oriented system. We synthesize relevant literature and established learning theories, such as constructivism and transformative learning, to analyse how these approaches can significantly enhance student engagement, leading to deeper understanding and knowledge retention. This paper investigates the benefits of interdisciplinary learning, demonstrating how connecting knowledge across different disciplines fosters a richer, more multifaceted understanding of complex issues. Furthermore, the study investigates the cultivation of lifelong learning habits, equipping graduates with the adaptability and critical thinking skills essential for success in a rapidly changing world. A key focus is on the challenges and opportunities for higher education institutions in effectively implementing these innovative pedagogical strategies. The process necessitates meeting diverse student needs, comprehensively training faculty, and resolving infrastructural limitations. The paper further analyses the implications for curriculum design, assessment methods, and resource allocation, proposing a strategic roadmap for successful integration. This roadmap encompasses policy adjustments, faculty development initiatives, and curriculum redesign to maximize the transformative potential of experiential and inquiry-based learning within the Indian higher education system, ultimately contributing to the development of a more engaged, skilled, and adaptable workforce. The research also considers the need for ongoing evaluation and adaptation to ensure the effectiveness and equity of these new approaches.

Keywords: NEP, Higher Education, Experiential Learning, Inquiry-Based Learning.

# Introduction

Learning is an ongoing journey that spans from birth to death. Throughout various stages of life, individuals engage in learning as students, educators, parents, and members of society. Experience plays a crucial role in this learning journey. What we acquire stems from our own experiences or those of others. For a considerable time, experiential learning has been recognized as a vital educational approach. With the growing emphasis on acquiring 21stcentury skills, experiential learning has gained prominence. This method primarily involves active engagement with the environment to gather knowledge, develop skills, and understand complex concepts. It is an exploratory approach that emphasizes practical experience, self-reflection, and critical analysis. By allowing students to engage with real-world challenges, experiential learning facilitates a deeper understanding of their underlying causes and potential solutions, thereby providing a more effective way to navigate complexity and uncertainty. The interconnectedness of experiential learning and inquiry in a multifaceted world highlights the importance of active engagement with one's surroundings. Through experiential learning, individuals can explore the intricacies and root causes of complex issues while enhancing their critical thinking skills. This process can lead to improved decisionmaking, more effective problem-solving, and a greater ability to manage complexity and uncertainty in the external environment (Sachdeva & Latesh, 2023). It fosters adaptive learning, integrates diverse learning modalities into a comprehensive educational experience, and cultivates essential skills and meta-learning capabilities (Kolb & Kolb, 2017). The National Education Policy (NEP) 2020 represents a pivotal transformation in India's higher education framework, advocating for a more holistic, flexible, and inclusive educational system. Among the primary strategies promoted by NEP 2020 are experiential learning and inquiry-based pedagogy.



#### **Review of Literature**

Experiential learning, rooted in Kolb's experiential learning theory (1984), emphasizes the process of learning through direct experience, followed by reflection and application. According to Kolb, the cycle of concrete experience, reflective observation, abstract conceptualization, and active experimentation fosters deeper understanding and skill acquisition. Research has demonstrated the efficacy of experiential learning in bridging the gap between theory and practice. Studies by Dewey (1938) and Schön (1983) highlight how hands-on activities, internships, and real-world projects enhance critical thinking, creativity, and problem-solving skills among students. Furthermore, recent research by Seaman et al. (2017) underscores the role of experiential learning in promoting engagement, motivation, and lifelong learning habits.

Inquiry-based pedagogy, influenced by constructivist theories of learning (Piaget, 1972; Vygotsky, 1978), encourages students to explore, question, and construct knowledge actively. This method shifts the role of educators from knowledge transmitters to facilitators of learning. Studies indicate that inquiry-based learning fosters critical thinking and autonomy among students. Hmelo-Silver et al. (2007) observed that students involved in inquiry-based activities develop higher-order cognitive skills, including analysis, synthesis, and evaluation. Similarly, a meta-analysis by Furtak et al. (2012) highlights how inquiry-based approaches enhance student achievement across disciplines, particularly in STEM fields.

The National Education Policy 2020 envisions a transformative shift in India's higher education system, emphasizing holistic, multidisciplinary, and skill-oriented learning. It advocates experiential and inquiry-based approaches to prepare students for 21st-century challenges. NEP 2020 highlights the importance of learning by doing, interdisciplinary research, and fostering curiosity among students (MHRD, 2020). Studies by Agarwal (2021) and Sharma & Kaur (2022) affirm that aligning higher education curricula with NEP 2020 goals through experiential and inquiry-based methodologies can enhance employability, innovation, and social responsibility among graduates.

Despite their advantages, experiential and inquiry-based pedagogies face challenges in higher education. Limited faculty training, resource constraints, and rigid assessment structures often hinder effective implementation. Research by Boud and Molloy (2013) points to the need for institutional support, capacity-building programs, and policy reforms to overcome these barriers. Moreover, studies by Sharma et al. (2021) and Kumar (2023) emphasize the importance of integrating technology and collaborative tools to scale experiential learning opportunities, especially in resource-constrained settings.

Globally, countries like Finland, Singapore, and the United States have successfully implemented experiential and inquiry-based pedagogies. These systems emphasize teacher training, collaborative learning environments, and continuous curriculum innovation (OECD, 2019). Indian higher education institutions can draw lessons from these practices to design context-specific strategies that align with NEP 2020 goals. Studies by Joshi and Menon (2022) recommend adopting blended learning models, industry-academia partnerships, and community-based projects to enhance experiential learning outcomes.

# Experiential Learning and Inquiry-Based Learning in Context to NEP 2020

The National Education Policy (NEP) 2020 marks a significant shift towards a learner-centric and transformative education system. At its core lies the integration of experiential learning and inquiry-based pedagogy, emphasizing real-world applications, critical thinking, and lifelong learning. By weaving in various dimensions such as internships, service-learning, personalized learning, and global collaborations, the NEP 2020 sets a progressive framework for holistic development. Below are the key aspects highlighting the role of experiential learning in achieving the NEP's objectives:-

# 1. Comprehensive Development

NEP 2020 envisions education as a holistic process, nurturing intellectual, emotional, social, and physical growth. Experiential learning fosters this by blending academic rigor with hands-on experiences such as field studies, service-learning, and exploration-based activities. These activities enhance life skills, creativity, critical thinking, and emotional intelligence, preparing learners to tackle real-world challenges while promoting cultural understanding and mutual learning.



# 2. Skill Development and Vocational Education

The policy emphasizes skill acquisition and vocational education from an early stage. Experiential learning bridges the gap between theoretical concepts and practical applications through internships, entrepreneurship development programs, and research projects. These opportunities not only cultivate employability skills but also inspire students to innovate and contribute meaningfully to society. The IITs incorporate experiential learning through extensive lab work, industry collaboration, and startup incubators. For instance, IIT Madras's Research Park fosters innovation by connecting students with industry experts to solve real-world problems. The Skill India initiative aligns with NEP 2020 by offering vocational training programs in institutions like the National Institute of Open Schooling (NIOS), promoting hands-on learning for diverse skills.

# 3. Multidisciplinary and Personalized Learning

NEP 2020 encourages a multidisciplinary approach, empowering students to explore diverse fields. Experiential learning complements this by enabling learners to amalgamate knowledge through personalized projects, interdisciplinary fieldwork, and research initiatives.

Personalization allows students to progress at their own pace, align education with their interests, and delve deeper into subjects of passion. Ashoka University known for its liberal arts curriculum, integrates interdisciplinary studies, allowing students to combine subjects like economics and philosophy, enhancing critical thinking and adaptability.

#### 4. Research, Innovation, and Entrepreneurship

A central aspect of NEP 2020 is fostering a culture of innovation and entrepreneurship. Experiential learning fuels this by engaging students in research-driven projects, innovation labs, and startup incubators. These initiatives encourage learners to ideate, prototype, and implement solutions to real-world problems, thus developing entrepreneurial mindsets. Institutions like Amity University have created incubation centers to support entrepreneurial ventures, in alignment with NEP 2020's emphasis on innovation-driven learning.

# 5. Community Collaborations and Alumni Engagement

The policy emphasizes collaboration between educational institutions and communities. Service-learning, community-based projects, and alumni engagement provide students with opportunities to contribute to societal development while gaining practical exposure. Alumni networks serve as valuable resources for mentorship, internships, and industry insights, enriching the learning ecosystem.

# 6. Global Engagement and Cross-Cultural Understanding

NEP 2020 envisions global citizenship through abroad study programs, international trade projects, and cultural exchange initiatives. Experiential learning fosters cross-cultural understanding and collaboration, preparing students for a globalized world. These experiences also promote leadership, adaptability, and a broader worldview. Universities such as Jindal Global University emphasize cross-cultural understanding through partnerships with global institutions, fostering a holistic perspective.

# 7. Leadership and Lifelong Learning

Leadership development is a key focus of the NEP 2020. Experiential learning nurtures leadership qualities through team-based projects, service-learning initiatives, and mentorship programs. By engaging in real-world problemsolving and mutual learning, students develop resilience, adaptability, and decision-making skills essential for lifelong learning and leadership roles.

#### 8. Teacher Training and Professional Development

Effective experiential learning requires teachers to adopt innovative methodologies. NEP 2020 prioritizes ongoing professional development for educators, equipping them with tools to implement dynamic teaching strategies, collaborative projects, and inquiry-driven practices. Programs like ARPIT (Annual Refresher Programme in Teaching) empower educators to implement inquiry-based and experiential learning methodologies effectively.

The benefits of experiential learning and inquiry-based pedagogy are numerous. These approaches can enhance



student learning outcomes, promote critical thinking and problem-solving skills, and foster a more collaborative and inclusive learning environment. However, implementing these approaches also poses several challenges, including the need for significant curriculum reform, teacher training, and resource allocation.

One of the key challenges in implementing experiential learning and inquiry-based pedagogy is the need for significant curriculum reform. Higher education institutions will need to revise their curricula to incorporate more experiential learning and inquiry-based pedagogy. This will require significant investment in teacher training and resource allocation.

Another key challenge is the need for teacher training. Teachers will need to be trained in the use of experiential learning and inquiry-based pedagogy, in order to effectively implement these approaches in their classrooms. This will require significant investment in teacher training programs.

#### **Discussion and Conclusion**

The aforementioned literature indicates that experiential learning is not a novel educational approach; rather, it offers a fresh perspective on the organization of educational practices within classrooms. This approach emphasizes the importance of placing students at the center of classroom activities, as educators increasingly adopt various techniques to engage learners through field-based experiences, collaborative projects, interdisciplinary research, reflection, and self-assessment. Experiential learning is characterized as a pedagogical method that enables students to learn through the processes of doing, reflecting, thinking, and applying (Butler et al., 2019). The research explored several critical aspects of experiential learning within real classroom environments, which can significantly enhance students' creativity, critical thinking, engagement with real-world issues, and understanding of concepts. In an era of constant change, the relevance of education is frequently scrutinized. Experiential learning provides a platform for individuals to showcase their learning capabilities, thereby improving their employability prospects. The integration of experiential learning within the National Education Policy (NEP) 2020 represents a transformative advancement towards a more holistic and effective educational framework. NEP 2020 recognizes the importance of comprehensive development by balancing theoretical knowledge with practical skills. Beyond enhancing academic understanding, experiential learning fosters essential qualities such as critical thinking, creativity, and adaptability, which are vital in today's fast-evolving landscape. The emphasis on experiential learning within NEP 2020 reflects a commitment to cultivating students who can seamlessly apply their knowledge across diverse contexts. Furthermore, the policy promotes a passion for lifelong learning by encouraging collaboration, curiosity, and hands-on exploration. The integration of experiential learning into NEP 2020 not only deepens students' comprehension of their subjects but also ignites their enthusiasm for learning.

Experiential learning and inquiry-based pedagogy hold the promise of revolutionizing the higher education system in India by fostering student-centered, adaptable, and inclusive educational settings. The National Education Policy (NEP) 2020 outlines a framework for the adoption of these methodologies; however, effective execution will necessitate substantial investments in teacher development, curriculum enhancement, and resource distribution.

It is essential for higher education institutions to emphasize experiential learning and inquiry-based pedagogy within their academic programs and to allocate resources for teacher training initiatives that facilitate these methodologies. Additionally, the government should offer incentives and support to encourage higher education institutions in the adoption of experiential learning and inquiry-based pedagogical practices.

#### Recommendations

- 1. Many educational institutions, particularly in resource-constrained settings, may lack the infrastructure and funding to fully implement experiential learning programs such as field trips, internships, and innovation labs. Partnerships with industries, NGOs, and international institutions could help provide the necessary resources. Government funding or grants dedicated to experiential learning projects, along with collaborations with the private sector, could offer valuable financial and infrastructural support.
- 2. The implementation of experiential and inquiry-based pedagogy requires significant teacher training to equip educators with the necessary skills to adopt these new methods. Teachers accustomed to traditional methods might struggle to transition to more student-centered, active learning approaches. Institutions should prioritize continuous



- 3. professional development programs to train educators in inquiry-driven and experiential learning techniques. Online platforms and collaborative workshops could be leveraged to provide flexible, accessible training.
- 4. Students may not be accustomed to active learning methods and could initially struggle with the self-directed nature of experiential learning or inquiry-based pedagogy. Gradual introduction to active learning methods through smaller, more manageable tasks before fully immersing them in self-directed projects can be helpful. Providing structured guidance in the early stages will help students develop the necessary skills for independent learning.
- 5. The long-term benefits of experiential learning, such as improved employability and lifelong learning habits, can be difficult to measure. Institutions can establish longitudinal studies and alumni tracking systems to assess the impact of experiential learning over time. Additionally, they can collaborate with industry partners to gather feedback on the effectiveness of experiential learning in preparing graduates for the workforce.

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# CROSS-BORDER COLLABORATION IN HIGHER EDUCATION: OPPORTUNITIES, CHALLENGES, AND BEST PRACTICES IN A GLOBALIZED WORLD

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#### Abstract

Cross-border collaborations in higher education have a key function in nurturing academic success, cross-cultural understanding, and worldwide citizenship in today's age of globalization. On the platform of globalization, the current research considers the strengths, weaknesses, and optimal practices of these collaborations. Joint research collaborations, student exchange, and double degrees are some of the collaborative activities that promote globalism and intercultural knowledge as well as stimulate knowledge sharing. This kind of collaboration is, however, hindered by challenges in terms of varying regulations, financial constraints, linguistic and cultural differences, and even benefit distribution. In addition, in the context of post-pandemic, technology integration has also been an essential tool to bridge geographical divides and enable virtual academic engagement. The research puts in the limelight best practices, such as putting the capacity building at priority number one, linking institutional objectives, designing open governance systems, and establishing inclusive collaborative strategies suitable to socioeconomic and cultural environments, by taking lessons from effective case studies. Importantly, the research emphasizes that actions and policies designed under these partnerships must be properly implemented in field contexts such that they go beyond paperwork and theoretical debates to leave real-time effects on the ground. Strategies are likely to be "e-garbage." either electronic or hard copy if this is not done. The research concludes by providing valuable information that will assist stakeholders, academic leaders, and policymakers in creating and sustaining effective cross-border partnerships to build a stronger and internationally networked higher education system.

Keywords: Cross-border Cooperation, Higher Education, Globalization, Sustainable Development, Global Partnerships.

# Introduction

Universities are increasingly leveraging cross-border cooperation, such as academic networks, exchange programs, double degrees, and joint research, to respond to globalization (Varghese, 2008). These programs recreate learning environments through global citizenship, cultural exchange, and academic excellence (Herda et al., 2025). Cross-border cooperation addresses worldwide challenges by exchanging knowledge, building capacity, and interacting culturally, making universities motors of societal innovation (Karim et al., 2024). Global partnerships enhance global access to resources, deepening education and research penetration (Jin et al., 2025).

Higher education international collaboration is confronted by legislative differences, financial limitations, cultural diversity, and unequal distribution of resources, which are magnified by COVID-19 (Deredzai & Goronga, 2024). The pandemic hastened dependence on virtual platforms to maintain alliances (Moshtari & Safarpour, 2023). Success demands harmonizing goals, transparent governance, engagement, and responding to socioeconomic and cultural contexts (Igbinenikaro et al., 2024). Barikzai et al. (2024) discuss the role of globalization, enabling pragmatic strategies from case studies to establish robust alliances. Finally, they must provide quantifiable, place-based results, promoting international education and a participatory world society (Opesemowo & Adekomaya, 2024).

# Literature Review

Internationalization of tertiary education introduces competition, cultural understanding, and global connections but is made possible by specific institutional facilitation in designing cultural awareness and global readiness (Kraja et al., 2024). Global education in 2050 will revolve around innovation, diversity, and technology-supported responsiveness (Pant, 2024). Cross-border partnerships capitalize on the strength of diversity to fuel innovation but lead to miscommunication, and communication training and competence need to be inculcated to attain maximum



potential (Tumba et al., 2024). However, geopolitics that spiral and research securitization erode intellectual autonomy (Marginson & Centre for Global Higher Education, 2024). Notwithstanding power disparity, global collaborations establish institutional growth with common cultural appreciation based on inclusive stakeholders' participation (Kang et al., 2024). Research mobility, especially in the area of STEM studies, contradicts cross-cultural learning as well as sustainability (Draçi & Kadiu, 2024). Active policy in matters of cultural diversity, finance, and educational quality can enhance global collaborations (Waham et al., 2023). The UAE incorporates sustainability in higher education via institutional approaches, but there are resource gaps (Abo-Khalil, 2024). Intellectual property conflicts, budget limitations, and cross-disciplinary challenges face international collaboration research, demanding policy changes (Srinivas & Varaprasad, 2023). Liberalization and globalization of GATS recontextualize cross-border education as having the potential to create possibilities but to widen quality assurance and equity issues, particularly for developing countries (Knight, 2006).

Cross-border migration is a complex issue that is of immense political, social, and economic significance. While it is problematic, it also offers chances for cooperation and innovation. Nations can leverage the potential of migration to produce high-quality, inclusive societies through cooperation (Gupta, 2019). To make trade operate in the interest of education for all, an equitable approach emphasizing fairness and the public good is required, as is careful analysis, investment, and openness (Ogli Abdullaev & Oizi Odilova, 2024). For improving global competency, the review is adamant about proper pedagogical practices and authentic tools of assessment (Jiaxin et al., 2024). Global educational exchange has been affected by recurring geopolitical disturbances, i.e., the return of nationalism and the collapse of globalization. Universities are confronted with challenges due to more stringent legislation that controls foreign education, which diversifies the academic environment. To ensure their global status and organization, institutions have to strike delicate political ecosystems (Marginson & Centre for Global Higher Education, 2024). Overcoming issues that confront borderless learning environments is a top agenda for education authorities. Decentralization of capital, maintaining quality and conformity, promoting intercultural cohesion, and constructing innovative assessment instruments are some of their most important agendas. In a digital, networked time, such strategies are intended to increase the quality and relevance of learning (Andrin et al., 2024). Enhancing the language skills of staff, encouraging bilingual instruction, improving internationalization, and continuously reviewing measures to become more competitive in international education are some of the proposals (Wei & Sumettikoon, 2024). Cross-border education, driven by the need of prosperous nations for high-skilled talent, particularly in the areas of science, technology, engineering, and mathematics (STEM), is pursued under GATS through e-learning, student/institutional mobility, and teacher mobility (Varghese et al., 2009). These collaborations—be it research networks, multinational partnerships, or cultural exchange—promote diversity, research quality, and global preparedness (Srinivas & Varaprasad, 2023). India must also balance equity with global competitiveness, which necessitates such inclusive measures as cultural exchange and student mobility (Jyothi, 2024). NEP 2020 initiatives (GIAN, SPARC) focus on improving India's academic prowess, looking to develop national status by 2047 (Nehra et al., 2024). Globalized research, driven by America-led collaborations, internet access, and diverse financing, increases publications and patents, which demand institutional investment, ICT, and English language proficiency (Marginson & Van Der Wende, 2007), Global R&D, despite constraints such as legal issues and cultural variations, facilitates innovation, which demands ethical guidelines for global development (Kseng, 2024).

The literature review emphasizes how cross-border collaboration has the potential to transform research, development, and higher education. It emphasizes its advantages while indicating the necessity to overcome challenges and create frameworks for responsible, fair partnerships. The following sections will concentrate on particular points to provide useful information and not just add to the literature. This study addresses:

RQ1: What are the best practices for cross-border collaboration in higher education?

RQ2: What challenges commonly arise with such partnerships?

# **Research Methodology**

This research uses a descriptive, exploratory research design based on secondary data and case studies to examine cross-border cooperation in higher education. Qualitative analysis reveals patterns, issues, and best practices. Secondary data provide a non-experimental design that allows for in-depth insight and practical advice to ensure maximum international academic collaboration.



# CASE STUDY 1: Cross-Border Higher Education in the ASEAN Region

The ASEAN region is an important cross-border higher education hub with more than 7,000 HEIs offering 12 million students. Regional actors such as the ASEAN University Network (AUN) and SEAMEO RIHED facilitate cooperation through the means of student/faculty mobility, collaborative degrees, and the ASEAN Credit Transfer System (ACTS), facilitating mobility. Though the United States, Australia, and Japan are top destinations, Vietnam has the largest outbound student mobility, and Malaysia boasts the largest number of inbound students in ASEAN, indicating efforts towards global citizenship and labor market competitiveness development. Efforts are thwarted by resource disparity, technology imbalance, and curriculum misalignment, fueled by COVID-19 despite spurring more universal e-learning adoption. Policy-makers are encouraging stronger international cooperation, harmonized qualification frameworks, and fair resource distribution in dealing with inequities and nurturing regionally inclusive growth (Khalid & Kurowska-Pysz, 2024).

# CASE STUDY 2: Latvia's Transformation in Cross-Border Higher Education

Latvia offers an interesting case of a CEEC negotiating a shift from a Soviet heritage to a competitive force in the European Higher Education Area. Prompted by strategic reforms and internationalization, such a shift presents opportunities and challenges inherent in cross-border higher education (Kirloskar & Inamdar, 2024, p. 1). Earlier, Latvia and other Central and Eastern European Countries (CEECs) were conventionally positioned in peripheral locations in international academia because of structural differences, resource differences, and language differences (Kirloskar & Inamdar, 2024, p. 14). After the Bologna Declaration (1999, as cited in Kirloskar & Inamdar, 2024, p. 14), Latvia harmonized degree structures and increased cross-border cooperation. Important reforms are Latvian language and internationalization parliament policies (Dedze & Rubene, 2016, p. 14, cited in Kirloskar & Inamdar, 2024, p. 14), mobility through Erasmus for study exchange (Kirloskar & Inamdar, 2024, pp. 9–10), quality low-cost education welcoming international students, especially Indian students (Kirloskar & Inamdar, 2024, p. 6). These policy reforms promoted Latvia's global position through cultural exchange as well as competency-based programs (Kirloskar & Inamdar, 2024, pp. 12–13). Nonetheless, there are challenges, such as limited resources, language differences, and quality differences with Western Europe (Kirloskar & Inamdar, 2024, p. 11). The integration of Western scholarship patterns with Indigenous innovations and "catch-up" mechanisms in Latvia (Scott, 2002, as cited in Kirloskar & Inamdar, 2024, p. 11) reflects flexibility in rectifying systemic disparities. The Latvian experience most vividly demonstrates the ability of CEECs to reshape higher education through strategic reform, internationalization, and cultural capital to build an inclusive, sustainable academic environment transcending the burden of history (Kirloskar & Inamdar, 2024, pp. 8–9). This indicates the importance of policy convergence and international collaboration in enabling cross-border education.

# Data Analysis

Thematic/content qualitative data analysis of case studies and secondary sources revealed cross-border collaboration patterns, best practices, and challenges. Thematic analysis grouped literature/dataset themes into categories; content analysis contrasted institutional reports/policies with theoretical frameworks.

Waham et al. (2023) report complexities in global collaboration in higher education, mentioning cultural differences that require flexibility, harmonization of curricula, and money policies. Overcoming challenges, such collaborations enhance global vision for access to knowledge, diversity of outlook, and cultural awareness, preparing students for globalized societies.

Challenges	Opportunities	
Cultural Disparities	-Increasing Access to International Knowledge Sources	
	-Promoting Diverse Opinions	
Academic Standards and Quality	-Increasing the Productivity of Research	
	-Students' Preparation for a Globally Connected Workforce	

Table 1. The opportunities and difficulties of working together internationally



	4 U
Complexities in Logistics	-Making Use of Cutting-Edge Technologies in Communication
	-Unambiguous Communication Procedures for Coordinating Time Zones
Financial and Material Limitations	-Examining Novel Funding Approaches
	-Allocation of Strategic Resources

Source: Waham, J.J.et al., (2023)

# **Best Practices in University Ranking Systems**

Bing (2024) observes university rankings increasingly focus on institutional diversity, social responsibility (public engagement, knowledge transfer, sustainability), and equity (affordability, representation, provision to underprivileged groups) in addition to teaching quality (student-faculty ratios, graduation rates). International collaboration results in best practices and benchmarking, and adaptive, multidimensional assessments of excellence supply through innovative measures (peer reviews) and open methods.

# Results

This study sees the role of cross-border cooperation as a transforming force for higher education. Strategic transformation, cooperative partnership, and integration through technology help solve cultural and logistics problems. Latvian academic setting is an example of good international cooperation, highlighting transparent governance and policy implementation towards an internationally competitive, sustainable, and strong system of higher education.

# **Discussions/Implications**

This paper highlights cross-border collaboration as essential for modern higher education. Institutions should adopt flexible, inclusive policies to address cultural and logistical challenges. Such collaboration enhances global citizenship, cultural competency, and innovation. Stakeholders must invest in capacity building and transparent governance to create a more interconnected, equitable academic landscape.

# Conclusion

This article emphasizes the central role of cross-border cooperation in the development of higher education for a globalized world. Latvia's experience demonstrates how strategic reform and international cooperation increase intellectual competitiveness. In the post-pandemic era, robust global networks will be forces of innovation, inclusivity, and sustainable development through open government and efficient cooperation.

# Limitations and Future Studies

Case study nature of the study restricts generalizability. Cultural and language differences can affect responses, and the dynamics of cross-border collaboration need further research. Subsequent studies must increase the scope, measure the long-term effects of international collaboration, and study the effectiveness of policies for long-term international cooperation in higher education.

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# MEASURED DRAWINGS AS A PEDAGOGICAL TOOL FOR BUILDING MATERIAL TECHNOLOGY

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#### Abstract

Building Material Technology (BMT) is often perceived as a highly technical subject, yet it is frequently taught in a theoretical manner, where students passively take notes or produce drawing sheets without meaningful engagement. This conventional approach fails to captivate students, particularly those accustomed to the hands-on pedagogy of design studios. Additionally, the disconnection between theoretical knowledge and its practical application in architectural design leads to the subject being viewed in isolation, limiting its relevance in professional practice.

This paper explores the role of measured drawings as an active learning tool to bridge the gap between theoretical instruction and hands-on construction detailing. By engaging students in the process of measuring and documenting existing buildings, the study aims to foster a deeper understanding of construction elements through direct physical interaction. The learning-by- doing approach not only enhances observational skills but also allows students to grasp intricate details such as joineries, material behaviour, and assembly techniques. Furthermore, integrating measured drawings with the Architectural Design Studio enables students to apply their knowledge by designing components learned in BMT and envisioning their execution in real- world scenarios.

Through this case study, the paper highlights how experiential learning, facilitated by physical observation and touch, can enhance students' comprehension of technical subjects. The proposed method reinforces the importance of contextual understanding in architectural education, ensuring that BMT is not merely a theoretical subject but an essential, applied component of the design process. By aligning construction knowledge with hands-on learning, this approach promotes a more cohesive and immersive pedagogical experience, ultimately improving students' ability to translate theoretical concepts into practical applications.

Keywords: Measured Drawings, Hands-on Learning, Architectural Education, Construction Details

# Introduction

Building Material Technology (BMT) is a cornerstone of architectural education, equipping students with essential knowledge about materials, their properties, and applications in construction. This knowledge directly influences the design and materialization of built forms, where the possibilities and constraints of construction technology play a decisive role (Acar, 2019). However, traditional methods of teaching BMT, often centered around lectures and theoretical assignments, frequently result in disengaged students who struggle to connect theoretical knowledge with practical applications. This disconnection leads to challenges in visualizing construction details and joineries, making it difficult for students to integrate material and structural understanding into their design process.

To address this gap, integrating measured drawings into the curriculum has been proposed as a transformative pedagogical approach. Measured drawings involve the study and documentation of existing structures, providing a hands-on experience that encourages physical interaction with materials and construction techniques. By engaging directly with built forms, students develop observational skills, precision, and an appreciation for the complexities of materiality and joinery. This approach fosters teamwork and communication skills, as students often collaborate in groups to document various aspects of a building. Each group's contributions help form a comprehensive understanding of the structure, fostering discussions about materials, techniques, and design choices.

The methodology underlying this approach is structured into two interconnected components: "Learn directly from the applications of the real world" and "Apply your learnings in your design." The first component involves students drawing from observation and measurement— referred to as the Measured Drawings Pedagogy—to enhance their engagement with real-world construction details. The second component involves integrating these learnings into design projects, encouraging students to think through the lens of their BMT curriculum and adapt their designs based on real-world construction considerations. By doing so, students critically assess and refine their designs, creating innovative yet feasible solutions.



This paper explores the role of measured drawings as a pedagogical tool in architectural education, particularly in enhancing students' understanding of BMT. It investigates how learning through physical observation, documentation, and design application can bridge the gap between theoretical and practical knowledge, fostering an immersive learning experience.

# Literature Review

The integration of experiential learning into architectural education has been widely explored, with measured drawings emerging as a powerful pedagogical tool for bridging theoretical knowledge and practical application. Architectural education traditionally emphasizes a balance between conceptual design and technical construction knowledge. However, the gap between these aspects often limits students' ability to apply theoretical concepts in real-world scenarios (Acar, 2019).

Measured drawings, as highlighted by Harbeson (1926), serve as a critical link between design and execution, providing students with a hands-on method for understanding construction details. This aligns with Kolb's Experiential Learning Theory (1984), which emphasizes learning through direct experience. Kolb's model consists of four stages:

- 1. Concrete Experience (CE): The learner engages in a new experience.
- 2. Reflective Observation (RO): The learner reflects on the experience.
- 3. Abstract Conceptualization (AC): The learner forms theories based on reflections.
- 4. Active Experimentation (AE): The learner applies the learned concepts in new situations.

In the context of measured drawings, CE corresponds to the "doing" phase, where students engage in hands-on activities such as measuring and documenting real-world structures. AE represents the "applying" phase, where learners implement their knowledge in new design scenarios by detailing construction elements in their projects.

Paul Emmons (2023) highlights the pedagogical value of measured drawings in fostering a circular understanding of architectural time, where the act of drawing connects the historical, material, and conceptual dimensions of architecture. Harbeson's (1926) perspective further underscores this approach as a critical link between design, creation, and execution, reinforcing the importance of experiential learning in architectural education.

In addition to enhancing technical proficiency, measured drawing exercises increase student motivation and knowledge retention. Hands-on learning approaches allow students to directly engage with construction materials and techniques, making abstract concepts tangible and accessible (Harbeson, 1926; Acar, 2019). The reflective process of designing within the constraints of their BMT curriculum fosters a deeper understanding of the implications of material and construction choices on their overall design. This holistic approach narrows the gap between imagination and reality, preparing students to approach architectural design with both creativity and practicality.

By integrating measured drawings into architectural education, students gain valuable skills and insights that bridge theoretical and practical knowledge. This pedagogical strategy not only enhances their technical understanding but also cultivates critical thinking, teamwork, and the ability to execute thoughtful, well-rounded architectural designs.

# **Research Methodology**

Knowledge gained is not engaged in architectural imagination (Acar, 2019). To address this, the methodology incorporates measured drawing exercises as a tool to bridge the gap between theoretical knowledge and practical application. The process of measuring and documenting existing building elements cultivates observational skills, attention to detail, and a deeper understanding of materials, construction techniques, and joinery details. As architect and educator John Harbeson (1926) concluded, measured drawing "is a connecting link between design, creation, and execution." Integrating these learnings into design studio projects ensures that students are better equipped to translate theoretical knowledge into practical applications. Methodology Components:

1. Linking BMT Learning to Real-World Applications: Students engage in measured drawing exercises.



2. Applying BMT in Architectural Design: Students detail their learnings in design projects.

Measured drawings serve as detailed and accurate representations of existing structures, capturing dimensions, materials, and construction details. These drawings act as case studies because they provide a hands-on opportunity for students to analyse real-world construction techniques and their practical applications.

#### **Study Implementation:**

The proposed BMT studio methodology was implemented for Third Semester students, AY24-25. The topics covered included Doors and Windows, and Gates, using the Measured Drawings Pedagogy.

#### **Case Study Example:**

- Students documented different types of windows at the Vishwakarma University campus. They measured and analysed a sliding window in a staircase, an awning window in their studio, and the main gate of the university.
- They later applied their learnings by designing a physical model of a door between a master bedroom and its balcony in their Architectural Design Project.

#### **Data Collection Process:**

- Selection of Case Studies: Identifying existing buildings for measurement.
- On-Site Data Collection: Students visited the selected buildings, measured components, and documented their findings through sketches, notes, and photographs. Tools like measuring tapes, laser measurers, and scale rulers were employed for precision.
- Drawing Production: Students created detailed measured drawings based on their measurements and interpretations.





Figure 1: Students collecting Data for measure Drawing for the topic of Gates (Site- Vishwakarma University)

#### **Observation & Findings**

The incorporation of measured drawings led to three key observations:

- 1. Increased Engagement:
  - Students exhibited heightened interest and motivation when working on hands- on projects compared to traditional theoretical assignments.
  - Group-based exercises fostered teamwork and discussion about materials, techniques, and construction details.



- 2. Enhanced Understanding of Construction Details:
  - The process of measuring and drawing allowed students to grasp intricate details often overlooked in lectures.
  - Physical interaction with materials helped in visualizing joineries, connections, and material behaviour.
- 3. Application in Design Projects:
  - Students successfully integrated BMT knowledge into their design projects, demonstrating a clear understanding of materiality and construction techniques.
  - The gap between imagination and reality decreased, allowing students to predict the execution of their designs with better clarity.

#### Conclusion

The integration of measured drawings into architectural education offers a transformative approach to bridging the gap between theoretical knowledge and practical application in Building Material Technology (BMT). By engaging students in the physical act of measuring, observing, and documenting real-world structures, this method fosters a deeper understanding of construction details, materials, and joinery techniques.

Furthermore, the application of these learnings in design studio projects enables students to translate their technical knowledge into creative architectural solutions. This dual approach strengthens their grasp of materiality and construction while improving their ability to visualize and execute designs with greater precision.

By narrowing the gap between imagined concepts and built realities, measured drawings empower students to approach architectural design holistically. This experiential and integrative pedagogical strategy prepares students not only to understand construction details but also to use this knowledge as a foundation for thoughtful and well-executed architectural designs.

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# INTEGRATIVE METHODS OF LEARNING MANAGEMENT SYSTEMS & ARTIFICIAL INTELLIGENCE IN EDUCATION

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#### Abstract

Artificial intelligence has become a new transformative force in many sectors, and education is no exception. Introducing AI techniques into learning management systems(LMS) can transform how students learn, just as it transforms how instructors teach. A LMS software application enables educational content to be delivered and managed alongside student progress and performance tracking. By integrating AI into these systems, educators can provide personalised learning experiences, intelligent tutoring systems, automated assessment tools, and predictive analytics to enhance the educational process. The benefit of integrating AI into LMS is that it can provide students with personalised learning experiences. For example, an AI-based LMS may analyse students' learning styles, performance, and engagement to adopt content tailored to every learner's needs. This personalisation will improve the student's motivation, retention rate, and overall performance. As for its wide application in LMS, another key area where AI is applied is the development of intelligent tutoring systems. These systems use natural language processing and machine learning algorithms for dialogue-based tutoring and provide real-time feedback and guidance to the student. AI-powered tutoring systems supplement or replace the lack of teachers, especially in subjects requiring individual attention for exemplary student performance. AI could also help in grading and assessment processes in LMS. Automated grading systems can offer immediate and uniform feedback to students, thus allowing instructors to have more time for other pedagogical activities. Additionally, predictive analytics based on AI in an LMS may identify at-risk students, allowing instructors to intervene early to deliver targeted support. As much as the integration of AI in the LMS seems promising, some challenges and disadvantages need to be addressed. Thus, in the final analysis, integrating artificial intelligence into learning management systems will go a long way in promoting the educational experience among students and their instructors. From the point of AI-powered personalisation, intelligent tutoring, automated assessment, and predictive analytics, an LMS may be more effective, efficient, and responsive to the needs of modern learners.

Keywords: AI, LMS, personalisation, algorithms learning.

# 1. Introduction

Integration of LMS (Learning Management Systems) and AI (artificial intelligence) forms the cornerstone tools in modern Education. As the growing technological, it is essential to advance the shape of student's career to face the competitive world today's world faces. Traditional education systems have evolved from chalk and board to smart boards. AI has emerged as a powerful ally through sophisticated algorithms which facilitate personalised learning experiences, predictive analytics, and intelligent tutoring. Such innovation ensures that education is adaptive, ensuring the maximum use of the possibility for inclusive diversity of students in need. (Simbeck et al., 2024) Introducing AI to the frameworks for Education would, in effect, develop tailored approaches for every individual according to his strengths, requirements, likes, IQ level, and preferred learning methods. One of the greatest strengths of Education powered by AI is instant feedback across every learning phase. It will lead to more accurate, timely appraisals of student performance that can measure results better. Incorporating personalised learning techniques will surely enhance learning outcomes by large numbers as the system becomes more responsive to engage, motivate, and educate students. (G et al., 2022) The Learning Management System, on the other hand, is responsible for delivering, managing, and tracking educational content. They help bridge challenges posed by geographical and temporal variations, ensuring all students can access learning materials and resources. The synergistic integration of LMS and AI opens up unprecedented opportunities for enhancing student experiences while streamlining teaching processes for educators. Research studies have highlighted the benefits of embedding AI within conventional educational practices. This combination would automate administrative tasks to reduce teachers' workload and enhance instant feedback provision. It would open up possibilities for data-driven decisionmaking in Education. (Mungai et al., 2024) The system can then effectively use these powerful tools to address



diverse learning needs by students, creating equity in the access to good quality educational opportunities. Through different methods of combining LMS and AI, will be able to synthesise whether this combination of methods can potentially transform the traditional educational paradigms. Through such diverse perspectives like case studies, technological frameworks, and emerging trends, we can gain insight into the inherent cores of innovation that will remake the future of Education.(Lampou, 2023)

# 2. Importance of LMS in Modern Education

Digital platform LMS serves as the heart of educational organisations, providing them with a wholesome framework for teaching, managing, and assessing almost all types of academic content, cultured systems devised to meet a variety of diverse demands from educators to learners, aiding in communication and collaboration and further providing access to a vast network of learning, irrespective of where they are based. An LMS allows teachers to assign courses, distribute learning materials, and manage all aspects of instructional delivery. Meanwhile, students benefit from a centralised hub to engage with content, collaborate with peers, and track their learning journey.(Memon & Rathore, 2018)

One of the greatest strengths of an LMS is its ability to accommodate many different instructional methods and learning styles. By incorporating a wide variety of multimedia content, including videos, podcasts, interactive simulations, and reading materials, LMS caters to visual, auditory, and kinesthetic learners alike. Besides, including interactive modules and discussion forums allows engaging activity that fosters a collaborative learning environment where students can participate in group discussions, provide peer feedback, and share resources. Such an accommodating learning environment enables active participation and builds community, an essential determinant for successful educational results. It allows the learners to access course materials at any time and place. It enables learners to experience personal learning based on their schedule, preference, and pace. Such a factor promotes lifelong learning and caters to non-traditional students. (Davis & Surajballi, 2014; Memon & Rathore, 2018)

Additionally, LMS positively affects efficiency in terms of administration within educational institutions. Automated features, such as grading systems, attendance tracking, and reports produced more straightforward and streamlined, help minimise the burden of administrative tasks on a teacher's part. Automating routine tasks allows educators to spend more time in instructional activities, offer individualised support, and develop greater awareness about their subjects.

Another powerful tool for institutional improvement is the embedded analytics functionality within an LMS. The institution's internal quality assurance cell needs to identify the recent trends and patterns that inform the decisionmaking team processes by collecting and analysing data related to student performance, engagement rates, and course completion metrics. This data-driven approach enables curriculum designers and administrators to assess the effectiveness of instructional methods, recognise areas that require enhancement, and implement targeted interventions to improve overall educational quality. In summary, LMSs are not merely technological tools but comprehensive ecosystems that integrate pedagogical best practices with administrative functionality, ultimately enriching the academic landscape for educators and learners.(Davis & Surajballi, 2014; Memon & Rathore, 2018)

The application LMS are

- They are helpful for course management, assessment, evaluation, reporting, analytics and communication tools.
- They provide consolidated learning materials and resources as a centralised resource hub in any or one location.
- They can be accessible for learning anytime and anywhere to the individual through the access of the digital platform.
- They help enhance engagement through interactive and multimedia enhancement, motivating participation and analyses.



LMS	Description	Software
Features	Course Management	Moodle's course builder
	User Management	Blackboard
	Reporting and Analytics	Google Classroom's
	Mobile Accessibility	Schoology's mobile app
	Assessment and evaluation	Canva
Benefits	Insights based on data	Canva
	Customised experiences	Blackboard
	Improved engagement	Edmodo
	Efficient administration	Google Classroom
	Insights based on data insights	Schoology
	Insights based on data insights	Schoology

# Table :1 LMS features benefits in Modern Education

#### 3. Importance of AI in Modern Education

AI customises its learning experience to suit individual students' needs, preferences, and learning styles. AI systems use student data to evaluate learning style, pace, knowledge gaps, and interests and formulate paths for customised learning. While personalised learning significantly improves learning outcomes, student engagement is also on an upward trajectory. Adaptive learning platforms adjust the content difficulty in real-time, and AI-driven recommendations suggest relevant resources. (Owoc et al., 2021) AI gave focused feedback to the students and support through virtual assistants or chatbots. AI could automate assessment tasks and provide students with instant feedback. Such availability will enhance students' timely and valid assessment and help the educator accurately target areas requiring student support. AI tools are available or preprogrammed to make the education system more accessible for students per their abilities. Speech-to-text and text-to-speech software can assist students with visual or hearing impairments. (Ayala-Pazmiño, 2023) At the same time, personalised learning platforms can cater to various learning needs and free educators from administrative activities such as grading assignments, conducting classes, and maintaining student records. Educators can devote more time or effort to teaching and interacting with their students. The main drawbacks or challenges faced by AI in Education are data privacy, bias in Algorithms, cost of implementation, upgradation and technical expertise.(G et al., 2022)

The applications of AI are

- They develop personalised learning as individuals' requirements by tailoring educational content and designing using platforms like Dreambox.
- They provide real-time feedback and guidance to the student with or without human intervention, known as automated.
- They are built with preprogrammed automation tools for evaluating assignments, tests, and projects and giving grades based on their work. An example is Gradescope, an app developed to automate exams and grading.
- > They have trained to predict and identify students' outcomes and design suitable models as necessary.
- > They also assist in scheduling and reminding the students of virtual classes, such as Chatbots like lvy.ai.
- They help develop content creation using available educational materials such as AL-based content generators like ScribeSense.(Oseremi Onesi-Ozigagun et al., 2024)



Figure 1: AI tools in Education

# 4. Advantages of integration of LMS and AI

The integration of LMS and AI continues to evolve, driven by the development of technology and the increasing demand for innovative educational solutions. Below are some of the emerging trends shaping the future of learning:(Oseremi Onesi-Ozigagun et al., 2024)

- Modern LMS platforms are incorporating AI-driven adaptive learning systems. These analyse real-time data on student performance, adjusting course recommendations according to unique learning paces and styles. Smart Sparrow, for instance, provides personalised pathways based on students' interactions.(Ayala-Pazmiño, 2023)
- Analytics dashboards are developed on two levels that offer actionable insights to teachers. These predictive models identify at-risk students, recommend interventions, and track teaching measures' effectiveness. An example in this regard is Brightspace Insights by D2L.(Mungai et al., 2024)
- Gamified elements and immersive technologies like video and audio recording are integrated with the LMS platforms to boost engagement. AI-based systems may sometimes create an interactive, changing, dynamically personalised learning environment to fulfil specific learning needs.(Krishna Kashyap Yakkala, 2024)
- Using early applications of AI, learning content is now curated through analysing learner preferences and performance. Edmentum applies AI, for example, by suggesting additional resources and activities aligned with individual learning targets. (Simbeck et al., 2024)
- AI chatbots are now becoming a norm in LMS platforms to help students with questions, course navigation, and administrative tasks. For example, Ivy.ai provides 24/7 support for both learners and administrators.(Mungai et al., 2024)
- New opportunities are emerging with the merging of AI with technologies such as Blockchain and IoT. While Blockchain provides secured credentialing and data privacy, IoT-enabled devices enhance interactive learning experiences.

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AI can assist with delivery through micro-learning: bite-sized content nuggets tied to a specific learning goal. It suits skill training or professional development, as seen on platforms like LinkedIn Learning.(Lampou, 2023)

# 5. Future of LMS and AI

The combination of AI and LMS can revolutionise education as we know it. They will be tailored to individual student's needs and learning capabilities using AI algorithms. AI will allow for an in-depth and nuanced analysis of student achievement so that teachers can pursue a more analytical approach to student development. Intelligent Self-Learning Management Systems will strengthen the adoption of more active and engaging pedagogies by combining real-life video and audio recording experiences with LMS. Students can easily communicate with digital systems from anywhere around the globe due to natural language processing, which will provide instant feedback. In addition, repetitive management duties can be handled by AI, enabling teachers to spend more time with students and refine school programs. With new possibilities arising from AI use in education, concerns regarding data privacy, automated discrimination, or proximity of fundamental interactions will be at the centre of ethical discussions. It is easy to see that the future currency will require an amalgamation of technology and human skills. AI and LMS promise a future that empowers students and teachers.

- ➤ The integration of LMS and AI will create a learning platform that tailors and designs content and assessments according to students' needs. The platform can easily modify the technique as students' progress in their preferences and will keep on updating.
- The gamified method of LMS and AI techniques will enhance and motivate the students to understand the theoretical content, improve engagement and motive.
- The integration and emerging technology of audio and video methods will engage the students and also help in augmenting reality tools in the incorporation LMS for immersing experiential learning.
- The connectivity with IoT devices can track the physical and digital interaction of LMS, which can help in the habituate of learning habits
- > The incorporation of social and collaborative learning will increase the emphasis in community
- Chatbots and virtual tutors are AI-powered and will provide responses and support on the fly, from answering questions to propelling the students on more complex topics.
- LMS & AI, the creation and update of learning assets (i.e. quizzes, presentations, and interaction simulations) will be shifted partly from the educators.
- AI shall forecast student performance by tracking behavioural data and provide anticipatory interventions to check student dropout and raise success rates.
- The Natural Language Process shall produce automated essay grading, real-time writing feedback, and learning needless sentiments.
- For the ultimate need, AI shall be a supportive technology for learning over their lifetimes and developing skills to match job tracks and industry trends.
- Models with AI will be optimised to make equal learning opportunities available to all students, limiting biases and catering to diversely abled learners.
- The LMS platform might incorporate AI-run voice assistants or gesture-based control to provide a more intuitive user experience.
- Privacy, ethics in AI usage, and cybersecurity are essential in protecting user information and having good and trustworthy systems.



## 6. Conclusion

Technology has revolutionised Education at a breakneck pace. LMS and AI integration can provide personalised learning, administrative efficiency, and data-driven decision-making. LMS platforms streamline content delivery, track student progress, and support collaborative learning. They are essential for effectively managing hybrid and Online Education. AI enables personalised learning experiences, automates tasks, and provides predictive insights to educators. Its applications range from adaptive assessments to virtual teaching assistants. AI is adaptive to the individual learner's needs, enhancing engagement and outcomes. Administrative burdens are reduced by AI, allowing educators to focus on teaching. Analytics are actionable insights into student performance and curriculum effectiveness. Infrastructure and compatibility issues. Protection of student data and ethical use of AI. Adoption barriers among educators and institutions. Real-world examples illustrate how institutions have successfully implemented LMS and AI to enhance student outcomes and operational efficiency. Technologies such as gamification, immersive learning, and Blockchain transform LMS platforms into more interactive, secure, and learner-centric platforms. The key trends are adaptive learning technologies, AI-powered dashboards, gamification, chatbots, and blockchain integration. These innovations help with personalisation, engagement, and security. It marks a paradigm shift in education by integrating LMS and AI, which will benefit learners, educators, and institutions.

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# EMPOWERING EDUCATION: "THE ROLE OF STUDENT-CENTERED LEARNING AND OUTCOMES-BASED EDUCATION IN NEP 2020"

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**Abstract:** - The National Education Policy (NEP) 2020 emphasizes a transformative approach to education in India by promoting student-centred learning and adopting Outcomes-Based Education (OBE) frameworks. This policy redefines traditional educational practices by prioritizing holistic development, critical thinking, and experiential learning. NEP 2020 fosters personalized learning pathways, enabling students to pursue their interests and excel in diverse fields. The integration of OBE ensures that education is aligned with predefined learning outcomes, focusing on skills, knowledge, and attitudes that meet societal and global demands. By emphasizing competency-based learning, the policy enhances employability and lifelong learning opportunities. Furthermore, NEP 2020 introduces multidisciplinary and flexible curricula, encouraging creativity, innovation, and interdisciplinary knowledge application. This study will focus on, policy which emphasizes the use of technology, equitable access, and the development of foundational literacy and numeracy. Through its student-centred and outcome-focused approach, NEP 2020 envisions an education system that nurtures global citizens while preserving India's cultural heritage. This paradigm shift is set to empower learners and educators, creating a dynamic ecosystem for sustainable and inclusive development.

Keywords: National Education Policy, student-centered learning, Outcomes-Based Education, holistic development, competency-based learning.

# 1. Introduction

# 1.1 Overview of NEP

Goal 4 of the 2030 Agenda, which India endorsed in 2015, is to "Ensure inclusive and equitable quality education and lifelong learning opportunities for all, by 2030." This aligns with the global agenda for education development. To achieve this ambitious goal, the entire educational system must be redesigned to make learning easier so that all such important (National Education Policy 2020, 2020). The agenda for the year 2030 is Sustainable Development goals and targets (SDGs) may be achievable. To give this momentum, the current government has endeavoured to have a holistic reform in the "Indian Education System" as part of a comprehensive "National Education Policy 2020". Aligning with this, the Prime Minister has recently called upon the nation to seize the opportunities offered by the Fourth Industrial Revolution and to propel India towards newer heights. The recent National Education Policy 2020 has envisioned an India-centric education system that directly leads to changing our country for sustainable transformation into a vibrant and equitable knowledge society through offering world-class education to all (Venkateshwarlu, 2021). The National Education Policy 2020 places a strong emphasis on the fundamental beliefs and idea that education should foster not only cognitive skills, such as the "foundational skills" of literacy and numeracy as well as "higher-order" skills like critical thinking and problem-solving, but also social and emotional skills, or "soft skills," like empathy and cultural awareness, grit and perseverance, teamwork, leadership, and communication, among others. The universalisation of pre-primary education is one of its objectives. Secondly, it targets ensuring foundational literacy/numeracy achievement by the end of primary school and onwards for all children by 2025 (Government of India, Ministry of Education, 2020).

1.2 Role of Outcomes-Based Education (OBE) and student-centred learning

Summed up, "outcome-based education is results-oriented thinking and, therefore, the antithesis of input-based education. where the approach is on the training process and where we are glad to take whatever be the outcome" (Harden, 2007). Programs are motivated by long-term objectives that are not met in a whole-school approach to OBE. Programs that are subject-specific (like the Key Competencies)—such as science courses like physics, history, or mathematics—will not be divided into distinct areas. knowledge using such a comprehensive method. Thus, to



assist students in achieving the intended results, abilities and perspectives from a variety of traditional topics are integrated (Killen, 2000).

## 2. Review of Literature

The primary focus of Philippine higher education institutions nowadays is outcome-based education. Competencybased learning standards and clearly defined outcomes-based quality assurance monitoring and evaluation are the forms that the OBE takes. Benefits and challenges in education (De Guzman, Edaño, & Umayan, 2017). Because SCL encourages active engagement, students find learning to be more interesting and significant (Prince, 2004). Encourages pupils to do more than just absorb information; they should also be encouraged to analyse, evaluate, and synthesise it (Facione, 1989). SCL-related active learning techniques enhance students' capacity to remember and use information in practical settings (Freeman et al., 2014). Prepares pupils for lifelong learning by cultivating their capacity for autonomous study (Barefoot & Gardner, 2004). Students may find SCL demanding because of the additional responsibility, while teachers used to traditional techniques may oppose it (Weimer, 2002). SCL requires significant resources, such as trained educators, technology, and infrastructure, which may not be available in all settings (Michael, 2006). The results of SCL approaches might not be sufficiently measured by conventional evaluation techniques (Huba & Freed, 2000). Planning and implementing SCL can take a lot of time, which could put off teachers with fast-paced courses (Marouchou, 2011).

## 3. Student-Centred Learning

"Student-centred learning" is a teaching method where the focus of instruction is placed from the teacher to the student, with a greater emphasis on active engagement, student autonomy, and personalization of learning experiences. With the help of this approach, students may take charge of their learning environment and hone their critical thinking, problem-solving, and independent learning abilities. SCL encourages students to actively participate in the learning process through discussions, problem-solving activities, and hands-on activities (Fayombo, 2012). Students are given the freedom to choose their own learning objectives, approaches, and speed, which promotes a sense of pride (Bandura, 2001). To ensure relevance and engagement, learning experiences are customised to each student's unique requirements, interests, and skills (Tomlinson, 2001).

#### 4. Outcomes-Based Education

Outcomes-based education is a student-centric model of instruction aimed at preparing students to achieve certain measurable outcomes by the end of the learning program. All these outcomes communicate knowledge, skills, attitudes, and values that students are anticipated to demonstrate at the end of their learning journey. OBE emphasizes what learners can do rather than how they were taught (Patra et al., 2020). Clearly stated outcomes are the foundation of the educational process. Students must attain these particular, quantitative, and observable competencies (Mukhopadhyay & Smith, 2010). Identifying targeted outcomes and creating instructional strategies to achieve them are the first steps in curriculum preparation. Resources, evaluations, and instructional strategies align with the results (Harden, 2007). OBE assumes that all pupils can perform to high standards, even though they might need different time frames or approaches. A key component of the framework is differentiated education and support (Spady, 1994). Additional resources, individualised learning routes, and flexible schedules are offered to guarantee that each student meets the desired results. presents constructive alignment, a framework that emphasises cogent curriculum design that is in line with OBE principles (Biggs, 1996).

# How SCL and OBE support equity, accessibility, and skill development

SCL offers individualized learning experiences to reduce the gap by relating to each learner's needs, such as their learning styles, cultural backgrounds, and abilities. Differentiated instruction makes sure that every learner has equal opportunities to achieve (Tomlinson, 2001). OBE focuses on clearly defined outcomes, which means that all learners, regardless of their starting point, will reach the same high standards. Additional resources and remedial programs for struggling learners to meet the outcomes (Spady, 1994). Makes education accessible for learners who have disabilities, in addition to openness to modifications in terms of teaching and learning environments. Using assistive technology and universal learning design (UDL) to support all learners.



## Current Implementation of SCL and OBE in Indian Education

Student-centred learning (SCL) and Outcome-Based Education (OBE) are gradually being implemented in the Indian education framework to shift from traditionalistic teaching methods to student-centred and learning outcomes-based approaches.

Examples: - Activity-Based Learning (ABL) in Tamil Nadu: In 2003, ABL initiated hands-on activities for self-learning. This methodology was implemented across all 270 primary schools in Chennai, enhancing students' engagement and learning results (Aslam et al., 2015).

Software Engineering Course at a State University in New Delhi: A case study documenting the use of an inverted classroom, large-group projects, real-client interactions, and studio-based instruction. This approach enhanced active learning, teamwork, and problem-solving skills among undergraduate students (Sureka et al., 2013).

#### Barriers

- 1) Teacher Beliefs and Practices: Some widely held beliefs of Indian teachers could be at variance with learnercentred education reforms and may therefore not allow SCL to be properly implemented (Brinkmann, 2015).
- 2) Implementation in Technical Institutions: Challenges in adopting OBE in India's technical institutions include aligning curriculum design with desired outcomes, ensuring faculty readiness, and developing appropriate assessment methodologies (Patra et al., 2020).
- 3) Standardization Concerns: Overemphasis on standardized outcomes in OBE may overlook holistic student development and creativity, thus posing a challenge to its comprehensive implementation (Dastagiri et al., 2024).

The pace of implementing Student-Centered Learning and Outcome-Based Education is gathering momentum in India, particularly at the higher education and skill development level. NEP 2020 supports SCL through competency-based curricula, experiential learning, and personalized learning pathways. Schools and universities are now embracing digital tools and active learning strategies to promote engagement. OBE is increasingly being integrated into engineering, technical, and vocational education, focusing on clearly defined learning outcomes and skill-oriented assessments. Platforms such as SWAYAM and DIKSHA promote accessible learning. Frameworks such as the NBA accreditation highlight OBE practices. However, infrastructure gaps and teacher training continue to be an issue.

#### **Impact on Learning Outcomes**

# Improvement in academic performance and critical thinking skills.

Academic performance, critical thinking abilities, engagement, and autonomy are just a few of the areas of student development that have been demonstrated to benefit from "Student-Centered Learning" and "Outcome-Based Education".

Academic Performance: The findings of a meta-analysis of 225 studies comparing active learning and traditional lecture methods in STEM courses at universities show that active learning strategies used in SCL and OBE lower failure rates from 32% to 21% while increasing student success by an average margin of 0.47 standard deviations in assessments.

Critical Thinking Skills: There is a strong positive correlation between student-centred teaching approaches and the development of critical thinking skills. A correlation coefficient of 0.555 was found in one study, suggesting that as student-centred teaching increases, so do students' critical thinking abilities (**Xhomara**, **2021**).

#### Results

# Supporting Equity, Accessibility, and Skill Development through SCL and OBE

Student-Centered Learning (SCL) and Outcome-Based Education (OBE) are transformative approaches that place learners at the core of the educational process, fostering equity, accessibility, and skill development. SCL emphasizes tailoring education according to individual learning needs, interests, and abilities. In this way, there is



equity in opportunities taken since the diverse backgrounds of the students are recognized and addressed. In SCL, marginal groups and variously capable learners are empowered through personalized instruction, active participation, and flexible learning paths. Accessibility is enhanced as technology, inclusive methods of teaching, and adaptive learning tools bridge gaps for students from underserved regions or those with special needs. OBE complements SCL by emphasizing measurable learning outcomes that are consistent with real-world skills. The clear definition of objectives ensures that all students will achieve specific competencies, irrespective of their starting point. This framework promotes skill development through practical, hands-on learning experiences and assessments designed to evaluate critical thinking, problem-solving, and technical expertise. Together, SCL and OBE offer a learner-led environment where the availability of resources, focused support, and performance-based teaching coalesce. Thus, a competent, confident individual is developed for society and employment, who has the potential to break barriers to build an education system that will meet the needs of the future and be inclusive for all.

# NEP 2020: A New Framework for Sustainable and Inclusive Education Development

A revolutionary framework for updating India's educational system to meet the needs of the twenty-first century while conserving the country's cultural legacy is the National Education Policy 2020. Emphasis is given to learnercenteredness, ensuring equitable access to education, technological integration, and foundational literacy and numeracy. Visualizing a holistic and multi-disciplinary educational structure, NEP 2020 thus sets out to create an ecosystem that creates a dynamic environment where sustainable and inclusive development gets its due fillip. A cornerstone of NEP 2020 is the focus on foundational literacy and numeracy. Recognizing the critical importance of these skills as the bedrock of learning, the policy seeks to ensure that every child attains grade-level competency in reading, writing, and arithmetic by Grade 3. To achieve this, NEP advocates the implementation of high-quality early childhood care and education (ECCE) and the restructuring of the school curriculum into a 5+3+3+4 system. This design aligns learning stages with the cognitive and emotional development of children, thus making the education experience age-appropriate and engaging.NEP 2020 places a strong emphasis on outcome-focused education. By aligning educational objectives with skill development and employability, it prepares students to thrive in a dynamic global economy. Vocational education is integrated into the curriculum, beginning at the school level, to foster entrepreneurship and practical skills. This paradigm shift addresses the disconnect between education and industry needs, enhancing India's human capital. Teachers and instructors are at the core of this change. NEP 2020 supports professional teacher development by constant learning, training, and empowerment. Focusing on high-quality teachers with a degree of autonomy is essential for fostering an atmosphere in which instructors can innovate and inspire learners. Thus, NEP 2020 envisions education as an agent of sustainable and inclusive growth. Its radical reforms are geared toward the empowerment of learners and educators, societal divides, and a generation of informed, skilled, and culturally grounded citizens. Embracing technology, equity, and foundational skills, the policy is a strong base for a progressive and globally competitive India.

# Case study

# Case study: Bologna process

The most common instance of international law in higher education is the Bologna Process. It established a European Higher Education Area (EHEA) with uniform academic degree formats and European higher education quality assurance criteria Wächter, B. (2004).

Main effects: Include increased staff and student mobility, reciprocal qualification recognition, and uniform higher education standards throughout the country.

# Case study: General Agreement on Trade and Services (GATS)

Higher education systems around the world have been impacted by the World Trade Organization's facilitation of education as a marketable service under GATS, which promotes commercialization and cross-border learning Knight, J. (2002).

**Key Impact:** Raised concerns about equity and cultural integrity while promoting private investments in education, foreign branch campuses, and student mobility.

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# Case study: UN Sustainable Goal 4 (SDG4)

SDG 4 is promoted by international frameworks, guarantees inclusive and equitable quality education for everyone, and expands possibilities for lifelong learning Unterhalter, E. (2019).

**Key Impact:** Improving access to and maximizing the quality of higher education is a legal or moral obligation for governments and institutions.

### Case Study: International Student Rights and the European Court of Justice

The rights of international students in the EU have been established by the European Court of Justice's (ECJ) decisions in instances such as Gravier v. City of Liège (1985) and Bidar v. London Borough of Ealing (2005) De Witte, B. (2006).

**Key Impact:** Improved the legal rights of students in host nations to non-discriminatory tuition costs and access to educational benefits.

#### **Case Study: Transnational Education Policies in Asia-Pacific**

The impact of international law is demonstrated via transnational education agreements, such as Australia's Education Services for Overseas Students (ESOS) Act, which regulates the rights of overseas students Marginson, S. (2012).

The protection of international students, improved quality assurance, and the expansion of higher education as an export sector are the main effects.

#### Conclusion: -

Equity and inclusivity form the NEP 2020 framework. The policy discusses the strategies that bridge educational gaps in socioeconomic, gender, and regional lines. It also provides access to quality education to disadvantaged groups, scheduled castes, scheduled tribes, other backward classes, and minorities. Special education zones and targeted scholarships are the initiatives that bridge these gaps by encouraging the participation of marginalized communities in mainstream education. The policy also focuses on the use of technology to transform the education sector. It aims to make the education system future-ready by incorporating digital tools in teaching, learning, and assessment. Technology-enabled learning experiences for students. This approach is particularly significant in bridging the urban-rural divide and expanding the reach of quality education to remote areas. The other defining feature of NEP 2020 is that it upholds India's cultural heritage while at the same time enhancing global competencies. The curriculum encourages students to be appreciative of India's rich traditions, languages, and values while still being exposed to international perspectives. Multilingualism and arts education foster creativity and a sense of national pride among global citizens deeply rooted in their heritage.

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# VIRTUAL LABS IN MICROBIOLOGY EDUCATION: BRIDGING THE GAP BETWEEN THEORY AND PRACTICE WITH DIGITAL TECHNOLOGY

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# Abstract

The integration of virtual laboratories into life sciences education, particularly in microbiology, is revolutionizing traditional teaching methods by utilizing digital technologies to improve learning outcomes. Virtual Reality (VR) and digital simulations create immersive, safe, and cost-effective environments where students can engage in complex experiments and deepen their conceptual knowledge. This paper reviews the development, implementation, and evaluation of virtual labs in undergraduate life sciences programs, highlighting their role in enhancing both psychomotor skills and theoretical comprehension. Research from various institutions demonstrates that virtual platforms, including VR-based microbiology labs and digital simulations, offer notable advantages over traditional in-person methods, such as increased accessibility, flexibility for repeated experiments, and the ability to tailor learning experiences. Student and faculty feedback reveal that these platforms are engaging and interactive, with many students expressing a preference for a blended learning approach that combines both traditional and virtual elements. Furthermore, a systematic literature review indicates that virtual labs are particularly effective in teaching abstract and complex subjects like cell biology, microbiology, and biotechnology, improving conceptual understanding, practical skills, and student motivation. The findings emphasize the crucial role of digital technologies in enabling hands-on learning experiences in the life sciences and suggest that the continued development and integration of virtual labs will further enhance the educational landscape to meet evolving instructional demands and challenges.

Keywords: Virtual laboratories, Life sciences education, Digital technology, Hybrid learning model.

# Introduction

The discipline of microbiology is dynamic and fast changing, and it is essential to industrial, environmental, and health applications. It takes a well-balanced combination of theoretical knowledge and practical abilities to comprehend microbial activities and their practical ramifications. Laboratory exercises are a cornerstone of science education, providing students with the opportunity to bridge theoretical knowledge and practical application. These exercises are essential for acquiring hands-on skills and fostering a deeper, experience-based understanding of scientific concepts. According to Bernhard (2010), the holistic development of conceptual knowledge is a fundamental purpose of laboratory education. However, the success of such exercises heavily depends on how well-prepared students are before engaging in physical lab work. Effective preparation allows students to focus their cognitive resources on critical aspects of the experiment rather than basic technical or procedural challenges.

Traditional face-to-face tutorials have been the standard approach to preparing students for laboratory work. Teachers often deliver these sessions in small groups at the start of a lab session, offering direct instruction and interaction. While effective, this method is time-intensive, costly, and limited in its capacity to address the diverse needs of individual students. Students with varying levels of prior knowledge and experience may not receive the tailored support they need, resulting in inconsistent learning outcomes.

As an alternative, **virtual laboratory simulations (vLABs)** are emerging as a transformative tool in science education, including microbiology. These simulations provide students with an interactive, computer-based environment to explore laboratory concepts and procedures before engaging in physical experiments. Research highlights their potential to standardize teaching, enhance learning, and prepare students effectively for hands-on exercises. For instance, instructional videos and simulations have been shown to improve student understanding of essential concepts and principles, thereby optimizing subsequent lab performance.

Virtual labs offer several distinct advantages over traditional preparatory methods. They are flexible, allowing



students to engage at their own pace and in their preferred learning style. Additionally, simulations provide a safe, cost-efficient environment where students can explore complex or hazardous processes without risk. Despite their benefits, vLABs are not intended to replace physical labs but rather to complement them. Studies indicate that combining virtual and physical lab experiences yields superior learning outcomes, as each approach offers unique advantages.

The growing adoption of vLABs across various educational disciplines, including microbiology, underscores their potential to reform laboratory teaching practices. Early research demonstrates that simulations enhance student motivation, self-efficacy, and cognitive skills, particularly when integrated with inquiry-based learning strategies. However, there remains a need for further investigation into their utility as a preparatory tool, especially in comparison to traditional face-to-face tutorials.

This paper explores the role of virtual labs in microbiology education, focusing on their potential to bridge the gap between theory and practice. It examines how vLABs can address the challenges of traditional lab preparation, improve student engagement, and support both cognitive and non-cognitive learning outcomes. By evaluating existing research and identifying gaps, this study aims to contribute to the growing body of knowledge on digital technology in science education and its implications for future pedagogical practices.

# Literature Review

The integration of technology into undergraduate laboratory education has been a growing trend, particularly as educational institutions face budgetary constraints and the need for innovative teaching methods. Several studies have explored the effectiveness of virtual and immersive laboratories in enhancing student learning in various science disciplines, especially when paired with traditional in-person learning experiences. Below is a synthesis of key findings from recent literature on virtual and technology-enhanced laboratories (V-Labs) across multiple fields of science education.

Rayment et al. (2023) highlight the importance of technology in bridging the gap between theoretical understanding and practical laboratory skills. Their study, which focused on second-year bioscience undergraduates in the UK, found that students utilized technology both as a tool for conducting experiments and as a resource for understanding complex concepts. Technology enabled students to make connections between theory and practice, particularly in post-laboratory activities. However, the study identified that many bioscience modules lacked postlaboratory activities, suggesting that further integration of technology into these areas could enhance the overall learning experience. This points to the growing trend of using technology not just as a supplement but as a fundamental tool for laboratory learning.

Damasceno et al. (2024) explored the use of immersive Virtual Reality (VR) technology in microbiology education. They developed a virtual microbiology laboratory where students used VR equipment such as Cardboard Glasses and Bluetooth joystick controls to interact with digital models of microbiological concepts. The results demonstrated that VR technology significantly improved students' understanding and visualization of complex microbiology content. The immersive nature of the virtual lab enhanced students' learning experiences, suggesting that VR can effectively augment traditional laboratory learning, especially in disciplines like microbiology where physical labs can be costly and logistically challenging. This aligns with the growing interest in virtual laboratories as a cost-effective and engaging alternative to traditional methods.

Brockman et al. (2020) examined the perceptions of medical students regarding online versus in-person microbiology laboratory experiences. Their study found that students who engaged with online labs were more likely to report a visual learning style, whereas those attending physical labs preferred tactile learning. Despite the convenience of online labs, students overwhelmingly preferred a hybrid model, with 89% expressing a desire for at least some in-person, hands-on laboratory experiences. This preference underscores the importance of combining both online and physical components to optimize learning outcomes, suggesting that while digital labs offer convenience and flexibility, they may not fully replace the benefits of hands-on experience.

Paxinou et al. (2020) investigated the effectiveness of virtual reality (VR) in microscopy education, comparing it to traditional tutorial-based instruction. They found that students who used VR simulations performed better in post-test assessments and were more confident in their ability to use optical microscopes in physical labs. The study emphasized the role of VR in enhancing students' conceptual understanding and practical skills, particularly when



used alongside face-to-face tutorials. This aligns with the broader trend of incorporating VR technologies into science education, highlighting their potential to complement traditional

Makransky et al. (2016) explored the use of virtual labs (vLABs) as preparation for microbiology lab exercises. Their study found that students who practiced in the vLAB before participating in physical lab exercises showed similar improvements in knowledge and skill acquisition as those who received live demonstrations. This suggests that vLABs can be just as effective as traditional face-to-face tutorials in preparing students for practical lab work, especially in microbiology. The study advocates for the integration of virtual simulations into laboratory curricula as a means to enhance learning efficiency and provide students with opportunities for repeated practice in a low-stakes environment.

Reeves and Crippen (2021) conducted a systematic review of virtual laboratories (V-Labs) in science and engineering education, focusing on studies published between 2009 and 2019. The review found that most V- Lab studies were evaluative in nature and predominantly explored improvements in content knowledge. However, the studies were often limited by a lack of theoretical and methodological diversity, and did not sufficiently address the social and interactive aspects of learning, such as faculty-student or peer interactions. This suggests a gap in research regarding the broader educational benefits of V-Labs, such as motivation, self-efficacy, and collaborative learning experiences. The review calls for more holistic approaches to studying V-Labs, incorporating the social dimensions of learning alongside technical skills development.

## **Research Methodology**

This research employed a mixed-methods design to evaluate students' experiences and perceptions of virtual microbiology labs in bridging the gap between theoretical knowledge and practical application. The study combined quantitative data from surveys and qualitative data from follow-up interviews, ensuring a comprehensive analysis of student engagement, learning outcomes, and platform effectiveness. The primary objective of the research was to assess the effectiveness of virtual labs in enhancing both theoretical knowledge and practical skills within microbiology education. Specifically, the study aimed to investigate how virtual labs impacted students' understanding of microbiological concepts, focusing on both the grasp of theoretical content and the application of practical techniques. By evaluating these aspects, the research sought to determine whether virtual labs could effectively bridge the gap between classroom learning and hands-on laboratory experiences.

In addition to the primary objective, the study included several secondary goals. First, it aimed to evaluate the impact of virtual labs on student engagement and learning outcomes, specifically looking at whether these labs fostered greater motivation, active participation, and improved academic achievement. Secondly, the research explored students' preferences regarding different lab models, including virtual, in-person, and hybrid approaches, to identify the most effective and engaging learning methods for microbiology education. Finally, the study sought to identify areas for improvement in virtual lab platforms based on direct feedback from students, with the goal of providing valuable insights that could guide the further development of these platforms to better meet student needs and enhance their learning experiences.

#### Study Population and Sample

The target population for this study consisted of undergraduate students enrolled in microbiology courses at a university or college. These students were typically in the early stages of their academic careers and had been introduced to foundational microbiological concepts. As the study aimed to assess the impact of virtual labs on students' learning experiences, this population was particularly relevant, as they were actively engaged in learning microbiology and utilizing virtual lab environments.

The sample size included approximately 150–200 students, which ensured a diverse range of opinions and experiences. To gain deeper insights into individual experiences with virtual labs, a subset of 10–15 students was selected for follow-up interviews. These interviews provided qualitative data on students' perceptions and helped uncover the nuanced factors influencing their use of virtual labs in microbiology education.

Stratified random sampling was used to ensure that the sample represented a variety of student demographics, such as age, gender, academic year, and prior laboratory experience. The sampling method also accounted for learning style preferences, including visual, auditory learners. This approach provided a comprehensive view of how



different groups of students interacted with and benefited from virtual labs, ensuring that the findings were applicable to a broad range of students within the microbiology discipline.

### Data Analysis

# Student Feedback Survey (Quantitative Data)

A key data collection method for this study was an online student feedback survey. The survey was designed to gather both quantitative and qualitative data from students who had used virtual labs as part of their microbiology coursework. It consisted of a combination of closed-ended questions (e.g., multiple-choice and Likert scale questions) and open-ended questions, allowing students to provide detailed responses where appropriate. The survey focused on several key dimensions:

- 1. Frequency and Usage of Virtual Labs: Students were asked about how often they used virtual labs in their microbiology courses, ranging from "Never" to "Always." This helped assess the extent to which virtual labs were integrated into their learning experience.
- 2. Learning Outcomes: The survey examined how students perceived the impact of virtual labs on their understanding of microbiology concepts. Students were asked whether the virtual labs helped reinforce theoretical knowledge and improve practical skills, with response options ranging from "Not at all" to "To a great extent."
- 3. Engagement and Interactivity: Questions assessed how engaging and interactive students found the virtual lab platform. This included questions about whether the labs enhanced student participation and interest in the subject matter.
- 4. Preferences for Hybrid Learning Models: The survey explored students' preferences for learning models that combined both virtual and in-person labs. Students were asked if they preferred this hybrid approach and, if so, why.
- 5. Usability and Satisfaction: Students rated their overall satisfaction with the virtual lab platform, including its usability, ease of navigation, and technical performance. They were also asked to provide suggestions for improvement.

# Follow-Up Interviews (Qualitative Data)

After the survey was completed, a subset of 10–15 students was selected for follow-up semi-structured interviews. These interviews provided qualitative insights into students' deeper perceptions of their virtual lab experiences. The interviews were conducted either in person or online, depending on logistical considerations, and explored a range of topics related to the use of virtual labs in microbiology education. The semi-structured format allowed for flexibility in addressing specific issues raised by individual students, while also ensuring that key topics were covered consistently across all interviews.

The interview questions delved deeper into students' experiences, asking them to elaborate on aspects such as:

- How virtual labs helped or hindered their understanding of microbiology concepts.
- Challenges or technical difficulties they encountered while using the virtual lab.
- Their level of satisfaction with the interactivity and engagement of the virtual labs.
- Their perceptions of the advantages and limitations of virtual labs compared to traditional in-person labs.
- Suggestions for improving the virtual lab platform, including technical features, content, or instructional support.

These qualitative data were analysed thematically to identify common patterns and unique insights that enriched the understanding of students' experiences with virtual labs.

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## **Result Analysis**

# Student Feedback Survey (Quantitative Data)

The results of the survey, based on the responses from 150–200 undergraduate students who used virtual microbiology labs, offered valuable insights into their experiences with these digital tools. The data revealed students' general experiences, the perceived effectiveness of virtual labs, their engagement levels, preferences for hybrid learning models, and their willingness to continue using virtual labs.

**General Experience with Virtual Labs:** A significant majority of students expressed positive experiences with virtual microbiology labs. Forty-five percent of respondents rated their overall experience as Excellent, while 40% rated it as Good, and 15% found it to be Moderate. Regarding how virtual labs influenced their understanding of microbiology concepts, 50% felt the labs had improved their understanding moderately, 30% felt they had improved it to a great extent, and 20% felt the improvement was slight. Comfort levels with virtual labs were high, with 70% of students reporting feeling comfortable using them, 20% remaining neutral, and only 10% feeling uncomfortable. When comparing virtual labs to traditional in-person labs, 35% felt the experience was about the same, 30% found virtual labs to be slightly more beneficial, and another 35% believed that traditional labs were more effective.

**Effectiveness of Virtual Labs:** In terms of enhancing theoretical knowledge, 60% of students agreed that virtual labs contributed greatly to their theoretical understanding of microbiology, while 25% found them to be moderately effective, and 15% felt the impact was slight. When it came to providing hands-on experience, 40% of students felt that virtual labs were moderately helpful, 35% found them slightly helpful, and 25% felt they were very helpful in simulating microbiological experiments.

**Engagement and Interaction:** While virtual labs were generally seen as a useful tool for learning, their ability to engage students varied. Forty-five percent of students reported that virtual labs made learning microbiology slightly more engaging, 30% felt it was moderately engaging, and 25% felt it had little impact on their engagement. In terms of interactivity, 40% of students felt virtual labs were slightly interactive, 35% rated them as moderately interactive, and 25% found them to be very interactive compared to traditional methods.

Regarding guidance, a substantial 70% of students found the virtual labs provided guidance very much, 20% felt it was moderate, and 10% felt the instructions were limited.

**Comparison with Traditional Labs:** Regarding the convenience of virtual labs, 40% of students found them to be about the same as traditional in-person labs, while 30% felt that virtual labs were more convenient, and 30% thought in-person labs were more convenient. Fifty percent of students highlighted experiment simulations as the most beneficial component of virtual labs, with 25% preferring interactive quizzes and another 25% valuing the data analysis features. When it came to opportunities for practicing skills, 45% of students felt virtual labs offered a moderate opportunity for skill development, 35% found it to be slightly beneficial, and 20% felt it was highly beneficial compared to traditional lab settings.

**Hybrid Learning Model Preferences:** A hybrid learning model, which combined virtual and in-person labs, was favored by most students. Fifty-five percent preferred a balance of both, 30% favored mainly virtual labs, and 15% preferred mainly in-person labs. Regarding the impact of a hybrid learning model on their overall experience, 60% of students felt it enhanced their learning to a great extent, 30% felt it was moderately beneficial, and 10% felt it slightly enhanced their learning. While 40% of students were unsure whether they would prefer to continue using virtual labs depending on the topic, 30% were very likely to continue, and 30% were somewhat likely to continue using them. Furthermore, 60% of students indicated they would very likely recommend virtual microbiology labs to their peers, 25% were likely to recommend them, and 15% were unlikely to do so.

In conclusion, the results of this survey demonstrated that virtual labs in microbiology education were generally well-received, with many students finding them beneficial in enhancing theoretical knowledge and providing a flexible learning experience. However, students still valued the hands-on experience of traditional labs, which is why a hybrid approach was preferred by the majority. These findings underscored the potential for virtual labs to complement, rather than replace, traditional learning models in microbiology education.



# Follow-Up Interviews (Qualitative Data)

Interviews with 10–15 students revealed both benefits and challenges of virtual labs in microbiology education. Many students highlighted that virtual labs helped improve understanding of complex concepts, such as microbial growth and enzyme activity, by providing visualizations of these processes. The flexibility to repeat experiments was also appreciated, with students noting that it allowed them to practice techniques at their own pace. Some found virtual labs valuable for pre-lab preparation, boosting their confidence in real lab settings.

However, concerns were raised about the lack of physical interaction and the inability of virtual labs to replicate real-life lab challenges, such as the unpredictability of experiments. Some students also suggested that more detailed instructions would have enhanced the virtual lab experience. Most students favoured a hybrid learning model, combining virtual and in-person labs, as it provided the best balance of theory and hands-on practice.

While students were open to using virtual labs in the future, their preference varied depending on the complexity of the topic, with simpler experiments being more suited to virtual labs and complex ones requiring in-person labs.

#### Discussion

The integration of virtual labs into microbiology education has gained significant attention due to its potential to bridge the gap between theoretical knowledge and practical application. As highlighted in the studies reviewed, virtual laboratories have proven to be a valuable tool in enhancing students' understanding of microbiological concepts, fostering greater engagement, and improving practical skills. Digital wet labs, as demonstrated by Grando and Calonge (2014), allow for the incorporation of blended learning models, providing students with online pre-laboratory activities and electronic resource packages that aid both in-class and independent learning. This approach facilitates a more interactive and accessible learning environment, where students can engage with the content at their own pace and revisit complex topics as needed. These digital tools also allow for more efficient assessment and feedback, enhancing the overall teaching and learning experience.

The use of virtual labs addresses several challenges faced by traditional microbiology teaching methods, such as the high cost of resources and the complexity of experiments. As Sancho et al. (2006) pointed out, microbiology education often struggles with the time and resource limitations of traditional lab-based teaching. Virtual laboratories offer a more flexible, cost-effective solution by allowing students to repeat experiments, analyze data, and refine their skills in a controlled, digital environment. Moreover, these platforms can simulate a wide variety of microorganisms and experimental conditions that would be difficult to recreate in a traditional lab setting, offering a more comprehensive understanding of microbiology concepts. The virtual lab model also enables more immediate feedback, overcoming the challenge of large class sizes and the difficulty of providing timely assessments in physical labs.

In terms of student motivation and learning outcomes, the studies reviewed provide mixed findings. Dyrberg et al. (2017) observed that while students felt more confident in their ability to operate laboratory equipment after using virtual labs, they did not necessarily feel more motivated to engage in the virtual environment compared to real labs. However, they also noted that virtual labs improved students' pre-laboratory preparation and facilitated more meaningful discussions during in-person sessions. This suggests that virtual labs can be particularly useful as a preparatory tool that complements traditional lab work, allowing students to familiarize themselves with equipment and experiment workflows before engaging in hands-on activities.

Additionally, Byukusenge et al. (2024) found that virtual labs positively impacted students' attitudes towards biology, especially when dealing with abstract or difficult concepts such as nerve cells and enzyme activities.

The use of visualization tools and interactive simulations helped demystify these topics, increasing student engagement and performance. This finding aligns with the broader trend of using digital technology to enhance learning in science education, where complex theoretical concepts can be visualized and manipulated in ways that are not possible in a traditional lab setting. The flexibility and accessibility of virtual labs provide students with opportunities to revisit and reinforce their learning outside the classroom, further strengthening their grasp of microbiology.

While the virtual lab model has shown promise, it is not without its challenges. For instance, the commercial virtual laboratory platform used by Caño de las Heras et al. (2021) was well-received by students but also had limitations



related to its learning framework and objectives. Despite these challenges, the findings suggest that virtual labs can be used effectively as a supplement to traditional in-person labs, providing students with additional resources and enhancing their overall learning experience.

## Conclusion

Virtual labs have the potential to significantly enhance microbiology education by bridging the gap between theory and practice. They offer numerous benefits, including increased accessibility, flexibility, and engagement, while also addressing the limitations of traditional lab settings, such as resource constraints and the complexity of experiments. The findings from various studies highlight that virtual labs not only improve students' practical skills and confidence in the laboratory but also enhance their understanding of abstract concepts, fostering a deeper level of learning.

While virtual labs should not be seen as a replacement for in-person labs, they serve as a valuable complement, offering students a hybrid learning model that combines the best of both worlds. This approach is particularly beneficial in situations where access to physical labs is limited, such as during the COVID-19 pandemic, or in large classes where individualized attention is difficult to provide. As technology continues to evolve, the potential for virtual labs to further enrich the learning experience in microbiology education is immense. Moving forward, it will be essential to refine these platforms based on student feedback and educational needs, ensuring that they continue to meet the demands of both students and educators in the ever-changing landscape of higher education.

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# GLOBALIZATION AND INTERNATIONALIZATION OF HIGHER EDUCATION

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#### Abstract

The phenomenon of globalization has significantly influenced the landscape of higher education, promoting a shift towards internationalization in institutions across the globe. This study explores the multifaceted impacts of globalization on higher education and delineates the evolving trends and challenges associated with the internationalization of higher education. In the context of rapid technological advances and interconnected global economies, higher education institutions are compelled to adapt by integrating international, intercultural, and global dimensions into their core missions. This paper assesses the strategies implemented by universities to navigate the complexities of global interdependencies and the competitive global education market. By examining various internationalization initiatives, such as cross-border education and global knowledge exchange, this study highlights the dynamic interaction between global influences and educational strategies. The findings suggest that effective internationalization not only enhances educational quality and global competitiveness but also plays a pivotal role in fostering global citizenship and cultural understanding. This abstract synthesizes key insights into the challenges and opportunities of aligning higher education objectives with the imperatives of globalization, emphasizing the necessity for institutions to cultivate a robust international presence and responsive educational frameworks.

Keywords: internationalization, globalization, intercultural, technological, Economies, Educational

## Introduction

Many studies devoted to the field of higher education have focused on the topic of internationalization, which is quickly becoming one of the century's most important concerns. Embracing the ethos of human and social development in globalization, universities located in underdeveloped environments make this issue especially visible. (Morosini, De Nez & Woicolesco, 2020). Thus, internationalization is mostly based on views that revolve on academic cooperation, where globalization processes are ever-present and influence patterns of greatness. (Abba & Streck, 2021). Over the last two decades, the academic notion of internationalizing higher education has evolved and changed several times since its introduction in the 1990s. The term-long commitment to vigilant monitoring is essential, as the globalization of universities ought to mirror society's lived reality. (Knight, 2012). The process not only influences but also gives significance to the creation and execution of HEI internationalization policies and programs. Consequently, there is a growing sense of urgency within the field of higher education to adjust to the ever-shifting social and technical norms, as well as the direct political and economic forces that mold the more complicated and competitive global economic environment. This means that the age of globalization is upon us. (Sousa & Santos, 2023).

One definition of globalization is the push from across the world to create open markets, boost knowledge industries, lower obstacles to the free flow of money and people, and encourage people to recognize their interdependence as part of a larger process of integration and convergence. (Altbach& Knight, 2007). Higher education and professional training, which are part of the new global knowledge sector, have received significant funding in this age of globalization. Numerous civilizations' dependence on information goods and people with higher education to meet their economic development goals is reflected in this investment, which also represents the emergence of the knowledge society and the rise of service industries. (Tauchen, Briceño, & Borges, 2023). As a result of globalization, research has become more integrated, scientific communication has become more standardized in English, job opportunities for students and researchers have grown, ICT companies have flourished, and methods of publishing and accessing information have become more effective on a global scale. (Fox & Hundley, 2011). Although higher education has always been inherently cooperative rather than competitive, globalization has had a major impact on its ethos. (De Wit, 2010). Therefore, in response to globalization, universities are becoming more internationalized by making their missions more inclusive of international, intercultural, or global dimensions sometimes used as a triad. (Knight, 2012). Therefore, internationalization is the



reaction of HEI to globalization; yet, it is not a unidirectional process; rather, it is both a catalyst for and a driver of globalization. (Lang, Foskett & Maringe, 2010).

Internationalization emphasizes distinctions, power structures, and hegemonies, while globalization emphasizes similarities and undermines these same factors. (Scott, 2000). The variety of cultures in nations, communities, and institutions is mirrored in the internationalization of higher education, and this component is tackled by interculturality. Discussions regarding internationalization often include globalization, despite the fact that it is controversial and seen as having value-laden aspects. (Knight, 2016).

## Meanings And Rationales Of Internationalization And Globalization

As the discussion around the globalization of universities has progressed over the last decade, a new set of terminology has taken root. These result from the effects of globalization on higher education and are much more connected to the international delivery of education: offshore education, education without borders, worldwide education, educational services traded internationally, and education that transcends national boundaries. "People tend to use it in the way that best suits their purpose" (De Wit, 2002), as I put it in 2002, when the worldwide component of higher education was getting greater attention and acknowledgement. Given the continued expansion of both activities and terminology, this is more true than ever before. "Globalization is altering the face of internationalization, and internationalization is altering the face of higher education," notes(Jane Knight, 2008). The internationalization of higher education is often defined and explained in connection to a particular reason or aim, which is reinforced by the ongoing discussion on globalization and internationalization as well as the fast development of cross-border activity in this sector. Peter Scott (2006) notes that globalization and internationalization are both multi-faceted processes, and that "the distinction between internationalization and globalization, although suggestive, cannot be regarded as categorical." There are a lot of ways in which they overlap and are connected." Ulrich Teichler (2004) explains that at first, "globalization seemed to be defined as the totality of substantial changes in the context and inner life of higher education, related to growing interrelationships between different parts of the world whereby national borders are blurred or even seem to vanish." On the other hand, he claims that the term "internationalization" has recently taken the place of "globalization" in discussions about public policy in higher education, leading to a change in definition: "the term tends to be used for any supraregional phenomenon related to higher education (...) and/or anything on a global scale related to higher education characterized by market and competition."

Jane Knight lists the following as examples of contemporary environmental realities and challenges: regionalization, information and communication technologies, new providers, alternative funding sources, borderless issues, lifelong learning, increased numbers and diversity of actors, and globalization and the knowledge economy's emergence. Thus, "the process of integrating an international, intercultural or global dimension into the purpose, functions or delivery of post-secondary education" (Knight, 2008) by Jane Knight recognizes the multiple levels and the necessity to address their relationship and integration. Additionally, she claims that two fundamental features of the globalization of universities are beginning to take shape.

One is "internationalization at home," which encompasses programs that encourage pupils to broaden their horizons and learn to work with people from different backgrounds. The focus shifts to the curriculum, which aims to equip pupils to actively participate in an increasingly globalized society. All of the following activities take place in the comfort of one's own home: academic pursuits, research, curriculum development, teaching and learning, extracurriculars, and partnerships with local cultural and ethnic groups. The second part is "internationalization abroad," which encompasses any kind of cross-border education, including the movement of students and teachers as well as initiatives, programs, and service providers. In policies and programs, these elements should not be seen as separate but rather as complementary. There has to be a clear delineation between the reasons for internationalizing higher education and the definition of internationalization when discussing this topic. There are a lot of publications, policy papers, and documents that mention internationalization without explaining why it is happening. Also, a lot of the literature has confused definitions of internationalization with justifications for it, leading to a lack of clarity between the two concepts. According to De Wit (2002), there are four main types of justifications for becoming global: intellectual, social and cultural, economic, and political. These justifications are not exclusive of one another; rather, their relative weight and influence may shift over time and among countries.



# Internalization Of Higher Education

The transportation and communication revolutions have paved the way for internationalization and globalization, which aim to increase political, economic, and cultural interconnectedness on a worldwide scale. Thanks to studies conducted at university and adult education centers, colleges and universities now have the power to alter students' perceptions of themselves and their organizational behavior. Internationalization in higher education refers to the process of integrating the global, intercultural, and international dimensions and goals of the educational, learning, research, and service functions of universities and the higher education system, as opposed to globalization, which primarily focusses on the global flow of ideas, resources, people, economies, values, cultures, knowledge, goods, services, and technologies. When compared to the idea of international relations, the disparities between global flow are profound and noticeable. In contrast to globalization, which focusses on the notion of economic, intellectual, and cultural flows over national boundaries, internationalization highlights the interconnections among countries, peoples, cultures, institutions, and systems.

Recent years have seen extraordinary changes in every facet of the economy and the environment as a result of globalization. This includes interactions between businesses and the media. Public and private universities alike are following the trend of other industries into the global arena. According to Nielsen's research, internationalization is more accurately seen as a driving force behind globalization rather than a response variable that characterizes the ways in which institutions deal with the economic, political, cultural, and social impacts of globalization. Over the course of many decades of rapid growth, internationalization has grown in size, impact, and breadth. Higher education institutions' varied roles and perspectives in researching and understanding higher education systems, the significance of borders and national boundaries, and the difficulties posed by globalization and internationalization are all becoming more apparent. Recent trends analysis reveals a more centralized and disorganized influx of overseas students. Take American institutions as an example; forty years ago, hardly no international students attended classes there. Nevertheless, the influx of overseas students has skyrocketed, surpassing 3 million in 2009. The worldwide education process may be better understood with the use of extensive mobility data. The percentage of foreign students at the PhD level is unusually high, at 24%, with an average of 9% international students and 24% international OECD students. Science, technology, engineering, and mathematics (STEM) are the focal points of competitions because of their importance to innovation, technical advancement, industrial performance, and economic development. The United States has almost half of all its international Ph.D. candidates in STEM, international students make up more than 40% of all doctoral applications in the UK and Switzerland, and the Netherlands has a particularly strong concentration in these areas. Internationalization efforts in higher education will have far-reaching effects and plant cosmopolitan seeds regardless of the goals, economic priorities, or outcomes of this trend. Where countries and universities stand in the global high education scene is directly related to the internationalization efforts they are able to undertake.

# The Impact Of Globalization On Higher Education

The previous discussion of globalization and the rhetoric surrounding global competitiveness have both contributed to the fast expansion of the higher education market on a global scale in recent years. Business and economic factors have a significant role in this event. Its growth has been greatly facilitated by the same neoliberal economic policies that swept the world in the late 20th century. As a "public good" that should not be supported by tax revenue, neoliberal economic theory does not support education. Instead, there's a case for deregulating schools and making them compete for students' (or "clients") money by making education a user-pays affair. A worldwide market is emerging in higher education, which is where this tendency is most noticeable. All too often, university administrations think that, in order to keep up with the ever-shifting world, they need to become customer-centric businesses and fully embrace the marketplace. (Currie, 2008). Few in the higher education sector have distinguished between the ways in which internationalization and globalization have affected colleges and universities. In common use, the two names mean the same thing. It is not apparent where one ends and the other begins.

In reality, many of them failed to pay close enough attention to local context to avoid conflating globalization with internationalization. Concerning the topic of the university curriculum's relevance, we sought the feedback and suggestions for solutions. In order to address the issue of unemployment and theoretical learning, a significant majority of students and faculty members (78.2% and 65%, respectively) believe that universities in Uganda should



tailor their curricula and training programs to meet the needs of industry. Additionally, a large majority of students and faculty (83% and 70%, respectively) believe that universities should provide practical knowledge competencies.

### **Challenges And Opportunities**

Many nations outside of the West are both sending and receiving students and faculty as a result of the widespread internationalization of higher education. Student mobility across 210 nations: a global network study (Barnett et al., 2016) "The USA is by far the most central country in the flow of international students, followed by China, the UK, France, Germany, Australia and India," the study said. Included on this shortlist are not just the two most prominent Asian powers, but also the most apparent American, Australian, and Western European contenders.

From economic and commercial demands to the desire to establish "world-class" colleges, these flows are motivated by a variety of institutional and national goals. Notable influence on "soft" (T. Y. J. Lo & Pan, 2021) is another way that international student programs, both domestic (like Brazil's PEC program and Turkey's Mevlana scheme) and international (like China's Confucius Institutes), may be fostered and put into practice. Although they may be small in size, countries like Switzerland, Norway, and Finland in Europe and Malaysia and Singapore in Asia have the potential to become major centers of international higher education, either globally or for particular areas, fields, or themes.

Higher education abroad takes several cues from the Western model, but not all of them. Hong (2020) draws the conclusion that "different responses to the global trends reflect the specificities of each nation and the ways path dependent factors mediate global pressures" (p. 768) after comparing the internationalization of higher education policy in China and Australia, two Western and non-Western nations, respectively.

Although the significance of linguistic variety and multilingualism is often and again emphasized, the English language offering's continued position as the foundation of the most desired international higher education provision is largely uncontested(e.g., Conceição, 2020). International higher education curricula have received comparatively little focus. (Sa & Serpa, 2020), notwithstanding demands for international understanding and citizenship (Ji, 2020).

#### Conclusion

Internationalization of higher education is inextricably bound up with globalization, which has an indisputable impact and a vast reach. It stands for the indestructible link that links people, places, and things across all corners of the globe, regardless of their physical or mental location. Adaptability and success in a globally interconnected environment are fundamental to HEI's capacity to internationalize. Tauchen et al. (2023) argue that higher education institutions may gain from globalization if they expand internationally. Through this procedure, international relationships and collaborations may be formed, resulting in a more intellectually and culturally diverse learning environment. According to the writers, pupils benefit from a more well-rounded education and a better grasp of the intricacies of the modern world because of the variety in the classroom. Academic mobility is another benefit of internationalization that helps students and teachers see the world from different angles. To meet the problems posed by globalization, this method encourages flexibility and critical thinking. (Reiffenrath et al., 2020). Higher education institutions (HEIs) have a crucial role to play in boosting global research and innovation via internationalization. The exchange of information and the resolution of difficult issues that go over national boundaries are both made possible by international cooperation in research initiatives. Both the academic community and society as a whole gain from this sharing of information. Therefore, rather than seeing internationalization of higher education as a passive response to globalization, we should view it as a tool that empowers academic institutions to actively and critically engage in our linked world. This is a great opportunity to teach people about one other's cultures, work together as a global community, and develop into global citizens who can handle the possibilities and threats that come with globalization. In the end, it stands for the dedication of universities to creating a world that is more just and fair.

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# ROLE OF NEP SAARTHI IN TRANSFORMING THE MODERN EDUCATIONAL LANDSCAPE

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## Abstract

The National Education Policy - Student Ambassador for Academic Reforms in Transforming Higher Education in India (NEP SAARTHI) represents a pioneering initiative designed to elevate academic standards and practices in Indian higher education. Rooted in the principles of student-centred learning and outcomes-based education (OBE), NEP SAARTHI acts as a bridge between policy aspirations and ground-level implementation. By prioritizing student engagement, personalized learning, and holistic educational outcomes, the initiative redefines the modern educational landscape. NEP SAARTHI emphasizes empowering students as active participants and ambassadors of academic reform, fostering a collaborative environment where learners contribute to shaping institutional practices and policies. This approach ensures inclusivity and responsiveness to the diverse needs of students, aligning with the global shift toward learner-centric education. Personalized learning pathways are central to this initiative, leveraging technology and innovative pedagogies to cater to individual aspirations and capabilities. Additionally, the initiative integrates outcomes-based education to measure academic progress through competency development and real-world applicability. By fostering critical thinking, creativity, and adaptability, NEP SAARTHI prepares students for personal growth and professional excellence. The program also highlights the importance of prioritizing student engagement through participatory teaching methodologies, co-curricular opportunities, and mentorship programs. NEP SAARTHI underscores the transformative power of education in fostering equitable access, lifelong learning, and global competitiveness. It bridges traditional values with modern advancements, ensuring the integration of interdisciplinary approaches and digital tools to enrich the learning experience. This will explore NEP SAARTHI's potential in revolutionizing higher education by addressing systemic challenges and driving meaningful change.

Keywords: NEP SAARTHI, Student-Centered Learning, Outcomes-Based Education (OBE), Higher Education Reforms

# Introduction

The National Education Policy (NEP) 2020 represents a transformative shift in India's educational framework, addressing systemic challenges like rote learning, rigid academic structures, and limited inclusivity. It advocates for a multidisciplinary, student-centric, and technology-integrated approach, aligning India's academic and professional goals with global standards while preserving its cultural essence (Kurien & Chandramana, 2020; Ashokkumar et al., 2024). Among its notable initiatives is the Student Ambassador for Academic Reforms in Transforming Higher Education in India (SAARTHI) program, which fosters student participation in policy implementation by bridging policy frameworks with grassroots-level action (Das & Das, 2024; Sony & Gayatri, 2024).

The SAARTHI program empowers students by nurturing leadership and advocacy skills, enabling them to address gaps in policy communication and implementation. It plays a vital role in reshaping the higher education landscape by promoting awareness and engagement at institutional and community levels (Muralidharan & Singh, 2021; Mishra, 2024). Additionally, SAARTHI prioritizes inclusivity by engaging marginalized communities, fostering equity, and enhancing psychological resilience and self-directed learning among students (Sony & Gayatri, 2024; Singh & Dixit, 2024).

Research emphasizes the importance of initiatives like SAARTHI in bridging the gap between policy design and practical implementation. Training student ambassadors has been identified as a key factor in ensuring the success of NEP 2020 by fostering continuous learning and adaptability (Ashokkumar et al., 2024; Das et al., 2024). However, challenges such as limited outreach and resource constraints highlight the need for sustained efforts to maximize the program's impact (Das et al., 2024; Kumar, 2021). Collectively, SAARTHI demonstrates the transformative potential of NEP 2020 as a driver of student-centric reforms and systemic innovation in education.



## Framework and Features of NEP SAARTHI

The NEP SAARTHI (Student Ambassador for Academic Reforms in Transforming Higher Education in India) program is a pioneering initiative under the National Education Policy (NEP) 2020. It seeks to empower students as active agents of change in implementing educational reforms, thereby fostering grassroots engagement and bridging the gap between policy design and practical application. The program is designed with a structured framework emphasizing inclusivity, empowerment, and collaboration, making students key stakeholders in India's educational transformation.



Figure 1. Flow of NEP SAARTHI Program

# Framework of NEP SAARTHI

The framework of SAARTHI is organized into four interconnected stages:

#### 1. Selection

The program begins with the selection of student ambassadors based on a combination of academic performance, leadership potential, and their capacity for community engagement. This selection process ensures that the most capable and motivated individuals represent the initiative. Special efforts are made to ensure inclusivity, involving students from diverse socio-economic and cultural backgrounds, in line with NEP 2020's emphasis on equitable access.

## 2. Training

After selection, ambassadors undergo rigorous training facilitated by the University Grants Commission (UGC). This training equips them with leadership, communication, and advocacy skills necessary for their roles. Training modules include workshops on policy comprehension, public speaking, and organizing campaigns, enabling ambassadors to effectively represent and promote NEP 2020's objectives.

#### 3. Advocacy

Following their training, ambassadors actively promote NEP 2020's reforms among their peers, institutions, and communities. They organize events, workshops, and campaigns to raise awareness and encourage stakeholder participation in adopting the policy's goals. This advocacy bridges the gap between policy and practice, ensuring that the reforms reach even the remotest areas.

#### 4. Transformation

The final stage of the framework is the transformation of the educational landscape. Through their efforts, ambassadors contribute to fostering critical thinking, skill development, and inclusivity within their institutions and communities. Their advocacy drives long-term change, helping NEP 2020 achieve its vision of a modern, student-centric education system.

Key Feature	Description	Impact	
Student Empowerment	Fosters critical thinking, leadership, and communication skills.	Prepares students for leadership a growth.	
Grassroots Engagement	Promotes bottom-up policy adoption at local levels.	Reaches underserved communities effectively.	
Inclusivity	Engages students from diverse backgrounds.	Is. Ensures equitable access and representation.	
<b>Technology Integration</b>	Utilizes digital platforms for outreach and	Enhances reach and real-time	



	engagement.	communication.
Collaborative Ecosystem	Encourages collaboration between students, institutions, and UGC.	Aligns reforms with institutional goals.
Advocacy Training	Provides skills for policy comprehension and stakeholder engagement.	Drives awareness and participation.
Feedback Mechanism	Connects students with policymakers to offer ground-level insights.	Enables continuous improvement in reforms.

 Table 1. Key Features NEP SAARTHI program

# International Context and Case Study

NEP SAARTHI follows worldwide school reforms that put student needs first and create stakeholder participation in decision making. Under Europe's Erasmus+ students travel internationally to learn new school systems and give back upon returning home. As in Erasmus+, students from different social backgrounds gain access to international learning options under programs that welcome both skill development and change readiness. Including international academic programs in NEP SAARTHI will improve its effectiveness because it enables us to transfer knowledge from around the world.

# Transformative Role of SAARTHI

The NEP SAARTHI (Student Ambassador for Academic Reforms in Transforming Higher Education in India) program is one of the most important pillars of NEP 2020, playing a transformational role in reorienting the Indian education system. The program not only empowers students but also equips them with leadership and advocacy skills to become active participants in educational reform. This change from a passive learner to an active reformer personifies the transformation NEP 2020 seeks to achieve in order to create lifelong learners and leaders.

By engaging students in outreach activities, SAARTHI narrows the gulf between policy intentions and their practical application. Ambassadors organize workshops, seminars, and other activities in their respective communities for the spread of reforms at the grassroots level, ensuring the vast goals of NEP 2020 are understood and adopted widely, even in the remote and underserved areas of the country.

As SAARTHI engages with these communities, it amplifies their voices and makes sure that the reforms cater to their needs. Technology is one of the important aspects of transformative impact in SAARTHI. Using digital tools and platforms, including social media and virtual workshops, the ambassadors reach a wider audience. As this works towards greater efficiency and accessibility for advocacy, it definitely supports the ambition of NEP 2020 in modernizing education through technological innovation. Moreover, it fosters skills in innovation and development that pull students out of rote learning and engage them in hands- on, application-oriented activities, preparing them for the 21st century.

Long-Term Vision			
Technology Integration			
Promoting Skills & Innovation			
Grassroots Engagement			
Fostering Inclusivity			
Bridging Policy and Practice			
Empowering Students			

# Figure 2. Roles of NEP-SAARATHI



- 1. Empowering Students: SAARTHI transforms students into proactive leaders equipped with advocacy and leadership skills, fostering ownership of educational reforms.
- 2. Bridging Policy and Practice: The program ensures NEP 2020's policies are translated into actionable steps, enabling on-ground adoption through workshops, seminars, and outreach programs.
- **3.** Fostering Inclusivity: By involving students from diverse backgrounds, SAARTHI promotes equity in education, addressing the needs of marginalized communities.
- 4. Grassroots Engagement: Ambassadors work at the community level, tailoring reform implementation to local contexts and ensuring broader reach.
- 5. **Promoting Skills & Innovation:** SAARTHI emphasizes application-oriented learning, critical thinking, and innovation, aligning with NEP 2020's vision of 21st- century education.
- 6. Technology Integration: The program leverages digital tools for communication and outreach, enhancing efficiency and accessibility.
- 7. Long-Term Vision: SAARTHI builds a foundation for sustainable reform by preparing students as lifelong learners and leaders who can influence future educational policy and practice.

# Impact on Educational Landscape

The NEP SAARTHI (Student Ambassador for Academic Reforms in Transforming Higher Education in India) program has had a profound impact on India's educational landscape, advancing the goals of the National Education Policy (NEP) 2020. One of its significant contributions lies in redefining the role of students within the education system. By empowering them to take leadership roles, the program has transitioned students from passive recipients of education to active participants in reform processes. Through workshops, campaigns, and outreach programs, student ambassadors play a pivotal role in ensuring that the objectives of NEP 2020 are understood and implemented effectively.

The long-term impact of the SAARTHI program lies in its ability to cultivate a generation of leaders who are deeply invested in the principles of NEP 2020. By fostering a culture of collaboration between students, faculty, and policymakers, the program ensures that educational reforms are not just temporary changes but are sustained over time. These ambassadors carry forward the vision of NEP 2020 as they progress into future roles as educators, administrators, and policymakers.

#### **Challenges and Strategic Solutions**

Despite its opportunity to change education NEP SAARTHI encounters barriers like digital inequality limited resources and stubbornness towards changing the system. A comprehensive solution needs to address several problems at once. We can address limited resources by partnering with both government and private sectors to build up needed technology and services in underserved places. Looking at successful programs around the world that use AI to help students learn and find support, we can bring these ideas back home to make learning better and get more students involved. Regular feedback collection and program tracking help us improve both our delivery methods and results.

### Conclusion

The NEP SAARTHI program represents a transformative stride in India's educational reforms under the NEP 2020 framework. By empowering students as advocates for policy implementation, the initiative bridges the gap between high-level educational objectives and practical execution at grassroots levels. Through its emphasis on inclusivity, leadership, and innovation, SAARTHI not only fosters critical thinking and adaptability but also ensures that marginalized communities are actively included in the reform process. Leveraging technology and promoting interdisciplinary learning, the program aligns with global educational standards while addressing India's unique socio-cultural needs. As a cornerstone of NEP 2020, SAARTHI's collaborative and student-centric approach redefines the role of education in shaping a future-ready society.



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# THE SYNERGY OF STUDENT-CENTERED LEARNING AND OUTCOME-BASED EDUCATION IN MODERN PEDAGOGY

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## Abstract:

In recent years, both Student-Centered Learning (SCL) and Outcome-Based Education (OBE) have emerged as changing pedagogical approaches aimed at improving the learning experience and outcomes in educational settings. This paper explores the synergy between these two methodologies, examining how their integration can foster a more personalized, engaging, and results-driven learning environment. Student-Centered Learning focuses on the needs, interests, and learning styles of individual students, empowering them to take ownership of their educational journey. Outcome-Based Education, on the other hand, emphasizes clearly defined learning outcomes, ensuring that students achieve specific competencies by the end of a course or program. By aligning these approaches, educators can create a balanced framework that not only enhances student engagement and motivation but also ensures that educational goals are met with precision and consistency. This paper investigates the theoretical foundations of SCL and OBE, identifies key strategies for their integration, and discusses the implications for curriculum design, assessment practices, and teacher-student interactions. Through literature review of various available resources, the paper highlights the positive impact of combining SCL and OBE on student learning, academic performance, and overall educational quality.

**Keywords :** Student – Centered Learning(SLC), Outcome Based Education (OBE), Higher Education Institutions (HEIs), Pedagogy, Skillbuiding.

## Introduction

In recent years, the scenario of higher education has undergone significant change, reason being the evolving societal needs, technological advancements, and the growing demand for more personalized learning experiences. At the centre of this change is the integration of student- centered learning (SCL) and outcome-based education (OBE), two pedagogical approaches that have gathered increasing attention for their potential to enhance educational effectiveness and student success. Student-centered learning, which prioritizes active engagement, learner autonomy, and personalized instruction, contrasts with traditional teacher-centered methods that often emphasize passive reception of information. Outcome-based education, on the other hand, shifts the focus from input (content delivery) to measurable learning outcomes, ensuring that students acquire the necessary competencies and skills for their future careers.

While both pedagogies have different fundamentals and objectives, their synergy creates a powerful framework for addressing the complex challenges of modern higher education. By combining the flexibility and individualized approach of SCL with the structured, measurable focus of OBE, institutions can foster an environment that not only enhances student learning but also bring into line academic programs with the expectations of employers, policymakers, and society. This paper explores the connection of student-centered learning and outcome- based education, examining their complementary roles in modern pedagogy and their impact on curriculum design, assessment strategies, and institutional practices. Through this exploration, we aim to highlight how the integration of these approaches can help higher education institutions direct the demands of an ever-changing educational scenario while promoting student achievement and success.

# **Objectives:**

- 1) To understand the Key Concepts of Student-Centered Learning (SCL)& Outcome- Based Education (OBE).
- 2) To assess the Benefits and Challenges of SCL and OBE Individually.
- 3) To explore the Synergy Between SCL and OBE.
- 4) To investigate the Impact on Student Engagement and Learning Outcomes.
- 5) To identify Best Practices for Integrating SCL and OBE in Modern Pedagogy.



By addressing these objectives, the paper seeks to contribute to the ongoing conversation about modern pedagogical innovations and their potential to enhance the quality of education in an ever-evolving academic scenario.

## Literature Review :

The integration of Student-Centered Learning (SCL) and Outcome-Based Education (OBE) has emerged as a significant pedagogical shift in the 21st century. As educational systems globally adapt to meet the needs of diverse learners and the demands of a rapidly changing world, these approaches offer a framework to enhance learning outcomes and student engagement. While Student-Centered Learning emphasizes active student participation in their learning process, Outcome-Based Education focuses on defining and achieving specific learning outcomes. This literature review examines the synergy between SCL and OBE in modern pedagogy, focusing on how the integration of these approaches can enhance the quality of education.

## Student-Centered Learning: Key Concepts and Benefits

Student-Centered Learning (SCL) is an approach that shifts the focus of education from the teacher to the student, emphasizing active involvement in the learning process. In SCL, students take responsibility for their learning, engage in problem-solving, and interact with peers and instructors in a more collaborative environment (Weimer, 2013). This model fosters deeper learning experiences by allowing students to connect new knowledge to their prior understanding, facilitating long-term retention and application (Bransford et al., 2000).

Recent literature highlights several benefits of SCL. It promotes critical thinking, creativity, and self-regulation (Schunk & DiBenedetto, 2020). For instance, collaborative learning and peer feedback in SCL environments have been shown to improve problem-solving skills and foster a sense of ownership over the learning process (Johnson et al., 2014). Furthermore, student-centered pedagogies have been linked to greater student satisfaction and motivation (Kahu, 2013). In a world where adaptability and innovation are prized, SCL's focus on preparing learners to be proactive, independent thinkers is essential.

However, implementing SCL is not without challenges. It requires a shift in instructional practices, with educators acting as facilitators rather than traditional sources of authority. It also demands substantial changes in curriculum design, assessment methods, and classroom management (Boyer et al., 2019). Despite these challenges, the effectiveness of SCL in promoting deeper engagement and improving learning outcomes has made it a central component of modern pedagogy.

# **Outcome-Based Education: Key Concepts and Benefits**

Outcome-Based Education (OBE) is a model that focuses on the attainment of clearly defined learning outcomes, which students must achieve by the end of their educational experience (Spady, 1994). This approach provides a clear framework for what students are expected to know, understand, and be able to do upon completion of a course or program. OBE has been adopted across various educational systems as it provides a more structured and measurable way to assess student learning.

Recent studies emphasize the advantages of OBE in aligning curriculum, teaching, and assessment with specific learning outcomes (Biggs & Tang, 2011). OBE encourages transparency in learning objectives, which helps both educators and students focus on what is essential for student success (Brockett & Hiemstra, 2018). This clarity fosters a sense of direction and purpose, motivating students to engage with the learning material more effectively. The application of flipped classrooms, blended learning, and task-oriented teaching methods within an Outcome-Based Education (OBE) framework can significantly enhance learning outcomes in vocational IT education. These methods align with the OBE principle of focusing on clear, measurable learning outcomes that are demonstrably achieved through student-centered learning activities. In an OBE framework, the flipped classroom model shifts the initial learning of new content outside the classroom, using digital platforms(Dai Kexin & Nor Aishah Buang,2024)

OBE is also linked to increased accountability within educational systems. By aligning assessments with specific learning outcomes, OBE ensures that all students are evaluated based on their mastery of relevant content and skills. This model provides a way to track student progress, identify learning gaps, and inform teaching practices to better meet student needs (Meyer, 2017). Furthermore, when outcomes are clearly defined, students are more likely to take ownership of their learning and work towards achieving set goals (Taggart, 2018).



However, critics of OBE argue that an overemphasis on measurable outcomes can narrow the scope of education, potentially undervaluing aspects of learning that are harder to quantify, such as creativity, personal development, and critical thinking (Caird, 2019). Despite these concerns, OBE continues to be a valuable tool for enhancing educational quality and ensuring that students are well-prepared for their future careers.

# Synergy of Student-Centered Learning and Outcome-Based Education

The synergy between Student-Centered Learning and Outcome-Based Education lies in the alignment of teaching practices with measurable student outcomes while maintaining a focus on active student engagement. Integrating the two approaches allows educators to create a learning environment that is both structured and dynamic, combining the best aspects of both pedagogies.

Recent literature suggests that combining SCL and OBE can enhance student motivation, engagement, and achievement. For example, when outcomes are clearly defined within a student-centered framework, students gain a clearer understanding of their goals and how to achieve them. According to Tait (2019), aligning OBE with SCL helps foster intrinsic motivation, as students can see the relevance and personal value of the learning outcomes. This alignment makes the learning process more meaningful and allows students to engage with content in a way that supports both their personal interests and academic goals.

Furthermore, the incorporation of active learning strategies, such as collaborative group work, peer review, and realworld problem-solving, within an OBE framework can promote deeper understanding and skill development (Hattie & Timperley, 2007). Research by Svinicki (2010) indicates that when students are given opportunities to engage actively with content while working toward specific outcomes, they are more likely to demonstrate mastery and higher- order thinking skills. To obtain all the characteristics of curriculum reform and development, it is necessary that its outcomes should be aligned with the market demands and future expectations. One of the most prominent and useful models is OBE which ensures the transformation of all those skills to the graduates, but OBE by itself is not sufficient for sustainable development unless implementation of active learning and cooperative learning at the course level. Having created a shared vision of what sustainability will look like and creating enabling conditions to realize it, the next challenge is to describe the knowledge, skills, behaviors, and attitudes that learners need to develop to achieve such a state. (Khadem Hussain Saeedi, 2023)The combined approach also helps address the diverse needs of students. As students engage with content in a personalized manner through SCL, they can work at their own pace and focus on areas where they need improvement, while OBE ensures that they are meeting predefined standards and achieving the desired outcomes (Anderson & Krathwohl, 2001). This personalized, yet outcomefocused approach enhances equity in education, as it accommodates varying learning styles and paces without compromising academic rigor.

# The United Nations Sustainable Development Goal (SDG) 4: Quality Education for All

SDG 4, set by the United Nations as part of its 2030 Agenda for Sustainable Development, specifically emphasizes quality education, lifelong learning, and a focus on equitable access to education for all. This has inspired national and international educational reforms that place a greater emphasis on student outcomes, especially in relation to marginalized communities.

#### Case Study:

**India's National Institutional Ranking Framework (NIRF)** is a direct response to global educational standards and SDG 4. The NIRF ranks institutions based on several factors, including teaching, learning, and resources, as well as the **outcomes of education** (e.g., graduation rates, employability of graduates, etc.). The framework encourages universities in India to adopt outcome-based education practices, with a focus on improving learning outcomes through student-centric methods such as experiential learning, research-driven teaching, and skills development.

# Case Study:

In Kenya, the Education Act (2013) introduced a focus on outcome-based learning, influenced by international norms, including the UN's SDGs. The emphasis has been on improving student learning outcomes and ensuring that teaching methods are more inclusive and adaptable to student needs. One significant reform involved the adoption of the Competency-Based Curriculum (CBC), which centers on student learning and achievement of specific



competencies rather than traditional rote memorization. This move aligns with the global shift toward a more personalized, outcome-focused educational approach.

## **Challenges of Integrating SCL and OBE**

While the synergy between SCL and OBE offers significant potential, there are challenges associated with their integration. One key challenge is the need for educators to balance flexibility with accountability. Student-centered approaches require flexibility in teaching methods and assessment strategies, while OBE demands a focus on measurable outcomes. Finding the right balance between these elements can be difficult, particularly in large and diverse classrooms (Fink, 2013). According to (Jose Eos Trinidad,2019) the theoretical literature on student-centered learning (SCL) in higher education focus on five aspects regarding the role of the teacher, the function of content, the responsibility for learning, the purpose of evaluations, and the balance of power & also shows which of the five facets are more evident than the others, and how university students and faculty differentially view SCL. Aside from summarizing insights from these facets, the discussion adds how SCL views are limited to classroom interaction without problematizing the very power relations between teachers and students.

Additionally, integrating SCL and OBE requires substantial support from institutional leadership, including professional development for teachers, alignment of curriculum across disciplines, and the development of robust assessment tools. Teacher resistance to changing traditional practices and the time required for planning and implementing both approaches may hinder successful integration (Pundak, 2020). Another challenge in integrating SCL and OBE is the **alignment of curricula** across disciplines. While the overarching goals of SCL and OBE may be consistent, the application of these approaches can vary significantly between fields of study. For example, in STEM fields, where technical competencies and standardized assessments are crucial, OBE may be more easily integrated, while in humanities and social sciences, where critical thinking, creativity, and independent inquiry are prioritized, the implementation of both approaches can be more complex.

#### Solution:

One effective solution is to develop **interdisciplinary teams** of faculty members who can collaborate on designing curricula that integrate SCL and OBE in ways that are relevant and appropriate to the specific needs of each discipline. This collaborative approach ensures that learning outcomes are meaningful and appropriately assessed across fields, while still accommodating the flexible, student-driven nature of SCL.

# **Future Directions**

As educational systems continue to evolve, further research is needed to explore the most effective ways to integrate SCL and OBE. Studies should focus on identifying best practices for assessment methods that both measure learning outcomes and accommodate diverse learning styles (Zhao, 2018). Additionally, more research is needed on how digital tools and technologies can facilitate the combination of SCL and OBE, particularly in remote and hybrid learning environment. There is also a need to explore the impact of this synergy on students' long-term success. Future research could examine whether combining these pedagogies leads to better preparedness for the workforce, particularly in terms of critical thinking, collaboration, and problem-solving skills.

# **Research Methodology** :

**Research Design**: This review paper employs a systematic literature review approach to explore the Synergy of Student-Centered Learning(SCL) and Outcome-Based Education (OBE) in Modern Pedagogy. The systematic review method allows for the comprehensive examination of existing literature, synthesizing findings from multiple studies to provide a holistic understanding of the subject matter. The review process follows predefined protocols and criteria to ensure rigor and transparency in the selection and analysis of relevant literature.

**Data Collection Methods**: 1. Literature Search: A systematic search of academic databases such as PubMed, Scopus, Web of Science, Researchgate and Google Scholar has been conducted to identify relevant articles, research papers, conference proceedings, and reports related to career opportunities in business analytics. Keywords including : Student – Centered Learning(SLC), Outcome Based Education (OBE), Higher Education Institutions (HEIs), Pedagogy, Skillbuilding and variations thereof will be used to broaden the search.

Result & Discussion : The integration of Student-Centered Learning (SCL) and Outcome- Based Education (OBE)



represents a significant shift in the pedagogical landscape of higher education. As universities respond to the evolving needs of students, employers, and society, combining these two approaches allows for a more holistic and flexible educational experience. The synergy between SCL and OBE not only improves student engagement but also enhances learning outcomes, providing a pathway to more personalized and effective educational practices.

## Conclusion

The integration of Student-Centered Learning and Outcome-Based Education offers a compelling solution to the challenges facing modern higher education. By combining the flexibility of SCL with the structure of OBE, educators can create a dynamic, engaging, and outcome-focused learning environment. While there are challenges to overcome in terms of implementation and institutional support, the potential benefits in terms of student engagement, motivation, and learning outcomes make this integration a valuable direction for the future of higher education. The continued exploration of this synergy, along with the development of best practices and support systems, will ensure that both pedagogies contribute to the academic success and long-term development of students in an increasingly complex and rapidly changing world.

#### Limitations of the study :

The study relies heavily on existing literature to examine the connection between SCL and OBE. While extensive, the body of research reviewed may not fully encompass all perspectives, particularly those from emerging or non-traditional educational systems. The inclusion of a broader range of studies, particularly those focusing on specific disciplines or regions, could provide a more comprehensive understanding of the pedagogical integration. The findings from the literature reviewed may not be universally applicable to all higher education institutions. Different contexts, such as varying cultural, institutional, and technological environments, may affect the implementation and effectiveness of integrating SCL and OBE. there is limited exploration of the long-term effects of this integration. Further research is needed to evaluate whether students who experience this combined pedagogical approach are better prepared for the workforce in terms of skills such as critical thinking, problem-solving, and collaboration.

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# ENHANCING STUDENT LEARNING IN DATA STRUCTURES AND ALGORITHMS COURSE: A PBL CASE STUDY

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## Abstract

The aim of Project based learning (PBL) is to integrate theoretical and practical knowledge and apply this knowledge to solve the real-world problems[7]. With an emphasis on long term retention, it gives an opportunity to the students to thoroughly involve with the course material[6]. We have implemented Project based learning (PBL) for data structures and algorithms course of second year CSIT (Computer Science and Information Technology) program. The objective of this course project is to link theory and practical knowledge acquired in the classroom with software development practices used in the IT sector by incorporating, selection of appropriate data structure, design and analysis of algorithm as part of the software development lifecycle.

This study examines how Project Based Learning (PBL) can enhance students engagement and learning at the course level. The performance of the target group i.e., PBL group is compared with the control group with a traditional, teacher-centered learning system. Statistical impact analysis is performed to evaluate the applicability of Project based learning. Quantitative results show a significant improvement in the grades of target group.

Keywords—Data Structures and Algorithms (DSA), Student Learning, Project Based Learning (PBL), Control Group (CG), Target Group (TG), .

## Introduction

Data structures and algorithms are very important for computer science and information technology students if they want to go for higher education, appear for competitive exams like GATE (Graduate Aptitude Test in Engineering), obtain high paying positions in the top IT industries, etc.[4][5] Data processing, automated reasoning, computations and other related tasks are simple for students who are proficient in data structures and algorithms. Good programs and codes are the result of deep understanding of data structures and algorithms. It improves data accuracy and lowers coding costs which are the ultimate goals of any organization.

The choice of data structure and algorithm can significantly impact execution time of a program ranging from a few seconds to several days. Students with solid understanding of data structures and algorithms can make wise decisions. Hence, Data structures and algorithms is a core course of computer science and Information Technology[4][5].

In this course, we teach students which data structures and algorithms work best for a particular task. Sometimes, students might not completely understand the reason behind selection of certain data structures and algorithm or they might not get an opportunity to analyze the impact of these choices.

So, we decided to plan and implement a PBL (Project Based Learning) methodology for this course that will help students to foster 21st-century skills like critical thinking, technology use, community ties, content relevance and analysis when developing software[1][8][11].

# **Course Overview**

In the digital era, data structures offers the correct way to organize data [4]. Computer networks, operating systems, artificial intelligence, blockchain, machine learning, compiler design, graphics, and other fields all make substantial use of data structures. Real-world situations serve as the inspiration for the majority of the data structures. In our everyday lives we use data structures without even realizing it. We use various arrangement strategies from to-do list, contact list, book piles, a deck of cards to organizational hierarchy. These are referred to as data structures in the computing realm.

Algorithms are building blocks of programming that enables smart phones and computers to operate smoothly and



make wise decisions. Let's look at a basic GPS (Global Positioning System) example. It searches for available routes using an algorithm. To check the current traffic it also employs several algorithms. And based on the information collected it suggests the best available route. The GPS code has all of these algorithms built in. So, if the GPS code has any error, it will not work properly and will give the wrong direction. Algorithms are used by computers to calculate things much faster than humans. Algorithms are well defined procedures that are used by computers to solve problem[4][5].

IT industries like Google, Microsoft, Amazon, etc. often ask questions based on data structures and algorithms to assess students problem solving abilities[10].

## Methodology

## **Project Based Learning**

It consists of 7 phases:

- A. An Entry Event: It played a very crucial role. It answered the basic questions: why, how, what.
  - ✓ Why course project is necessary?
  - ✓ How the course project will be carried out?
  - ✓ What outcomes are expected?
- B. Group Formation: Groups of 3-4 students are formed based on input from the students and their interest. Mentor tried to balance the groups and helped students who failed to form the groups on their own.
- C. Problem Identification: Real-world, curriculum-related problem is identified by the students.
- D. Planning: A plan/schedule is prepared by the students to solve the problem. For the graphical depiction of project schedule Gantt chart is used.
- E. Researching: The information sources, software and hardware requirements are identified to solve the given problem. It involves understanding the suitable data structure and algorithm to meet the basic need.
- F. Implementing and improving: Students implemented and tested their software using any programming language that they are comfortable with. Teacher gave valuable insights about what went well and what they need to change. And imposed grade penalties for incorrect and inefficient implementations
- G. Presenting/Prototype/ Application Development: Final Project is shared with class/larger group. Experimental analysis is performed by students to observe performance differences using different data structures. The cost of the final product is measured. Number of modules and number of lines of code are used as metrics.

#### **Assessment of Project Based Learning**

Assessment is an essential component of teaching learning. An assessment framework, called detailed rubrics are prepared that helped the mentors/evaluators and students to understand the evaluation process. In this framework, different levels of student performance and criteria were set to evaluate the performance of students. This framework assured the consistent and fair grading. The rubrics used to evaluate project based learning are compiled in Table1.

	Unsatisfactory (0-5)	Satisfactory (6-10)	Good (11-15)	Excellent (16-20)
Identification of Problem	Understand the purpose but not able to explain need of the project.	Purpose and need of the project is explained poorly.	Average explanation of the need and purpose of the project.	Detailed and extensive explanation of the need and purpose of the project.
Planning of Project Work	Project planning is explained poorly. Project Calendar is not	Project planning is average Project Calendar is	Project planning is appropriate Project Calendar is not	Project planning is appropriate Project Calendar is also



	prepared	not prepared	prepared	prepared.
Coding Standards	Poor use of data structures (many global variables, ambiguous naming). Poor implementation of algorithm	Good use of data structures (few global variables, unambiguous naming). Able to implement algorithm	Effective use of data structures (no global variables and unambiguous naming) Partial working for given data structure as per the algorithm	Effective use of data structures (no global variables and unambiguous naming). Worked given linear/ non-linear data structure as per the algorithm
Solution	Does not implement complete solution User prompts are misleading.	Compile time errors. User prompts are not clear.	Run time errors. User prompts are difficult to grasp. Not getting desired output.	Executes flawlessly. Excellent User prompts. Getting desired output.
Presentation	Contents of presentation are not appropriate. Poor presentation	Contents of presentation are appropriate Poor presentation	Contents of presentation are appropriate Average presentation	Contents of presentation are appropriate. Good presentation

Table1. An assessment framework - Rubrics

# **Impact Analysis**

This course is offered as a core course in 3<sup>rd</sup> semester of B. Tech. CSIT program. Control group (CG) consists of 77 students whereas target group (TG) consists of 80 students.

# A. Result Analysis

There were total 77 students in the control group. Out of these 73 appeared for the end- semester exam and 4 were detained/disqualified due to poor performance during the in-semester evaluation. There are total 80 students in the target group. Out of these 78 appeared for the end- semester exam and 2 were detained/disqualified due to poor performance during the in-semester evaluation.

Data in Table 2 clearly shows that there is an improvement in the grades of the target group. There is a remarkable change in the % of students getting detained and failed. The percentage of students in AB and AA grade is increased whereas the percentage of students getting detained and failed is decreased.

Grades	Control Group (CG)		Target Group (TG)	
	No. of students	% of students	No. of students	% of students
XX (Detained)	4	5.19	2	2.5
FF (Failed)	12	16.44	2	2.56
CD (45-49)			3	3.85
CC (50-59)	3	4.11	7	8.97
BC (60-69)	11	15.07	14	17.95
BB (70-79)	16	21.92	13	16.67
AB (80-89)	20	27.4	22	28.21

#### Table 2: Result Analysis
JMRT	Internat IS	iternational Journal of Multidisciplinary Research and Technol ISSN 2582-7359, Peer Reviewed Journal, Impact Factor 6. www.ijmrtjournal.(			
AA (>90)	11	15.07	17	21.79	





Figure 1. Result Analysis

## **B.** Analysis of Course Exit Survey

A course exit survey is used to gather responses from students regarding the course learning outcomes (CLOs)[9]. After completion of the course, students' responses are collected through multiple-choice questions. Responses were collected from all the students registered for the course both from control group and target group. Students are given five options to respond to the questions:

- a. Often
- b. Always
- c. Sometimes
- d. Rarely
- e. Never

Following Questionnaire is build using the course learning outcomes defined for the course.

- 1. I can explain fundamental terms used in data structures and algorithms.
- 2. I am capable of writing algorithms for various operations performed on data structures.
- 3. I can demonstrate how a stack, queue, linked list, tree, and graph operate.
- 4. I am capable of comparing linear and non-linear data structures, static and dynamic representations of data structures.
- 5. I can select suitable data structures when creating a solution to the given problem.

After the completion of the survey, students' text responses were converted to numerical form for the purpose of analysis. The correlation between response and points is given below:



## Table3: Conversion of text responses into points

Response	Points
Often	10
Always	7.5
Sometimes	5
Rarely	2.5
Never	0

Based on the above relation, student's responses are converted to points. The average and standard deviation of the responses to the course learning outcomes is given below:

	Control C	Group (CG)	Target Gr	roup (CG)
CO.				
No.	Average	Standard Deviation	Average	Standard Deviation
CO1	6.56	1.03	7.53	1.15
CO2	6.42	1.01	7.29	1.12
CO3	6.56	1.03	7.71	1.18
CO4	6.49	1.02	7.4	1.13
CO5	6.18	0.99	7.36	1.13
	6.44	1.02	7.46	1.14

#### Table 4: Student responses to Course Exit Survey

Data in the Table 4 clearly shows there is improvement in the average response from 6.44 for control group to 7.46 for target group.



Figure 2. Course Exit Survey - Average students responses Vs Course Outcomes

Figure 2 shows the average responses on the scale of 10 plotted against questions for the control group (CG) and target group (TG).



## C. Analysis of Students Survey

After completion of the course project, students survey is conducted through multiple- choice questions for the target group (TG). Following Questionnaire is prepared to evaluate the effectiveness of project based learning:

- 1. Project based learning helped me to gain a deeper understanding of the data structures and algorithms concepts.
- 2. I am capable of applying the concepts learned in the class to the real-world scenario.
- 3. I am able to choose the right data structures and algorithm to address issues in real time.
- 4. Project based learning enhanced my problem-solving skills, logic building skills, presentation skills and boosted my confidence level.
- 5. I enjoyed Project-based learning.

Students are given five options to respond to the questions:

- i. Strongly Agree
- ii. Agree
- iii. Neutral
- iv. Disagree
- v. Strongly Disagree

Figure 3 shows the students response against questions for the control group (CG) and target group (TG).



Figure 3. Student Feedback for Course Project

#### **Challenges and Opportunities**

Project-based learning (PBL) presents challenges related to managing group dynamics, assessing individual contributions within teams, and ensuring equitable access to resources, but also offers opportunities for deep learning, development of critical thinking skills, and real-world application of knowledge through engaging, student-centered projects.

## **Challenges of Project-Based Learning:**

#### A. Managing conflict within groups:

Disagreements and conflicts within teams can hinder project progress and affect student engagement.



## B. Differentiated learning needs:

Adapting projects to cater to diverse student abilities and learning styles can be challenging

#### C. Uneven participation and workload distribution:

In group projects, some students may not contribute equally, leading to concerns about fair assessment and potential free-riding behavior.

#### D. Access to resources and technology:

Ensuring every student has equal access to required resources, materials and technology for project completion can be a barrier.

#### E. Assessing individual learning in group work:

Accurately evaluating each student's contribution within a collaborative project can be difficult.

### **Opportunities of Project-Based Learning:**

### A. 21st-century skills development:

PBL encourages necessary skills like creativity, problem-solving, adaptability, and information literacy, which are crucial in today's world.

### B. Deeper understanding and knowledge application:

By actively engaging in projects, students can gain a more profound understanding of concepts and apply their learning to real-world scenarios.

#### C. Real-world connections:

By addressing authentic problems or issues, projects can connect learning to real-world contexts, making it more meaningful.

#### D. Increased student motivation and engagement:

When given ownership of their projects and relevant topics, there is a greater chance that students will be inspired and involved in the learning process.

#### E. Development of critical thinking competencies:

PBL encourages students to evaluate, synthesize, and analyze information to solve problems creatively.

#### Conclusion

PBL (Project-based learning) promotes active learning, fosters 21st-century skills, and connects classroom content to real-world contexts, enhancing career exploration, technology use, student engagement, community ties, and content relevance[1][3]. The findings of this case study indicate that academic performance and student involvement improved significantly. Project-based learning helped to keep the students motivated and engaged with the course contents, thus achieving a deeper understanding of its theoretical concepts. It encouraged student engagement and enhanced application-based learning. It helped to take away the pressure of retaining information and allowed students to focus on understanding the concepts better [2].

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# CHALLENGES AND OPPORTUNITIES FACED BY STUDENTS IN ADOPTING THE FYUGP SYSTEM: A CASE STUDY OF THE UNIVERSITY OF KERALA

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## Abstract

The Four-Year Undergraduate Programme (FYUGP), introduced under the National Education Policy (NEP) 2020, aims to transform higher education by fostering interdisciplinary learning, enhancing flexibility, and aligning academic pursuits with global standards. This study examines the challenges and opportunities faced by students in adopting the FYUGP system, focusing on the University of Kerala as a case study. The study highlights several important obstacles, such as low awareness, trouble adjusting to interdisciplinary courses, a heavier workload, and difficulty choosing courses. Additionally, it draws attention to opportunities like improved career readiness, flexible learning, and skill development. Using a thorough examination, the research investigates students' awareness and readiness for the FYUGP system under the University of Kerala, exploring how the program influences their academic and career goals. Through the collection of student perspectives from a range of academic fields, this research seeks to offer practical suggestions to enhance the system's deployment, guaranteeing a more seamless transition for learners and cultivating a positive learning atmosphere. The results add to the expanding discussion on higher education reform in India by providing insightful viewpoints on how to best utilize the FYUGP system for the benefit of students.

**Keywords**: National Education Policy 2020(NEP), Four Year Undergraduate Program(FYUGP), Interdisciplinary learning, Higher Education Reform, Student Adaptation

## Introduction

A historic reform, the National Education Policy (NEP) 2020 seeks to modernize India's educational system by making it more adaptable, interdisciplinary, and research-focused. One of its main projects is the Four-Year Undergraduate Programme (FYUGP), which substitutes a more thorough and internationally-oriented framework for the conventional three-year degree. A certificate after one year, a diploma after two years, a bachelor's degree after three years, and a bachelor's degree with honors/research after four years are the various exit options available to students under the FYUGP. By encouraging interdisciplinary learning, skill development, and research opportunities, this system makes sure that students are more equipped for postsecondary education and the workforce.

FYUGP offers both opportunities and challenges within the framework of Kerala's higher education system. The program's emphasis on research, innovation, and flexibility can be advantageous for Kerala, a state renowned for its robust academic institutions and high literacy rate. Students' employment opportunities and international mobility are improved by the extra year of study, which brings Kerala's degrees into compliance with international standards. Nonetheless, it is imperative to carefully address issues like faculty training, curriculum restructuring, budgetary limitations, and adjusting to the new valuation system. FYUGP has the potential to improve Kerala's academic environment and give students a more engaging and globally competitive education if it is implemented successfully.

The University of Kerala's implementation of the Four-Year Undergraduate Programme (FYUGP) in accordance with the National Education Policy (NEP) 2020 offers students both substantial opportunities and challenges. These challenges include limited awareness of the system's structure, issues in managing a heavier academic workload, confusion regarding course selection, and struggles with adapting to interdisciplinary subjects. Simultaneously, the system provides opportunities for skill development, career advancement, and wider learning experiences. In order to find practical ways to enhance implementation and support systems for a more seamless transition, this study intends to examine the main obstacles students face when implementing the FYUGP system as well as the opportunities it offers.



#### **Literature Review**

The Four-Year Undergraduate Programme (FYUGP) introduced under the National Education Policy (NEP) 2020 aims to enhance flexibility, interdisciplinary learning, and research-oriented education in higher institutions across India. In Kerala, implementing the FYUGP system has brought both opportunities and challenges that have shaped the experiences of students and faculty.

One of the primary benefits of the FYUGP system is its flexible credit-based structure, which allows students to explore interdisciplinary learning and multiple exit options (University of Kerala, 2024). The inclusion of researchoriented courses in the third and fourth years helps students develop critical thinking and analytical skills, preparing them for higher education and competitive job markets (Kerala State Higher Education Council, 2023). Furthermore, the emphasis on career-specific electives and industry collaborations makes graduates more adaptable to evolving employment demands (Sinha, 2024).

However, the transition to the FYUGP system has also faced several challenges. One major concern is the lack of awareness among students regarding the interdisciplinary structure and credit system, leading to confusion and difficulty in selecting elective courses (KSHEC, 2023). Additionally, faculty preparedness for interdisciplinary teaching remains a challenge, as many educators require additional training to adapt to the new curriculum (Sinha, 2024). Universities' infrastructural and technological limitations, especially in integrating digital platforms for credit tracking and assessments, have also slowed down smooth implementation (Kerala State Higher Education Council, 2023).

Despite these challenges, the University of Kerala has taken initiatives to address these issues by investing in faculty development programs and enhancing student support systems (University of Kerala, 2024). The long-term success of the FYUGP system will depend on continuous policy refinement, institutional support, and student awareness programs. If effectively implemented, the FYUGP can revolutionize Kerala's higher education landscape, making it more globally competitive and research-driven.

The recognition of academic qualifications across borders is a critical aspect of international law's influence on higher education. The work by McGrath (2021) explores the legal frameworks that facilitate and challenge the cross-border recognition of higher education credentials. This study highlights the role of international agreements such as the Lisbon Recognition Convention in ensuring fair and consistent recognition of qualifications.

A study by the Far Eastern University (2022) examines how the implementation of Republic Act 10533 affected the Philippines' education system's performance in international and local assessments. This case highlights the intersection between international law and national education policy implementation.

#### **Research Methodology**

This study uses a mixed-methods approach, combining quantitative and qualitative research techniques to thoroughly investigate the opportunities and difficulties students at the University of Kerala faced when implementing the FYUGP system. Primary data from structured surveys and secondary data from academic literature, policy documents, and institutional reports form the basis of the study.

#### **Research Objectives**

- To identify the key challenges faced by students in understanding and adapting to the FYUGP system at the University of Kerala.
- To explore the opportunities offered by the FYUGP system that enhance academic, professional, and personal development for students.
- To examine the level of awareness and preparedness among students regarding the interdisciplinary and flexible curriculum structure of the FYUGP system.
- To analyze the impact of the FYUGP system on students' academic workload, course selection, and career aspirations.



• To provide recommendations to improve student adaptation and support mechanisms for a smoother transition to the FYUGP system

### **Research Design and Sample Selection**

The study used a descriptive research design with the goal of documenting students' experiences and opinions of the FYUGP system in real time. 100 first-year FYUGP students from a variety of colleges affiliated with the University of Kerala, including government, aided, and self financing institutions, make up the sample. To guarantee proportionate representation of students from various institution types and improve the findings' generalization, a stratified random sampling technique was employed.

#### **Data Collection Methods**

### **Primary Data Collection**

To collect information on important topics like students' awareness and readiness, academic workload, faculty support, and general experiences with the FYUGP system, a structured questionnaire was created. The survey had both open-ended and closed-ended questions to gather qualitative information and measure students' opinions using Likert scales. The survey was administered both offline and online to maximize participation and guarantee data reliability, enabling a wide variety of students to successfully share their experiences.

### **Secondary Data Collection:**

In order to comprehend the wider context of FYUGP implementation, a review of pertinent scholarly research, government policy documents, and University of Kerala reports was carried out. These resources gave a thorough grasp of the systemic changes and their effects on higher education by offering insightful information on faculty readiness, institutional strategies, and national policy directives under the National Education Policy (NEP) 2020.

### **Research Design**

Several data analysis tools were used in this study to guarantee thorough and precise interpretation of the information gathered. The survey results were compiled using descriptive statistical techniques, such as frequency distributions and percentages, to shed light on the preferences and difficulties faced by the students. Significant correlations between variables, such as students' comprehension of the interdisciplinary and elective paper selection process and their interest in pursuing specialization or honors programs, were also found using inferential statistical techniques, such as the Chi-square test.

#### Data Analysis

This section presents a detailed analysis of the data collected from first-year FYUGP students across government, aided, and private colleges under the University of Kerala. The study explores four key aspects: students' awareness and preparedness regarding the FYUGP system, the challenges they face in adapting to the new curriculum, the opportunities provided by the system, and their general feedback on its implementation.

By analyzing students' awareness and preparedness, the study examines their understanding of the FYUGP structure, curriculum, and evaluation methods, as well as their readiness to navigate this system. The challenges faced by students highlight the difficulties encountered in academic, administrative, and infrastructural aspects. Meanwhile, the opportunities section explores how FYUGP enhances students' academic and career prospects. Finally, the general feedback provides a comprehensive overview of students' perceptions, satisfaction levels, and suggestions for improvement.

The findings derived from this analysis will help assess the effectiveness of the FYUGP system and provide insights for policymakers and educational institutions to enhance its implementation.

According to the data analysis, the majority of students cited the orientation session as their primary source of information about the FYUGP system. This implies that although the orientation session is an important way to spread knowledge, it is also one of the main ways that students are exposed to the FYUGP system.



Figure 1 Shows the Various challenges faced by the students under FYUGP system



## Primary Data

The majority of students were experiencing all of the aforementioned issues with the FYUGP system, as the figure makes evident. The students are stressed because they lack sufficient study materials and resources; they are also perplexed about enrolling in interdisciplinary courses and are unsure of how to handle their assignments and tests.

Figure 2 Represents the students opinion towards interdisciplinary courses provide better insights into societal and global challenges



## Primary Data

The data shows that most students have a neutral or positive perception of interdisciplinary courses, with a majority expressing indifference or uncertainty, while a smaller group acknowledges their value. Only a few students disagreed with the usefulness of such courses. The neutral responses suggest areas that may require further attention or clarification.

Figure 3 Shows the correlation between understanding the interdisciplinary and elective paper selection process and interest in enrolling in the fourth-year specialization or honors program.





Primary Data

The analysis explored the potential correlation between respondents' understanding of the interdisciplinary and elective paper selection process and their interest in enrolling in the fourth-year specialization or honors program. The Chi-square statistic was found to be 20.39, indicating a possible relationship between the two variables. The p-value of 0.02, which is below the standard significance threshold of 0.05, suggests that this correlation is statistically significant. The analysis was conducted with 9 degrees of freedom. The representation of the Chi-square statistic, p-value, and degrees of freedom further emphasized the strength and significance of the correlation. These findings suggest that there is a statistically significant relationship between students' comprehension of the paper selection process and their interest in enrolling in the specialization or honors program. Consequently, enhancing students' understanding of the selection process may foster greater interest in pursuing the specialization or honors program.

Figure 4 Impact of Pressure to Take Multidisciplinary Subjects on Workload Management and Academic Planning



Primary Data

The data indicates that students who feel pressured to enroll in multidisciplinary courses often struggle with workload management, while those who do not experience such pressure tend to manage their studies more effectively. This highlights the need for better academic planning and clearer communication from the university. Addressing these concerns can help students navigate the FYUGP system more efficiently.

Figure 5 Students Perception of the Credit System's Role in Promoting Holistic Learning and Skill Development



Primary Data

The data suggests that most students believe the credit system moderately promotes holistic learning, with many acknowledging its role in developing a broad range of skills. While some students find the system helpful, others feel it requires improvements to better align with their career goals. These findings highlight the need for enhancements to maximize the system's effectiveness.



#### Figure 6 Students choice towards multidiciplinary courses



#### Primary Data

The data suggests that students prefer practical, skill-based, and specialized learning experiences over broad multidisciplinary courses. The preference for vocational training and core discipline focus highlights the importance of aligning educational offerings with career aspirations and industry needs. Institutions may need to reconsider the balance between multidisciplinary exposure and targeted, career-oriented learning pathways.

Figure 7 Students Perception towards the overall balance of challenges and opportunities in the FYUGP system



#### Primary Data

With 48% of respondents thinking they face more obstacles than opportunities, the pie chart shows that opinions of the FYUGP system are generally negative. Although there are challenges, there may also be advantages, according to a smaller group of 45% who believe that opportunities and challenges are equally distributed. Merely 7% of respondents believe that opportunities outweigh challenges. This shows that in order to increase system efficacy and user satisfaction, the perceived difficulties must be addressed. In order to change attitudes and promote increased use, it may be helpful to make an effort to explain the system's opportunities and to improve its functionality over time.

#### **Results:**

The study reveals that students face several challenges in the implementation of the FYUGP system, including a lack of study materials, confusion in enrolling for interdisciplinary courses, and difficulties in managing assignments and exams. While many students have a neutral or positive perception of interdisciplinary courses, others experience pressure in enrolling for multidisciplinary subjects, leading to workload management and academic planning challenges. The study finds a significant correlation between students' understanding of the interdisciplinary and elective paper selection process and their interest in pursuing specialization or honors programs. The credit system is perceived to promote holistic learning to a moderate extent, with students acknowledging its potential for skill development but highlighting areas for improvement. Furthermore, survey results suggest that students predominantly prefer skill-based or vocational training programs over multidisciplinary courses. Many students also show interest in advanced courses within their core discipline and research-focused coursework, while a smaller group consider industry-focused certifications and other alternatives as viable options. Addressing these challenges and preferences is crucial for the effective implementation of the FYUGP system.



#### **Discussions:**

Awareness and Readiness: Students' dependency on orientation sessions highlights the need for ongoing awareness programs and guidance on FYUGP's structure and benefits.

Challenges: The complexity of the interdisciplinary approach and elective course selection suggests the need for better academic advising and structured counseling.

Workload Management: The added pressure from multidisciplinary courses indicates a requirement for more strategic academic planning and workload distribution strategies.

Credit System Perception: While students see the potential in the credit system, enhancements are necessary to align it more effectively with their career aspirations.

Institutional Support: Effective faculty training programs and infrastructure improvements are crucial to ensuring smooth FYUGP implementation.

Alternative Learning Preferences: The survey findings suggest that students are inclined towards more practical and specialized learning, emphasizing the need to reconsider the current multidisciplinary approach in favor of skill-based training and research opportunities.

#### Conclusion:

The adoption of the FYUGP system at the University of Kerala presents both significant opportunities and challenges. While students appreciate the program's flexibility and potential career prospects, they face notable difficulties in course selection, workload management, and access to study resources. The survey findings further indicate a strong preference for skill-based and vocational training, suggesting a need to tailor the curriculum to align with students' career aspirations. Institutions must focus on enhancing guidance, faculty training, and infrastructure to facilitate a smoother transition and improve the overall learning experience. The FYUGP system holds great potential to elevate Kerala's higher education landscape and produce globally competitive graduates if the existing challenges are addressed through strategic interventions and continuous support systems.

#### **Limitations and Future Studies:**

This study is limited by its focus on first-year students within a specific university, which may not fully represent the broader experiences across different regions and institutions. Additionally, the reliance on self-reported data may introduce biases in the findings. Future research should expand to include longitudinal studies tracking students' progress over multiple years and comparative studies with other universities implementing FYUGP. Further exploration into the impact of faculty training and infrastructure development on student adaptation would also provide valuable insights. Future studies could also delve deeper into understanding the reasons behind students' preferences for alternative learning methods and explore ways to integrate practical learning options within the current academic framework.

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## THEMATIC AREA AND SUB THEME QUALITY ASSURANCE MECHANISMS IN HIGHER EDUCATION: EXAMINING FRAMEWORKS, POLICIES, AND PRACTICES IN ENHANCE ACADEMIC STANDARDS

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#### Abstract

This research examines the various frameworks, policies, and practices within higher education designed to enhance academic standards through effective quality assurance (QA) mechanisms. A qualitative approach, utilizing thematic analysis, was employed to explore key themes within the existing literature on quality assurance in higher education institutions (HEIs). The findings suggest that while QA frameworks and policies are crucial for maintaining academic standards, their implementation often lacks consistency and is influenced by various institutional factors, such as culture and regulatory context. This study contributes valuable insights into how academic standards can be strengthened through more effective QA mechanisms, offering practical recommendations for their improved application in higher education institutions.

Keywords: Quality Assurance, Academic Standards, Thematic Analysis, Higher Education, Policy Frameworks

### 1. Introduction

Ensuring the quality of higher education is a topic of significant concern for policymakers, university administrators, and accreditation bodies across the globe. The establishment and maintenance of robust academic standards are critical not only for enhancing educational outcomes but also for fostering societal development and reinforcing institutional credibility. Quality assurance (QA) mechanisms play a pivotal role in regulating and advancing academic standards by ensuring that educational processes within higher education institutions (HEIs) meet clearly defined and rigorous criteria (Brennan & Shah, 2020). However, despite the growing importance of these mechanisms, the role of QA frameworks, policies, and practices in achieving academic excellence is multifaceted and often varies greatly across different institutional contexts (Tight, 2020).

The purpose of this study is to investigate the implementation and impact of QA frameworks, policies, and practices in higher education institutions and their contribution to improving academic standards. Given the increasing global demand for transparency, accountability, and enhanced educational outcomes, this research is especially timely and relevant in the context of modern higher education (Altbach, 2020). By delving into the nuances of these QA mechanisms, the study seeks to identify both the successes and the challenges that HEIs face in striving for academic excellence.

## 1.1 Research Problem

The central question guiding this research is: How do QA frameworks, policies, and practices contribute to enhancing academic standards in higher education?

## **1.2 Objectives of the Study**

The objectives of this research are:

- To identify the key frameworks and policies employed in quality assurance within higher education institutions.
- To evaluate the effectiveness of these frameworks and policies in improving academic standards.
- To explore the challenges and obstacles faced by institutions in implementing quality assurance mechanisms.



## **1.3 Importance and Relevance**

This research directly aligns with assessing the effectiveness of frameworks and policies within higher education systems. Understanding how QA mechanisms are applied, and the challenges they encounter in improving academic standards, is essential for refining global higher education practices and making them more impactful (Altbach, 2020).

## 2. Literature Review

In the past few decades, significant attention has been devoted to developing and refining QA frameworks in higher education, particularly through national and regional accrediting bodies. Prominent frameworks such as the European Standards and Guidelines (ESG) and the Australian Qualifications Framework (AQF) are widely recognized and have set a global standard for maintaining academic rigor and ensuring quality education (Harvey & Green, 2018; Rauhvargers, 2020). These frameworks serve to uphold academic standards by setting benchmarks for HEIs to meet, ensuring that educational processes are effective, transparent, and of high quality.

However, despite the presence of these frameworks, numerous challenges have emerged in their implementation. Institutions often struggle with translating these policies into effective practice due to issues such as insufficient resources, limited faculty engagement, and inconsistent enforcement across departments (Huisman, 2021). Furthermore, factors such as institutional autonomy, governance models, and local educational contexts can significantly affect the success or failure of QA frameworks (Rauhvargers, 2020). As noted by Trowler (2019), institutional culture plays a key role in shaping how QA policies are adopted, implemented, and sustained over time.

The success of QA frameworks depends largely on institutional commitment, robust administrative support, and the availability of resources to continually evaluate and improve quality processes (Harvey & Green, 2018; Brennan & Shah, 2020). The literature also highlights the importance of internal stakeholder engagement, particularly faculty and administrators, in driving quality initiatives that lead to lasting improvements.

#### 2.1 Research Gap

A notable gap in the existing literature is the limited focus on how local institutional culture and context shape the implementation of QA frameworks. While much of the existing research emphasizes national policies and accreditation bodies, fewer studies explore the practical, day-to-day challenges that institutions face in applying QA measures at the ground level (Altbach, 2020). This study aims to fill this gap by examining the dynamic interaction between QA frameworks and the institutional context in which they are implemented.

#### 2.2 Current Research Contribution

This study contributes to the literature by providing an in-depth analysis of how QA frameworks, policies, and practices are influenced by and adapted to local institutional contexts. By doing so, it offers a nuanced perspective on the challenges faced by HEIs in striving to improve academic standards through QA mechanisms.

## 3. Research Methodology

## 3.1 Research Design

This study employs a qualitative research design, utilizing secondary data gathered through comprehensive literature reviews and case studies. A qualitative approach is particularly suited for this research, as it allows for an in-depth exploration of the complexities surrounding the role of QA frameworks, policies, and practices in higher education (Flick, 2020). The thematic analysis of existing literature provides insights into the patterns, trends, and emerging themes related to the effectiveness of QA mechanisms in diverse institutional contexts.

## 3.2 Data Collection

The data for this study were drawn from a wide range of sources, including peer-reviewed journal articles, policy documents, reports, and case studies published between 2018 and 2023. These sources were selected based on their relevance to the topic of QA in higher education, with particular emphasis on frameworks, policies, and the practical implications for academic standards across various types of institutions (Brennan & Shah, 2020). Case



studies were carefully chosen for their ability to provide concrete examples of how QA mechanisms are applied in real-world settings, including accreditation processes, self-assessments, and external evaluations.

The criteria for selecting secondary sources, particularly case studies, were guided by the following considerations:

- Geographical diversity: To capture a global perspective on QA mechanisms.
- Institutional variety: To include examples from public, private, and semi-autonomous higher education institutions.
- **Relevance to the timeframe**: Case studies published between 2018 and 2023 were prioritized to reflect current practices and challenges.
- Focus on policy and implementation: Emphasis was placed on studies addressing the application and outcomes of QA frameworks, such as the ESG and AQF.

### 3.3 Data Analysis

The data were analysed using two complementary methods: thematic analysis and content analysis.

### Thematic Analysis

Thematic analysis was employed to identify and explore recurring themes within the literature and case studies. This approach allowed for an examination of the key components of QA frameworks and policies, their effects on academic standards, and the factors that contribute to their success or limitations (Braun & Clarke, 2019). Major themes that emerged from the analysis included government regulations, institutional autonomy, faculty engagement, and resource allocation.

Theme	Finding	Implication
Effectiveness of QA Frameworks	National and international QA frameworks set essential benchmarks, but implementation varies.	Inconsistent enforcement reduces overall effectiveness.
Institutional Adaptation	Institutions often tailor QA frameworks to fit their cultural context, with mixed success.	Customization is needed, but requires sufficient support.
Challenges in Implementation	Common barriers include inadequate resources, resistance to change, and lack of staff training.	Addressing these barriers is crucial for QA success.

Table 1 Key Themes and Findings from Thematic Analysis

#### **Content Analysis**

Content analysis was used to systematically examine case studies where QA frameworks had been implemented in HEIs. The analysis focused on the specific policies and frameworks used, the challenges faced during implementation, and the measurable academic outcomes, such as improvements in student learning, institutional performance, and overall academic reputation (Krippendorff, 2018).

By combining these two analytical methods, this study offers a comprehensive understanding of the effectiveness and challenges of QA mechanisms in higher education.

#### 4. Results and Discussion

The thematic analysis identified three key themes regarding the effectiveness of QA mechanisms in higher education:



#### Effectiveness of Policy and Frameworks

National and international QA frameworks, such as the ESG and AQF, are pivotal in maintaining academic standards. However, inconsistent implementation and enforcement undermine their effectiveness. Additionally, frameworks that lack adaptability to local contexts were seen as less practical (Brennan & Shah, 2020).

#### **Institutional Adaptation**

Institutions often tailor QA frameworks to suit their specific cultural and contextual needs. While this approach has led to positive outcomes in some cases, challenges such as limited faculty participation, inadequate administrative support, and resource constraints have impeded success in others (Huisman, 2021).

#### **Challenges in Implementation**

Barriers to effective QA implementation, including insufficient resources, resistance to change, and inadequate staff training, were frequently cited. These challenges have restricted institutions from fully realizing the benefits of QA frameworks in enhancing academic standards (Trowler, 2019).

Overall, the findings emphasize that while QA frameworks are essential for maintaining academic quality, their success largely depends on how they are adapted to the local context and how effectively they are implemented across different institutional environments.

#### 5. Conclusion

This study highlights the critical role that Quality Assurance (QA) frameworks play in enhancing academic standards across higher education institutions. QA frameworks such as the European Standards and Guidelines (ESG) and the Australian Qualifications Framework (AQF) provide essential structures for maintaining high academic standards. However, their effectiveness is closely tied to factors such as the local institutional context, available resources, and overall governance. While these frameworks are necessary, the challenges of inconsistent implementation, insufficient faculty involvement, and a lack of administrative support hinder their potential to drive meaningful improvements.

#### 6. Implications and Recommendations

To enhance the effectiveness of quality assurance (QA) mechanisms in higher education institutions (HEIs), the following recommendations are proposed:

#### **Resource Allocation**

HEIs should allocate adequate funding for QA activities, including reviews, accreditations, and staff training. Proper resources ensure infrastructure and personnel are equipped to uphold QA standards (Trowler, 2019).

#### **Stakeholder Engagement**

Active participation from faculty, administrators, students, and external experts fosters collective responsibility for QA. Forming diverse QA committees can enhance collaboration and strengthen outcomes (Harvey & Green, 2018).

#### **Professional Development**

Regular training programs should equip staff with the skills and knowledge to effectively participate in QA processes, ensuring alignment with institutional goals (Harvey & Green, 2018).

#### **Context-Specific Frameworks**

QA frameworks should be tailored to local needs while aligning with global benchmarks. Adapting these frameworks ensures relevance and practical applicability (Rauhvargers, 2020).

#### **Continuous Improvement**

QA should be an ongoing process integrated into institutional strategies. Regular reviews and feedback mechanisms can drive sustained quality enhancement (Brennan & Shah, 2020).



## **Technology Integration**

Leveraging digital tools for monitoring, data collection, and reporting can streamline QA processes and maintain standards, especially in digital learning contexts (Trowler, 2019).

#### 7. Limitations of the Study

This study relies primarily on secondary data, drawing from literature and case studies published between 2018 and 2023. While this approach provides valuable insights, it is limited by the lack of primary data from institutional stakeholders, which would offer a more direct perspective on the practical challenges of implementing QA frameworks. Furthermore, the case studies selected were largely from specific regions, which may not fully capture the diversity of experiences and practices in other global contexts.

### 8. Suggestions for Future Research

Future research could explore several areas that would further enrich our understanding of QA in higher education:

#### Integration of Technology in QA

As online and hybrid learning environments continue to grow, there is a need to investigate how digital tools, artificial intelligence, and automated systems can enhance the efficiency and effectiveness of QA processes. Research could explore how these technologies can provide real-time feedback, streamline accreditation procedures, and help institutions monitor academic standards more efficiently.

### **Long-Term Impact Studies**

Longitudinal studies examining the long-term effects of QA frameworks would be invaluable. By tracking the performance of institutions over extended periods, these studies could offer insights into the lasting impact of QA processes on student outcomes, institutional performance, and academic reputation.

#### **Exploring Local Contexts in QA**

Further research is needed to understand how local cultural, structural, and contextual factors shape the adoption and success of QA frameworks. By investigating how institutions adapt these frameworks to their specific needs, researchers could uncover strategies for more effective QA practices that align with both national and institutional goals (Tight, 2020).

These areas of research have the potential to refine QA frameworks, providing a more nuanced understanding of how they can be applied to improve academic standards globally.

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# ENHANCING DIGITAL LEARNING: INSIGHTS ON TECHNOLOGY INTEGRATION, STUDENT ENGAGEMENT, AND INSTITUTIONAL SUPPORT

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Abstract: This research examines the integration of technological tools among both students and faculty, the determinants influencing student engagement within digital learning contexts, the obstacles met, and the facets of digital preparedness. A comprehensive dataset encircling two hundred participants, forming 150 students and 50 faculty members, was scrutinized to assess the rates of technology adoption, with a particular emphasis on Learning Management Systems (LMS), gamification tools, and artificial intelligence-driven platforms. The results indicate an elevated level of LMS utilization among both demographics, revealing no substantial discrepancies in the adoption of alternative technologies. A multiple regression analysis elucidated critical predictors of student engagement, underscoring the significance of perceived user-friendliness, the training provided, and user attitudes over institutional support. Furthermore, obstacles such as a deficiency in digital competencies were recognized, with a noteworthy percentage of respondents acknowledging this issue. Factor analysis uncovered two dimensions of digital preparedness: Institutional and Motivational Support, alongside Self-Efficacy and Ease of Use. Ultimately, a structural model demonstrated that institutional support is a significant predictor of student engagement, accentuating the essential role of organizational interventions in improving digital learning experiences. These findings highlight the necessity for focused capacity-building initiatives and support frameworks to promote effective technology integration within educational environments.

Keywords: Technology Integration, Student Engagement, Institutional Support, Digital Readiness, Predictors.

## 1. Introduction

In an era where technology permeates every aspect of life, its integration into educational settings has become paramount for fostering effective learning experiences (Singh, 2013). This research delves into the assimilation of digital tools among students and faculty, focusing on the utilization of Learning Management Systems (LMS), gamified tools, and artificial intelligence-powered platforms. By examining a dataset of 200 respondents, comprising 150 students and 50 faculty members, the study seeks to illuminate the current state of technology adoption within educational environments, identify key predictors of student engagement, and assess the barriers and support mechanisms that influence the effective use of these digital learning technologies (Tan, 2009).

As educational institutions strive to enhance their digital offerings, understanding the dynamics of technology integration and its impact on student engagement is crucial (Birziņa & Na-Songkhla, 2019). This investigation not only highlights the prevalent usage rates of various educational technologies but also uncovers the significant factors that drive student engagement in digital learning contexts. Furthermore, it addresses the challenges faced by both students and faculty, particularly the widespread lack of digital skills, and emphasizes the importance of institutional support in navigating these obstacles.

Through a comprehensive analysis, this article aims to offer valuable insights into the dimensions of digital readiness and the structural factors that contribute to student engagement. By focusing on the interplay between technology, user attitudes, and institutional frameworks, the findings underscore the necessity for targeted capacity-building initiatives and support mechanisms that can ease effective technology integration in educational settings.

## 2. Literature Review

## 2.1 Introduction

The integration of technology in educational settings has become increasingly vital for enhancing learning experiences and outcomes. As educational institutions adopt various digital tools, understanding the factors that influence technology adoption and student engagement is essential. This literature review scrutinises existing



research on technology integration among students and faculty, predictors of student engagement, challenges faced in digital learning environments, and the dimensions of digital readiness.

## **2.2 Technology Integration in Education**

The use of Learning Management Systems (LMS), gamified tools, and artificial intelligence (AI) platforms has transformed the educational landscape (Baker et al., 2020). Studies have shown that LMS platforms are widely embraced by both students and faculty, easing course management and communication (Bates, 2019). Research shows that faculty members tend to adopt LMS technologies at higher rates than students, though this disparity is not always statistically significant (Davis et al., 2021). The current study echoes these findings, revealing that while LMS usage is prevalent, the adoption of gamified and AI tools stays comparable across user groups, suggesting a balanced exposure to various educational technologies.

### 2.3 Predictors of Student Engagement

Engagement in digital learning environments is influenced by several factors, including technology training, user attitudes, and perceived institutional support. Earlier research has identified perceived ease of use and usefulness of technology as critical predictors of student engagement (Venkatesh et al., 2016). The present study corroborates these findings, revealing that perceived ease of use is the strongest predictor of engagement, followed by training received and technology motivation. Interestingly, institutional support appeared as a significant factor in enhancing student engagement, emphasizing the need for targeted interventions to foster a supportive learning environment (Kahu, 2013).

### 2.4 Challenges in Digital Learning

Despite the benefits of technology integration, challenges persist. A significant body of literature highlights barriers such as lack of digital skills, poor internet access, and inadequate devices (Hwang & Chen, 2017). The current study found that a substantial percentage of both students and faculty reported lacking digital skills, underscoring a critical area for institutional intervention. While issues related to internet access and device availability were noted, they did not show significant differences between groups, suggesting that the primary challenge lies in building digital competencies rather than infrastructural inadequacies.

#### 2.5 Dimensions of Digital Readiness

Understanding digital readiness is crucial for effective technology integration. Recent studies have proposed various frameworks to assess digital readiness, emphasizing the role of institutional support and individual self-efficacy (Ribble, 2015). The exploratory factor analysis in this research found two key dimensions: Institutional and Motivational Support, and Self-Efficacy and Ease of Use. These findings align with existing literature that suggests a strong relationship between perceived support and individual confidence in using technology (Hsu & Chiu, 2019). The negative loading of technology anxiety on both dimensions shows the complexity of emotional responses to technology, warranting further examination.

#### Conclusion

The integration of technology in educational settings presents both opportunities and challenges. This literature review underscores the importance of understanding the predictors of student engagement and the barriers to effective technology use. The findings highlight the necessity for institutions to focus on capacity-building initiatives and support mechanisms that enhance digital readiness. By addressing the identified challenges and using the predictors of engagement, educational institutions can foster a more effective and inclusive digital learning environment. Future research should continue to explore the interplay between technology, user attitudes, and institutional frameworks to develop strategies that promote successful technology integration in education.

#### **3.** Operational Definitions.

**3.1 Technology Integration**: "Technology integration is the incorporation of technology resources and technologybased practices into the daily routines, work, and management of schools." (Davies & West, 2014)



**3.2 Learning Management System (LMS):** "Learning Management Systems (LMS) are software applications or platforms designed to facilitate the administration, documentation, tracking, reporting, and delivery of educational courses or training programs." (Adzharuddin & Ling, 2013)

**3.3 Gamified Tools:** "Gamified tools refer to digital applications that incorporate game design elements, such as points, badges, and leaderboards, into non-game contexts to enhance user engagement and learning outcomes." (Sanmugam et al., 2015)

**3.4 AI-Powered Educational Platforms:** "AI-powered educational platforms utilize artificial intelligence technologies to personalize learning experiences, provide adaptive assessments, and offer intelligent feedback to enhance student engagement." (Schumann et al., 2020)

**3.5 Student Engagement:** "Student engagement refers to the degree of attention, curiosity, interest, optimism, and passion that students show when they are learning or being taught." (McCormick et al., 2013)

**3.6 Digital Readiness:** "Digital readiness encompasses the preparedness of individuals to use digital devices and the internet, including the skills, knowledge, and attitudes necessary to effectively engage with digital technologies." (Al-Araibi et al., 2019).

**3.7 Institutional Support:** "Institutional support involves the resources, policies, and practices that educational institutions provide to facilitate the effective integration and use of technology in teaching and learning." (Serow, 1996).

**3.8 Perceived Ease of Use:** "Perceived ease of use is defined as the degree to which a person believes that using a particular system would be free of effort." (Rashed & Donnell, 2001).

**3.9 Perceived Usefulness:** "Perceived usefulness is defined as the degree to which a person believes that using a particular system would enhance their job performance." (Rashed & Donnell, 2001)

**3.10 Tech Anxiety:** "Tech anxiety refers to the apprehension or fear experienced by individuals when considering or actually using technology, which can hinder effective interaction with digital tools." (Brosnan, 1998)

**3.11 Self-Efficacy:** "Self-efficacy is the belief in one's capabilities to organize and execute the courses of action required to manage prospective situations."(Tsang & Hui, 2006)

**3.12 Barriers to Digital Learning:** "Barriers to digital learning are challenges that hinder the effective use of technology in education, including factors such as lack of digital skills, inadequate access to devices, and insufficient internet connectivity." (Assareh & Hosseini Bidokht, 2011).

## 4. Theoretical Framework

The integration of technology in educational settings and its impact on student engagement can be understood through several theoretical lenses. This section outlines the key theories that underpin the research, providing a comprehensive theoretical framework to support the study's objectives.

**4.1 Technology Acceptance Model (TAM):** Proposed by Davis (1989), the Technology Acceptance Model posits that perceived ease of use and perceived usefulness are critical factors influencing an individual's decision to accept and use technology. In the context of this study, TAM serves as a foundational framework for understanding how students and faculty perceive and adopt educational technologies such as Learning Management Systems (LMS), gamified tools, and AI-powered platforms. The model suggests that if users find these technologies easy to use and beneficial to their learning or teaching processes, they are more likely to engage with them effectively.

**4.2 Constructivist Learning Theory:** This theory, rooted in the works of Piaget and Vygotsky, emphasizes the importance of active participation and social interaction in the learning process. Constructivist principles suggest that technology can enhance learning by providing interactive and collaborative environments. The use of gamified tools and AI-powered platforms aligns with constructivist approaches, as they engage learners in meaningful activities that promote critical thinking and problem-solving. This theoretical perspective supports the study's exploration of how technology integration can foster student engagement and improve learning outcomes.



**4.3 Self-Determination Theory (SDT):** Developed by Deci and Ryan (1985), SDT focuses on intrinsic motivation and the role of psychological needs in fostering engagement and well-being. The theory posits that individuals are motivated to act when their needs for autonomy, competence, and relatedness are met. In the context of digital learning, the study examines how perceived institutional support, training, and encouragement can fulfil these psychological needs, enhancing student engagement. The alignment of SDT with the study's findings on the significance of institutional support highlights the importance of creating supportive learning environments that nurture student motivation.

**4.4 Social Cognitive Theory (SCT):** Bandura's Social Cognitive Theory emphasizes the interplay between personal, behavioural, and environmental factors in learning. Central to SCT is the concept of self-efficacy, which refers to an individual's belief in their ability to succeed in specific situations. This theory supports the study's focus on self-efficacy as a predictor of student engagement. By understanding how institutional support and training can enhance self-efficacy, educators can develop strategies that empower students to engage more fully with digital learning technologies.

**4.5 Unified Theory of Acceptance and Use of Technology (UTAUT):** Venkatesh et al. (2003) proposed the UTAUT model, which integrates various technology acceptance theories to explain user intentions to use technology and subsequent usage Behavior. The model finds four key constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions. This framework can be applied to the study to analyse how these constructs influence the adoption of educational technologies among students and faculty, providing a comprehensive understanding of the factors that drive technology integration in educational contexts.

By employing these theoretical frameworks, the study aims to provide a nuanced understanding of technology integration, student engagement, and the role of institutional support. This theoretical foundation not only contextualizes the research findings but also guides future interventions aimed at enhancing digital learning experiences in educational settings.

## 5. Hypotheses

**5.1 H1: Technology Integration.** There is no significant difference in the usage of Learning Management Systems (LMS), gamified tools, and AI-powered platforms between students and faculty.

**5.2 H2: Predictors of Student Engagement.** Perceived ease of use of technology positively predicts student engagement in digital learning environments. Training received positively predicts student engagement in digital learning environments. Perceived usefulness of technology positively predicts student engagement in digital learning environments. Tech motivation positively predicts student engagement in digital learning environments. Tech anxiety negatively predicts student engagement in digital learning environments. Institutional encouragement positively predicts student engagement in digital learning does not significantly predict student engagement in digital learning environments.

**5.3 H3: Barriers to Digital Learning.** There are no significant differences in the barriers to digital learning (digital skills lacking, poor internet access, lack of devices) reported by students and faculty.

**5.4 H4: Dimensions of Digital Readiness-** The dimensions of digital readiness (Institutional and Motivational Support, Self-Efficacy and Ease of Use) are positively correlated with student engagement.

**5.5 H5: Structural Model of Student Engagement-** Institutional support is a significant positive predictor of student engagement in digital learning environments. Technology attitudes positively influence student engagement, but the effect is not statistically significant. Digital self-efficacy does not significantly predict student engagement.

Based on the comprehensive review, findings, suppositions, and recommendations, the study proposes the following model for the study.



## Figure 1: Research Model for the Study



### 6. Methodology

This study employed a mixed-methods approach to examine technology integration among students and faculty, find predictors of student engagement, assess barriers to digital learning, and explore dimensions of digital readiness. The methodology is outlined as follows:

#### 6.1 Participants

The study involved a total of 200 respondents, comprising 150 students and 50 faculty members from various educational institutions. Participants were selected through convenience sampling, ensuring a diverse representation of experiences with digital learning technologies.

### 6.2 Data Collection

Data were collected using a structured questionnaire that included both quantitative and qualitative measures. The questionnaire was designed to assess:

**6.2.1 Technology Integration:** Usage rates of Learning Management Systems (LMS), gamified tools, and AI-powered educational platforms.

**6.2.2 Predictors of Student Engagement:** Variables such as perceived ease of use, perceived usefulness, training received, technology motivation, technology anxiety, and institutional support.

**6.2.3 Barriers to Digital Learning:** Challenges faced by students and faculty, including digital skills gaps, internet access issues, and device availability.

**6.2.4 Dimensions of Digital Readiness:** Attitudes toward technology, institutional support, and self-feelings on technology use.

#### 6.3 Data Analysis

Quantitative data were analyzed using statistical methods, including:

**6.3.1 Descriptive Statistics:** Summarize the demographic characteristics of participants and the usage rates of educational technologies.

**6.3.2 Chi-Square Tests:** Compare technology usage and barriers reported by students and faculty, assessing the significance of differences between groups.

**6.3.3 Multiple Regression Analysis:** Evaluate the predictors of student engagement, finding significant factors influencing engagement levels.

**6.3.4 Exploratory Factor Analysis (EFA):** To uncover underlying dimensions of digital readiness, deciding the factor structure of attitudes, support, and self-feelings related to technology use.



**6.3.5 Structural Equation Modelling (SEM):** To test a structural model that explains student engagement based on learner attitudes toward technology, perceived institutional support, and digital self-efficacy.

#### 7. Limitations

The study acknowledges limitations, such as the reliance on self-reported data, which may introduce bias, and the use of convenience sampling, which may limit the generalizability of findings. Future research could benefit from larger, more diverse samples and longitudinal designs to assess changes over time.

This comprehensive methodology provides a robust framework for understanding the dynamics of technology integration, student engagement, and institutional support in digital learning environments.

### 8. Finding of the study.

### 8.1 Technology Integration Among Students and Faculty

### a) Descriptive Analysis

The dataset included 200 respondents — 150 students and 50 faculty members. The usage of three educational technologies was compared across both groups:

<b>Technology Tool</b>	Student Usage (%)	Faculty Usage (%)	Total Usage (%)
LMS	92.7% (139/150)	100% (50/50)	94.5%
Gamified Tools	68.7% (103/150)	66.0% (33/50)	68.0%
AI Tools	39.3% (59/150)	38.0% (19/50)	39.0%

### Table 1: Usage of Educational Technologies by User Group

Table 1 : Chi-Square	e Test Results f	or Technology	Usage by Group
I ubic I i Chi Square	I COU ICOUICO I	JI I COMMONDE	osuge by Group

Tool	χ² Value	<i>p</i> -value	Interpretation
LMS	2.60	0.107	Not significant
Gamified Tools	0.03	0.861	Not significant
AI Tools	0.00	1.000	Not significant

Although LMS usage was higher among faculty (100%) than students (92.7%), the difference was not statistically significant (p = 0.107). Usage rates for gamified tools and AI platforms were also similar between the two groups, with no significant differences observed. These results suggest that both students and faculty have relatively equal exposure and adoption of digital technologies, especially beyond LMS platforms.







Bar chart comparing technology adoption percentages between students and faculty.

## 8.2 Predictors of Student Engagement

### **Regression Model Summary**

Predictor Variable	Estimate	Std. Error	<i>t</i> value	<i>p</i> value	Significance
(Intercept)	2.434	0.304	7.996	< 0.001	***
Training Received	0.114	0.049	2.316	0.022	*
Tech Usefulness (Q10a)	0.105	0.052	2.038	0.043	*
Tech Ease (Q10b)	0.117	0.034	3.403	< 0.001	***
Tech Anxiety (Q10c)	0.084	0.038	2.199	0.030	*
Tech Motivation (Q10d)	0.085	0.034	2.479	0.014	*
Inst. Training (Q11a)	0.063	0.049	1.283	0.201	
Inst. Encouragement (Q11b)	0.076	0.042	1.800	0.074	† (marginal)
Adjusted R <sup>2</sup> :	0.339 F (7, 142) = 11.90, $p < 0.001$				
† Marginally significant at $p < 0.10$ , * Statistically significant at $p < 0.05$ , *** Highly significant at $p < 0.001$					

### Table 2.1 Multiple Regression Predicting Student Engagement

The model explains approximately **34%** of the variance in student engagement scores, which is considered strong in behavioural and educational research. Several key predictors appeared as significant:

**Perceived ease of use** (p < 0.001) was the strongest predictor of engagement. Training received, perceived usefulness, tech motivation, and tech anxiety were all statistically significant (p < 0.05), positively influencing engagement. Institutional encouragement showed a marginal influence (p = 0.074), while formal institutional training was not a significant predictor.

These findings highlight that student engagement is primarily driven by personal beliefs and emotional attitudes toward technology, rather than institutional support alone. Efforts to enhance digital engagement should focus on improving user experience, confidence, and value perception of the tools being used.

Figure 3 Relative Strength and Significance of Predictors of Student Engagement





Figure 3 illustrates the relative strength and direction of each predictor of student engagement. Ease of technology use emerged as the strongest positive predictor, followed by motivation, anxiety, usefulness, and training received. Institutional support variables had weaker or marginal effects. Predictors with confidence intervals that do not cross zero are statistically significant.

## 8.3 Challenges and Support Mechanisms

Barrier	Students Reporting (%)	Faculty Reporting (%)	Chi <sup>2</sup>	<i>p</i> -value	Significant?
Digital Skills Lacking	80.7% (121/150)	74.0% (37/50)	0.64	0.423	No
Poor Internet Access	2.0% (3/150)	0% (0/50)	0.11	0.737	No
Lack of Devices	6.7% (10/150)	0% (0/50)	2.25	0.134	No

### Table 3: Descriptive & Inferential Analysis of Challenges

None of the digital learning challenges showed statistically significant group differences. However, a large proportion of both students (81%) and faculty (74%) reported lacking digital skills, indicating a widespread need for capacity-building initiatives. While students reported more issues with internet and device access, these differences were not significant.

Support Dimension	Faculty Mean	Student Mean	<i>t</i> -value	<i>p</i> -value	Significant?
Training Helpfulness	4.33	4.21	0.46	0.652	No
Institutional Training Level	2.56	2.55	0.16	0.872	No
Institutional Encouragement	4.32	4.09	1.88	0.064	† Marginal

**Table 3. 1: Institutional Support Summary** 

Both groups rated training and institutional encouragement positively. Faculty members perceived slightly higher levels of encouragement (p = 0.064), but the difference was only marginally significant. These findings suggest that while support structures are in place, their perceived effectiveness is relatively even across roles — with room for stronger engagement strategies.

**Figure 4** visually presents the proportion of students and faculty who reported specific challenges in digital learning. The most prominent barrier across both groups is the lack of digital skills, with 81% of students and 74% of faculty indicating this concern. In contrast, issues related to device access and internet connectivity were reported only by a small fraction of students (6.7% and 2%, respectively), and not at all by faculty.

Despite the visual differences, none of the group comparisons were statistically significant (p > 0.05). However, the consistently high percentage of respondents identifying digital skill gaps points to a critical area for institutional intervention. The relatively low reporting of hardware and connectivity issues may reflect infrastructural adequacy, at least within the surveyed population.



## Figure 4: Proportion of Students and Faculty Reporting Digital Learning Barriers



#### 8.4 Identifying Dimensions of Digital Readiness

#### Table 4: KMO and Bartlett's Test

Test	Result	Interpretation
KMO Overall MSA	0.61	Acceptable (Minimum threshold = 0.60)
Individual MSAs	Lowest = 0.44	Some items (e.g., <i>Q12a</i> ) may not be suitable for factor analysis
Bartlett's Test (χ <sup>2</sup> )	93.92, <i>p</i> < 0.001	Significant $\rightarrow$ Suitable for factor analysis

#### **Table 5: Parallel Analysis**

Test	Result	Interpretation
Suggested number of factors	2	Use 2 factors for EFA

#### **Table 6: Factor Loadings (Varimax Rotation)**

Item	Factor 1 (MR1)	Factor 2 (MR2)	Communality (h <sup>2</sup> )	Uniqueness (u <sup>2</sup> )
Q10a_Tech_Useful	0.76		0.57	0.43
Q10b_Tech_Easy		0.81	0.66	0.34
Q10c_Tech_Anxiety	-0.53	-0.58	0.61	0.39
Q10d_Tech_Motivation	0.55		0.33	0.67
Q11a_Inst_Training	0.46		0.22	0.78
Q11b_Inst_Encourage	0.73		0.56	0.44
Q8_Training_Helpful		0.54	0.31	0.69
Q12a_Self_Efficacy		0.40	0.16	0.84
Q12b_Align_Goals		0.34	0.12	0.88



Metric	MR1	MR2
Eigenvalue (SS Loadings)	1.93	1.62
Proportion of Variance	0.21	0.18
Cumulative Variance Explained	0.21	0.39
Proportion Explained	54%	46%

## Table 7: Factor Summary

## Table 8: Goodness-of-Fit Indices

Measure	Value	Interpretation	
Tucker-Lewis Index (TLI)	0.98	Excellent fit	
RMSEA (90% CI)	0.012 (0-0.137)	Excellent (close to 0)	
RMSR	0.07	Acceptable	
BIC	-52.33	Lower is better	
Factor Score Correlations	MR1: 0.89, MR2: 0.88	Strong relation with derived factors	

The exploratory factor analysis revealed two distinct underlying factors. The first factor, labelled Institutional and Motivational Support, includes items such as *Q10a\_Tech\_Useful*, *Q10d\_Tech\_Motivation*, *Q11a\_Inst\_Training*, and *Q11b\_Inst\_Encourage*, all of which showed strong loadings on this factor. This dimension appears to capture participants' perceptions of the usefulness of technology, their motivation to use it, and the degree of institutional support and encouragement they receive. The second factor, labelled Self-Efficacy and Ease of Use, makes up items like *Q10b\_Tech\_Easy*, *Q8\_Training\_Helpful*, *Q12a\_Self\_Efficacy*, and *Q12b\_Align\_Goals*. These items reflect individuals' confidence in using technology, the helpfulness of training received, and the alignment of technology use with personal or professional goals. Notably, *Q10c\_Tech\_Anxiety* loaded negatively and moderately on both factors, showing that anxiety about technology use may be inversely related to both perceived support and self-efficacy. This item's complex relationship with both factors suggests it may require further examination or refinement in future analyses.

## Figure 5: Parallel Analysis Scree Plot for Factor Retention





Comparison of eigenvalues from actual data, simulated data, and resampled data to determine the optimal number of factors for exploratory factor analysis.

### 8.5 Structural Model of Student Engagement

Fit Index	Value	Interpretation
Chi-square (df = $30$ )	77.27	$p < 0.001 \rightarrow \text{Model not a perfect fit}$
CFI	0.909	Acceptable (≥ 0.90)
TLI	0.864	Moderate
RMSEA	0.102	Above optimal range (< 0.08 preferred)
SRMR	0.116	Slightly above threshold (< 0.08 desired)

## **Table 9: Structural Model Fit Indices**

Model fit is marginally acceptable. While CFI is > 0.90, RMSEA and SRMR exceed optimal thresholds, suggesting **some room for model refinement**. However, the model stays interpretable for theory testing.

### Key Findings from Path Analysis

#### a) Measurement Model

The measurement model showed acceptable validity for most latent constructs, as summarized below:

Construct	Strongest Loading Indicators	Loadings
	Tech Motivation, Usefulness	0.80, 0.80
Tech Attitude	Easy Use	0.58
	Tech Anxiety (reverse)	-0.78
Institutional Support	Institutional Training Encouragement,	0.81, 0.67
Self-Efficacy	Digital Confidence, Goal Alignment	0.90, 0.46

Table 10: Measurement Model: Latent Constructs and Their Strongest Loading Indicators

Notably, **Tech Anxiety** negatively loaded onto the Tech Attitude construct, aligning with theoretical expectations that anxiety dampens positive attitudes toward technology. The **Self-Efficacy** construct displayed high reliability for digital confidence but weaker loading for goal alignment, suggesting potential for further refinement in future models.

#### b) Structural Model and Path Analysis

 Table 11: Standardized Path Coefficients

Predictor	Estimate	Std. Beta	<i>p</i> value	Significance
Institutional Support	0.333	0.38	0.047	Significant
Tech Attitude	0.135	0.23	0.329	Not Sig.
Self-Efficacy	-0.001	-0.002	0.987	Not Sig.

Only perceived institutional support appeared as a significant positive predictor of student engagement. While technology attitudes showed a moderate effect size, it was not statistically significant. Surprisingly, digital self-efficacy did not predict engagement.



This model highlights the critical role of institutional encouragement and training in enhancing student engagement with digital tools. Emotional and motivational support from institutions appears more influential than even personal confidence or attitudes toward technology.

**Figure 6** Structural Equation Model showing path coefficients and factor loadings. Only Institutional Support significantly predicts student engagement (Q5\_).

These findings reinforce the **central role of institutional environments** in shaping student engagement in digital learning. The significance of **Institutional Support** highlights the importance of **organizational-level interventions**—such as structured training, consistent encouragement, and access to digital resources—in enhancing student participation and motivation.



## Figure 6: Structural Equation Model for Student Engagement

Surprisingly, individual-level psychological constructs, such as self-efficacy and attitudes toward technology, did not significantly influence engagement. This may suggest that external factors outweigh internal motivation in contexts where digital learning adoption is institution-driven or unevenly supported.

For educators and policymakers, this implies that investments in faculty development, digital infrastructure, and student support services may yield greater returns on student engagement than solely focusing on student mindset interventions.

## 9. Discussion

The findings of this study offer critical insights into the integration of technology within educational settings, highlighting the dynamics of usage among students and faculty, the predictors of student engagement, the barriers faced, and the dimensions of digital readiness.

## 9.1 Technology Integration Among Students and Faculty

The high adoption rates of Learning Management Systems (LMS) among both students (92.7%) and faculty (100%) show a strong foundational reliance on these platforms for educational delivery. However, the equal usage rates of gamified tools (68.7% for students and 66.0% for faculty) and AI-powered educational platforms (39.3% for students and 38.0% for faculty) suggest that both groups are progressively exploring diverse technological offerings. The lack of statistically significant differences in technology usage between the two demographics implies a



collective movement towards digital integration. This finding aligns with existing literature, which emphasizes the importance of collaborative technology use in enhancing educational outcomes (Baker et al., 2020).

### 9.2 Predictors of Student Engagement

The multiple regression analysis revealed that perceived ease of use appeared as the strongest predictor of student engagement, followed by training received, perceived usefulness, tech motivation, and tech anxiety. These results resonate with the Technology Acceptance Model (TAM), which posits that user perceptions significantly influence technology adoption (Davis, 1989). The findings underscore the necessity for educational institutions to prioritize user-friendly technology and comprehensive training programs to foster engagement. Interestingly, while institutional support was identified as a significant factor influencing student engagement, the study revealed that individual attitudes and emotional responses towards technology, such as tech anxiety, play a critical role in shaping engagement levels. This highlights the complexity of engagement, suggesting that emotional and motivational factors may outweigh institutional interventions in some contexts.

### 9.3 Barriers to Digital Learning

The study found a predominant barrier of lacking digital skills among both students (80.7%) and faculty (74.0%). This finding highlights a pressing need for capacity-building initiatives that focus on enhancing digital literacy across educational institutions. While issues related to internet access and device availability were less frequently reported, the significant percentage of respondents showing a lack of digital skills suggests that these barriers may be more critical to address than infrastructural inadequacies. This aligns with earlier research that emphasizes the importance of developing digital competencies to facilitate effective technology integration (Hwang & Chen, 2017).

### 9.4 Dimensions of Digital Readiness

The exploratory factor analysis revealed two key dimensions of digital readiness: Institutional and Motivational Support, and Self-Efficacy and Ease of Use. These dimensions reflect the interplay between perceived institutional support and individual confidence in using technology. The negative loading of tech anxiety on both dimensions indicates that anxiety may inversely affect both perceived support and self-efficacy, suggesting a need for strategies that address emotional responses to technology. This finding aligns with Self-Determination Theory (SDT), which posits that fulfilling psychological needs enhances motivation and engagement (Deci & Ryan, 1985).

## 9.5 Structural Model of Student Engagement

The structural model demonstrated that institutional support is a significant positive predictor of student engagement, reinforcing the notion that supportive environments play a crucial role in facilitating effective technology use. However, the lack of significance in the path coefficients for technology attitudes and self-efficacy suggests that external factors may have a more substantial influence on engagement than previously thought. This finding implies that while fostering positive attitudes and self-efficacy is essential, institutions must also focus on creating supportive infrastructures that motivate and encourage students to engage with digital learning tools.

#### **10.** Conclusion and Implications

In conclusion, this study highlights the importance of understanding the multifaceted nature of technology integration and its impact on student engagement in educational environments. The findings suggest that while technology adoption is prevalent, significant barriers related to digital skills persist. Educational institutions should prioritize capacity-building initiatives and enhance institutional support structures to foster effective technology integration. Future research should explore longitudinal changes in technology integration and engagement, as well as the potential impact of targeted interventions on overcoming identified barriers. By addressing these challenges, educational institutions can create more inclusive and engaging digital learning environments that prepare students for success in an increasingly digital world.

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## EXPLORING THE IMPACT OF FDPS ON PEDAGOGICAL PRACTICES FOR IN-SERVICE FACULTY

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**Abstract:** "Education is the most powerful weapon we can use to change the world." *Nelson Mandela*. Teachers wield the powerful tool of education, equipping students to change the world. In the 21st century, technological advancements have significantly simplified and simultaneously posed challenges for both teachers and students. Technology has seamlessly integrated into teaching and learning processes, becoming indispensable for delivering quality education. From a teaching perspective, educators must continuously upgrade their skills and knowledge to deliver content effectively, remain innovative, and thrive in the dynamic educational landscape. To achieve this, faculty require on-going assessment and professional development through FDPs, workshops, and similar initiatives to stay well-equipped for modern educational demands.

This study examines the impact of Faculty Development Programs (FDPs) on the teaching effectiveness of inservice faculty. A six-day FDP was organized at Spicer Adventist University, featuring experts from diverse fields related to AI in education and research, with the participation of 40 faculty members. The program aimed to enhance pedagogical practices, introduce contemporary educational strategies, and equip educators with skills aligned with the needs of today's learners.

Data collected through feedback forms and structured evaluations revealed that the FDP significantly enhanced teaching methodologies, fostered innovative classroom practices, and increased faculty confidence in integrating modern technological tools. Participants highlighted the program's role in broadening their perspectives on student engagement and curriculum delivery.

The study findings indicate that faculty members who participate in FDPs find them highly beneficial and valuable for their professional growth. These programs boost their confidence in tackling various challenges by equipping them with skills relevant to contemporary educational demands. The study concludes by recommending that educational institutions should regularly organize FDPs as a strategic initiative to maintain teaching quality and continuously enhance faculty competencies. Such efforts are vital for fostering academic excellence and aligning educational practices with the evolving needs of modern learners.

## Introduction

"Education is the most powerful weapon we can use to change the world." *Nelson Mandela*. Teachers wield the powerful tool of education, equipping students to change the world. "Higher and nobler than all ordinary ones are another set of teachers, the Avatâras of Ishvara, in the world. They can transmit spirituality with a touch, even with a mere wish" *Swami Vivekananda*. In the rapidly evolving landscape of education, faculties play a pivotal role in shaping students' academic success and holistic development. As educational paradigms shift to accommodate advancements in technology, changing learner expectations, and innovative pedagogical practices, it becomes imperative for educators to continuously upgrade their knowledge and skills. Faculty Development Programs (FDPs) have emerged as essential interventions for fostering professional growth and enhancing teaching effectiveness.

Faculty development also refers to a range of activities that are perceived to help academicians in improving their professional skills that are vital for carrying out their teaching, research or administrative activities. FDPs are structured initiatives aimed at equipping faculty with contemporary teaching strategies, technological tools, and research insights to create impactful learning experiences. These programs not only help educators stay abreast of emerging trends but also empower them to address the diverse challenges encountered in modern educational environments. By fostering critical thinking, innovative pedagogy, and effective classroom management techniques, FDPs contribute significantly to the professional competence and confidence of faculty members. According to Ghazvini. (2014) and Jones (2015), Steinert (2009) outlined essential characteristics of effective faculty development. These include incorporating experiential learning, providing timely and constructive feedback,



fostering relationships with peers and colleagues, implementing well-structured interventions aligned with teaching and learning principles, and employing a variety of educational strategies also self-learning materials (SLMs)

This study investigates the influence of FDPs on the teaching effectiveness of in-service faculty, with a specific focus on a six-day program conducted at Spicer Adventist University. With 50 faculty members participating and expert sessions covering areas related to AI in education and research, the program aimed to enhance pedagogical practices and equip educators with skills relevant to the current generation of learners. The findings provide valuable insights into how FDPs contribute to faculty development and underscore the importance of regular professional training in ensuring teaching excellence and student engagement.

Keywords: Faculty development programme (FDP), Self-learning materials (SLMs), Technology.

## Literature of Review

Faculty Development Programs (FDPs) play a crucial role in enhancing teaching effectiveness by fostering professional growth and enabling faculty members to adapt to evolving educational demands. Research highlights that FDPs contribute to improved pedagogical strategies, technological integration, and overall teaching competence.

Steinert (2009) emphasized the importance of experiential learning, timely and effective feedback, and collaborative relationships among faculty as key elements of successful FDPs. These elements, coupled with well-organized interventions and diverse educational strategies, create a comprehensive framework for professional development in educational settings.

Furthermore, Ghazvini et al. (2014) and Jones et al. (2015) noted that faculty members who participate in development programs gain greater confidence in addressing instructional challenges and adopting innovative teaching methods. The authors highlighted that such programs foster adaptability, which is essential in dynamic educational environments.

According to Mishra and Panda (2007), FDPs not only enhance faculty competence but also contribute to curriculum innovation and improved student outcomes. Their study found that faculty members who undergo professional training are more likely to implement learner-centred approaches in their teaching practices.

Similarly, Austin and Sorcinelli (2013) underscored the role of FDPs in fostering a culture of continuous learning within educational institutions. They emphasized the need for educational organizations to invest in faculty development as a strategic measure to maintain teaching quality and promote academic excellence.

In the context of technological advancements, Mandal and Mete (2016) highlighted the growing relevance of FDPs in integrating digital tools and AI-driven educational technologies into teaching practices. This shift is critical for aligning educational strategies with the learning preferences of today's tech-savvy generation.

Kirkpatrick model (1959) This is a very popular model, proposed by Donald Kirkpatrick, which focuses on measuring four kinds of outcomes or levels that are expected from an effective training programme. These four levels are reaction, learning, behaviour and results. Reaction is how well the trainees liked the training program; learning deals with whether the trainees acquired any knowledge, attitude or skills; behaviour evaluates the extent to which the trainees' job behaviour changed as a result of the training while results try to determine the extent to which the outcomes have been impacted by the training programme. This model is the most preferred evaluation framework as it helps in understanding the training evaluation in a very systematic way (Shelton and Alliger, 1993).

#### Research objectives of this study are as follow:

- 1. To evaluate the effectiveness of Faculty Development Programs in enhancing teaching strategies, classroom management, and technological skills among in-service faculty.
- 2. To assess the impact of Faculty Development Programs on faculty confidence in handling academic challenges and their overall teaching effectiveness.
- 3. To explore faculty perceptions of contemporary training needs, including mental health, technology integration, and collaborative networking, for future FDP improvements.



#### **Research Questions**

- 1. Does your organization organise a Faculty development program?
- 2. Are you aware of the credentials of the Faculty Development program?
- 3. Why do you think Faculty Development Programs are essential for academic growth and professional development?
- 4. Suggest some contemporary topics that you think can be implemented in FDP which will be highly beneficial for faculty?
- 5. How has your confidence in academic and teaching skills changed after the FDP?
- 6. What specific skills or knowledge have you gained from the FDP? (Open-ended)
- 7. How has the FDP influenced your teaching approach or classroom practices? (Open-ended)
- 8. Do you feel better equipped to handle academic challenges after attending the FDP?
- 9. What aspects of the FDP did you find most valuable and why?
- 10. Would you recommend FDPs to other faculty members?

#### **Research Methodology**

#### **Population/ Sample:**

In this study, 55 faculty members who attended the FDP programme at Spicer Adventist University were selected.

#### Sample:

A total of 40 faculty teaching in a private university, Pune city have responded

#### **Delimitation of Study:**

- This research study includes only faculty who attended FDP programmes at private universities.
- This research study was conducted only on faculty in Pune city.

#### Analysis:

The data were collected with the help of a Questionnaire based on faculty perception on FDPs as a tool to enhance teaching and learning process and the analysis was completed by responses given by faculty in percentage form.

The graphical presentation of the analysis is as follows -













65%




10) Would you recommend FDPs to other faculty members? State reasons to your answers .

Yes
Yes
Yes, absolutely most would recommend FDPs to other faculty members as they provide a valuable
opportunity to enhance teaching skills, update knowledge on current trends in their field.
Yes, as we need to grow and upgrade ourselves from time to time and become more efficient in our
professional development
Yes, FDPs enhance teaching skills, promote new methodologies, foster research collaboration, and keep
faculty updated with innovations.
Yes, It's really very helpful to those who are already engaged in work, it's helpful equipped teachers with
latest technology and helps to understand the diverse classroom
It will enhance productive in group work.

## Results

- 1) A significant majority of faculty (90%) acknowledged that their institutions conduct FDPs, indicating widespread institutional support. However, the 10% gap suggests that some organizations still need to recognize the importance of such initiatives.
- 2) Awareness of FDP credentials stands at 80%, highlighting the need for further communication and outreach to the remaining faculty members. A notable 75% of faculty participate in FDPs to stay updated with contemporary teaching strategies and educational trends, while others focus on research enhancement, technological skills, and collaborative networking.
- 3) To stay updated with the latest teaching strategies and educational trends was opted by 75% of faculty. Others have opted to enhance research and publication skills, to develop technological skills for effective teaching and to improve collaboration and networking with other faculty members.
- 4) The contemporary topics recommended by faculty, including smart board usage, technology-based learning, and mental health and well-being, underscore the evolving needs of modern educators. Faculty reported significant improvements in teaching confidence (65%) and the acquisition of specific skills such as enhanced teaching strategies and classroom management.
- 5) Mental health and well-being of students and faculties
- 6) Around 65% of the faculty clam that there is significantly increased in confidence in academic and teaching skills when they attend FDP.
- 7) Specific skills or knowledge they have gained after attending FDP is it has improved their teaching strategies and classroom management skills.
- 8) They feel better equipped to handle academic challenges after attending the FDP.
- 9) Moreover, FDPs have positively influenced teaching approaches, equipping faculty to better handle academic challenges. Hands-on workshops and practical training sessions were identified as the most valuable components, emphasizing the importance of experiential learning.
- 10) When asked if they would recommend FDPs to other faculty most of them responded yes, absolutely most would recommend FDPs to other faculty members as they provide a valuable opportunity to enhance teaching skills, update knowledge on current trends in their field.

## **Discussion and Implications**

• FDPs are crucial for enhancing teaching skills and staying current with educational trends, thus contributing to overall professional development.



- Institutions should focus on bridging the gap in recognition and awareness of FDPs to ensure all faculty benefit from these opportunities.
- The focus on modern topics like technology integration and mental health indicates the importance of aligning FDPs with current educational challenges and priorities.
- Continued participation in FDPs not only improves immediate skills but also prepares faculty for future challenges in education, fostering a culture of lifelong learning.
- Encouraging more hands-on workshops and practical sessions can further enhance the effectiveness of FDPs in preparing faculty for real-world educational scenarios.

## Conclusions

The study on the impact of Faculty Development Programs (FDPs) on pedagogical practices for in-service faculty reveals several critical insights. The findings underscore the transformative role of FDPs in fostering professional growth, ultimately contributing to the enhancement of teaching and learning outcomes in educational institutions. Institutions must continue to invest in and innovative FDPs to support faculty in meeting the dynamic challenges of education. Faculty Development Programs (FDPs) play a crucial role in enhancing the professional capabilities of educators, ultimately contributing to the growth and success of educational organizations. some key reasons why FDPs are essential are it because it helps faculty members adopt innovative teaching methodologies, improve classroom management techniques, and create engaging learning experiences for students, it helps them to stay updated with educational trends and it boosts confidence and motivation in them. In conclusion, FDPs are indispensable for organizations seeking to foster a culture of excellence, adaptability, and innovation. They empower faculty members to grow professionally, ultimately benefiting the institution and its stakeholders.

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