

AN EMPIRICAL STUDY OF TECHNOLOGY-ENABLED LEARNING IN BANGALORE'S WITH SPECIAL REFERENCE TO PRIVATE COLLEGES

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ABSTRACT:

Aim of the Study:

This study aims to investigate the degree and efficacy of technology integration in Bangalore's private colleges. It seeks to understand faculty attitudes towards technology adoption, pinpoint the ways in which digital tools are changing teaching and learning, and investigate the difficulties that educational institutions encounter in establishing and maintaining digital learning environments.

Methodologies:

A structured Questionnaire serves as the main instrument for gathering data in this quantitative study. The sample population consisted of faculty members from different private colleges located in Bangalore. The quality of Digital tools, the frequency of classroom technology use, faculty preparedness and the perceived efficacy of technology in improving learning outcomes were among the many variables that were measured by the questionnaire.

Findings:

According to the study, all the faculty members view technology in the classroom favourably. Faculty think it improves student learning; it supports self-directed learning and raises teaching satisfaction. However the study draws the attention to problems like restricted institutional access to cutting-edge technologies like flipped classrooms, gamification, interactive content tools and LMS (Learning management System), in addition to that there is noticeable gap in faculty training and varying degree of digital adoption among the colleges.

Implications for Research:

The study emphasizes the necessity of consistent training programs, ongoing institutional support and well-rounded pedagogical approach that blend traditional and digital instruction. In order to maximise the long term success of digital education it recommends policy making that supports fair access to technology consistent investment and continuous evaluation

The study uniqueness:

This study adds to the small body of empirical research that focuses on technology enabled teaching methods in Bangalore private colleges, its institutional and regional focus provides information that can direct useful changes in higher education, adoption of technology and teacher preparedness program.

Key Words: LMS adoption, Faculty perception, Bangalore private colleges, higher education in Bangalore, education and technology, teachers training.

INTRODUCTION

Today's Education system focuses on transforming India's higher education system by using digital tools promoting cross-disciplinary learning and expanded access. In today's growing Economics India holds in the position of 126th Rank in term of Global Education indices. Since Post pandemic technology has become a blood of Education system without which it cannot be complete. Particularly private college has given much importance for inculcating the technology in teaching pedagogy and prepare the student for the future digital world. The Integration of technology has transformed the Education system with opportunities and challenges where the education institutions in Bangalore is offering the student for personalised learning and flexible learning to cater the needs of the individuals

The Key role of AICTE and UGC is to have digital competence and digital literacy in Higher education especially from 2025 onwards. Now both the education institutions required to include Technology based Learning, Digital Skills and Digital infrastructure at various levels for both faculty and students

In today's world AI has played a vital role in assessing the student performance and helped them to identify their strength and weakness which contribute to more tailored learning pathways. In Genz era and with driven academic administration all the teachers want to be equipped with digital pedagogy, interactive environments and of digital competences among the students and faculty.

Keeping in the mind current trend technology has enhanced the teaching Learning activity in private colleges, Private Colleges inculcated the digital driven syllabus to impart education to combat the challenges of the current scenario This evolution in technology will prompt faculties to inculcate innovative deliverables that harness GenAI to cultivate critical thinking and innovation skills essential for the modern workforce. In this research article we delve in to the challenges faced by teaching fraternity, teacher readiness, inadequate digital infrastructure facility to deliver Curriculum in private colleges.

REVIEW OF LITERATURE:

Afridi, Chaudhry (2019) – The research articles states about the adoption and integration of technology in the teaching and learning in the universities. The aim of the paper is to determine the accessibility level and skills of the respondents on the CBT's, integration of CBT by teachers in the university and also to determine the significant difference in the opinions of teachers and administrators about the integration of CBTs in teaching at universities. The other goal of the paper is to identify the differences of opinions among the respondents regarding the integration of CBTs in university teaching with respect to the demographic variables. The study has used the Rogers' Diffusion of Innovation Theory (DOI) methodology to assess the adoption and integration of technology. The research design used in the study in quantitative research method by conducting the survey. In the research multistage sampling technique, purposive sampling technique and census and proportionate sampling techniques is used, the study is conducted in eight Central Punjab Public and private Universities. The sample collected for the study is 2,944 students, 393 teachers and 57 administrators, therefore the total sample collected is 3,394 from 8 universities of Central Punjab. Primary data is collected through structured questionnaire of five- point Likert type scale, along with demographic questions. The quantitative data collected is analysed through Chi square, paired sample t-test, factor analysis, one sample t-tests, independent sample t-test,

one-way ANOVA, Multi Analysis of Variance (MANOVA) and descriptive statistics. The major findings of the study are the technology integration and adoption in teaching at public and private universities in Punjab has not achieved a satisfactory status, the second findings are accessibility and adoption of computer-based technologies is much higher than the integration of these technologies in teaching. The study also reveals that all the three group of respondents are expertise and skill full in using technology, especially teachers are more interested in CBT but using of these technologies is low in university teaching. The study recommends HEC, the universities' authorities and government may take measures to overcome the slow speed of the internet, and providing students with easy access to internet facilities at department's computer labs, libraries, hostels, and even homes. The integration of CBTs in teaching at universities might be a must and not an option. The use of online teaching activities and web-based teaching activities may be enhanced by pedagogical integration in teaching. The e-teaching may be integrated and made part of curriculum and teaching pedagogies.

Baskaran (2025) – The study reveals about the technology and innovation in higher education, the study has aimed to disclose about the trends in technology – enhanced learning. The author has mentioned the details about the technological trends have emerged in higher education like, flipped class rooms, gamification, virtual reality (VR) and augmented reality (AR), Artificial Intelligence and the collaborative tools like google workspace, Microsoft teams, Slack, Zoom, Asana and Trello. The study concludes that using all the technological trends and tools the teaching and learning has a built a more interactive, personalised and accessible education among the students. The study suggests that educators and institutions should continue for innovative and adapt the technological tools in the education and improve learning outcomes of the student.

Seth S, Sharma S, Lowe D, Galhotra B (2024) – The researcher gives the view of technological advancement in the higher education institutes in India. The paper states the impact technological advancements, current trend in technology, government initiatives, Robotics and automations and future prospectus of technology in the higher education institutions. The study aims to provide the insight about the technology usage in the Indian higher education system, the qualitative approach is used to analyse the secondary data collected from different sources of academic journals, case studies, government reports and also the researcher has conducted interviews with educational experts and students to study in-depth about the best practices and the challenges faced in technology integration in Indian higher education institutes. The major findings of the study are, the technology integration has impacted positively in teaching learning activity among the students and faculties, the faculties are very much acknowledging the enhancement of interaction and facilitation of personalised learning experience, where as students appreciate the flexibility and engagement by digital learning tools. At the same time the challenges of ethical practices and faculty readiness to learn in full potentiality is a major issue and the student's Ethical usage of the AI and learning analytics is very much doubted. The paper concludes saying the current state of technology in the HEI's of India is flexible in engagement at the same time there are challenges faced by the usage and loosing of the more appropriate skills by the students.

Tbaishat D, Amoudi G, Elfadel M (2025) – The study analyses the perception of higher education students in adoption of Generative AI tools in teaching – learning activity and also focus on the factors influencing on student satisfaction and engagement. The study is conducted by comparing two different universities students' perception on Gen AI satisfaction. For the study researcher has taken Zayed University (ZU) in the UAE and King Abdulaziz University (KAU) in Saudi Arabia students for data analysis through a structural

questionnaire. The researcher has taken major variables like University Support (US), expected Benefits (EB), Ethical Awareness (EA), and Technology Self-Efficacy (TSE) by taking Behavioural Intention (BI) of the student's satisfaction (SS) of the two universities are compared and analysed in the paper. The data is collected and analysed using SmartPLS-4. The descriptive and correlational research methodology is used for investigation and the quantitative approach methodology is used for the study. There are 9 hypotheses set by the researcher to analyses the relationship between each variable set to the student satisfaction. The data collected is analysed by researcher at two stages assessing the measurement model for reliability and validity and structural model to test the hypothesis. The findings of the study are the student's perception on tangible academic benefits and there is a belief in using the Gen AI tools adoption gives a greater experience and satisfaction for students. The study concludes by taking all the quantitative data collected from the students states the relationship between the BI, EB and TSE is the strongest predictor and influence more on the student's satisfaction directly or indirectly there is a significant impact of the variables on SS. US and EA do not significantly impact on the student's satisfaction. The study has not taken the longitudinal consequences of AI tools usage among the students of both universities. The study is limited to two universities only and the samples are collected based on the self-selection where there is a bias in the sample collection which can be overcome by the future researchers.

Tanweer Alam Sunny M, Vijay Jamnekar A, Singh A, Ajay Warankar (2024) – The paper mainly aims to conduct an in- depth analysis of the techniques for technology integration in Indian universities by addressing the opportunities and challenges in collaboration with NEP 2020 policy of India. The paper also aims to investigate the technology enabled learning, challenges in implementation and the strategies for the successful technology integration. For the study purpose secondary data is collected and qualitative research methodology is done. The study gives the different aspects of NEP 2020 and presents the critical evaluation of the challenges inherited. The study reveals that the technology incorporation has enhance greatly the students new cross-educational alliances in the institutions. The NEP 2020 gave a vast opportunity of learning with the integration of technology the more opportunities is created among the students for a greater learning activity. The study reveals that the policy has prioritise the use of the technology and online resources to easily bridge the gap between urban and rural communities which leads in establishment of research centres, partnerships and encourage innovations in technology utilisation in the education system.

Statement of problem:

Integration of technology in the higher education is important to the colleges to give a better skilled student to the society, as the world is moving to the era of artificial intelligence, machine learning, natural language programming, etc., to make students to be competitive and high demanded in the job market, the skill of technology is important. Therefore, the integration of the technology and usage of the technology in the curriculum is important.

After conducting a thorough review of the literature, there are many papers related to the integration of technology in higher educations, wherein the paper reveals about the different types of technological tools, pedagogies used in the education institutions for teaching and learning aspect. From this review major gap identified is there are many research conducted based on the secondary data by analysing different tools, software, Gen AI tools. But there is very limited research conducted through a primary data collection from the perceptions of faculty and student in the state of Karnataka, specified to Bangalore city. Based on the gap identified, the problem statement is that the study analyses the challenges faced by teaching

fraternity in integration of technology in the teaching learning activity in private colleges of Bangalore city. It is still not well understood how teachers' disciplinary expertise and their capacity to incorporate technology enabled cross disciplinary teaching methods. To implement effective curriculum delivery, the adequate digital infrastructure needs to be addressed and Installed in Education Institutions.

RESEARCH METHODOLOGY:

Research method:

The quantitative research method is used in this study. Simple random sampling method was used for data Collection and the primary data of 109 Responses collected through structured Questionnaire using Five Point Likert scale. For Research the factors considered are Technology Infrastructure, Integration of Technology, Readiness of Learning among faculties, Adoption of Technological tools in Curriculum, Teaching and Learning Activity, Benefits of Technology Integration, Challenges of Technology Integration. Data analysed through using SPSS software tools and techniques -

Objectives of the study:

- 1) To understand the technology integrated in the private college for teaching learning process.
- 2) To examine the effectiveness of technological tools usage in curriculum delivery for teaching learning process in Private Colleges.
- 3) To evaluate the Impact of technology integration on teaching Performance in Private Colleges.
- 4) To analyse the benefits and challenges faced by faculties in integration of technology in the teaching and learning activity in Private Colleges.

Hypothesis:

2. **To examine the effectiveness of technological tools usage in curriculum delivery for teaching learning process in Private Colleges.**

H₀: The effectiveness of curriculum delivery in private colleges is not considerably increased by the use of technological tools

H₁: The efficiency of curriculum delivery in private colleges is greatly increased by the use of technological tools

3. **To evaluate the Impact of technology integration on teaching Performance in Private Colleges.**

H₀: Teaching effectiveness in private colleges is not significantly impacted by technology integration

H₁: Teaching effectiveness in private colleges is significantly impacted by technology integration.

4. **To analyse the benefits and challenges faced by faculties in integration of technology in the teaching and learning activity in Private Colleges.**

H₀: Using technology in teaching and learning activities does not present any major advantage or difficulties for faculties

H₁: using technology in teaching and learning activity offers faculties both substantial advantages and difficulties

Scope of the study:

The study is conducted on the integration of technology adoption in the teaching and learning process in higher education institutions. The study covers the benefits and challenges faced by teaching fraternity in integration of the technology in teaching and learning activity. The study covers the private colleges of Bangalore city only.

Reliability Statistics	
Cronbach's Alpha	N of Items
.936	41

Analysis

According to reliability statistics, “a scale with 41 items has a Cronbach’s Alpha value of 0.936”. this shows that the items are highly correlated and consistently measure the same underlying construct, indicating that the instrument has excellent internal consistency. ‘A Cronbach’s Alpha value greater than 0.9 is typically regarded outstanding, suggesting that the scale is statistically sound and trustworthy for use in research’. Although care should be taken to ensure that the items are not unduly redundant the scale’s high alpha of 41 suggest that it likely captures a wide range of dimensions related to the construct. The validity of using this scale for consistent measurement in academic or applied settings is generally supported by the reliability co-efficient.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Gender	109	1.0	2.0	1.541	.5006
Age	109	1.0	5.0	2.037	.9519
Designation	109	1.0	4.0	1.587	1.0383
Experience	109	1.0	5.0	2.569	1.3835
Type	109	1.0	3.0	2.367	.6333
Training	109	1.0	2.0	1.486	.5021
Valid (listwise)	N109				

With a mean of 1.541 on a scale where 1 and 2 probably represent male and female respectively. The study samples 109 faculty members gender distribution is almost baanced, according to the descriptive statistics. This suggests that there are slightly more males than females according to the coded scale, the majority of the respondents are in the younger to middle age range, as indicated by the average age, which is in the second category (mean=2.037) moderate variation in faculty positions is indicated by a designation mean of 1.587 with a standard deviation of 1.587 with a standard deviation of 1.0383. the average teaching experience is 2.569 years, but the standard deviation is 1.3835, suggesting a mix of senior and junior faculty. Among the various institutions, the type of college (mean 2.367) exhibits moderate representation.

ANOVA						
		Sum of Squares	DF	Mean Square	F	Sig.
Training	Between Groups	2.885	4	.721	3.081	.019
	Within Groups	24.344	104	.234		
	Total	27.229	108			
ICT	Between Groups	7.666	4	1.916	1.921	.112

	Within Groups	103.747	104	.998		
	Total	111.413	108			
Connectivity	Between Groups	4.710	4	1.177	1.272	.286
	Within Groups	96.281	104	.926		
	Total	100.991	108			
conducts_FDP	Between Groups	12.869	4	3.217	2.242	.070
	Within Groups	149.241	104	1.435		
	Total	162.110	108			
Regular_Updates	Between Groups	3.426	4	.856	.661	.621
	Within Groups	134.758	104	1.296		
	Total	138.183	108			
Technical_staffs	Between Groups	2.041	4	.510	.422	.792
	Within Groups	125.611	104	1.208		
	Total	127.651	108			
Integration_Technology	Between Groups	4.079	4	1.020	.873	.483
	Within Groups	121.481	104	1.168		
	Total	125.560	108			
Guidelines	Between Groups	.269	4	.067	.044	.996
	Within Groups	159.841	104	1.537		
	Total	160.110	108			
E_learning	Between Groups	2.844	4	.711	.490	.743
	Within Groups	150.899	104	1.451		
	Total	153.743	108			
Support	Between Groups	1.623	4	.406	.328	.859
	Within Groups	128.707	104	1.238		
	Total	130.330	108			
Technology_Integration	Between Groups	.796	4	.199	.194	.941
	Within Groups	106.617	104	1.025		
	Total	107.413	108			
Confident	Between Groups	5.530	4	1.383	1.932	.111
	Within Groups	74.433	104	.716		
	Total	79.963	108			
Trained_Well	Between Groups	13.884	4	3.471	3.273	.014
	Within Groups	110.300	104	1.061		
	Total	124.183	108			
Learning_and_Adopting	Between Groups	6.551	4	1.638	1.930	.111
	Within Groups	88.256	104	.849		
	Total	94.807	108			
Attend_FDP	Between Groups	7.074	4	1.768	2.169	.078
	Within Groups	84.780	104	.815		
	Total	91.853	108			
Re_Designed	Between Groups	2.841	4	.710	.983	.420
	Within Groups	75.123	104	.722		
	Total	77.963	108			
Presentation_Software	Between Groups	6.411	4	1.603	1.648	.168
	Within Groups	101.148	104	.973		
	Total	107.560	108			
Digital_Tools	Between Groups	8.332	4	2.083	1.437	.227

Is	Within Groups	150.732	104	1.449		
	Total	159.064	108			
Flipped_Classes	Between Groups	5.635	4	1.409	1.138	.343
	Within Groups	128.805	104	1.239		
	Total	134.440	108			
Digital_Platforms	Between Groups	5.541	4	1.385	1.609	.178
	Within Groups	89.542	104	.861		
	Total	95.083	108			
MOOC_s	Between Groups	11.111	4	2.778	1.981	.103
	Within Groups	145.861	104	1.403		
	Total	156.972	108			
Teaching_Performance	Between Groups	1.144	4	.286	.292	.883
	Within Groups	101.810	104	.979		
	Total	102.954	108			
Learning_Outcomes	Between Groups	1.751	4	.438	.512	.727
	Within Groups	88.965	104	.855		
	Total	90.716	108			
Efficient	Between Groups	1.773	4	.443	.679	.608
	Within Groups	67.897	104	.653		
	Total	69.670	108			
Teaching_Interactive	Between Groups	1.125	4	.281	.330	.857
	Within Groups	88.526	104	.851		
	Total	89.651	108			
Job_Satisfaction	Between Groups	1.246	4	.311	.404	.805
	Within Groups	80.167	104	.771		
	Total	81.413	108			
Deliver_Content	Between Groups	.879	4	.220	.297	.880
	Within Groups	77.084	104	.741		
	Total	77.963	108			
Assessment	Between Groups	.721	4	.180	.208	.934
	Within Groups	90.270	104	.868		
	Total	90.991	108			
Communication	Between Groups	3.776	4	.944	1.178	.325
	Within Groups	83.307	104	.801		
	Total	87.083	108			
Good_Relationship	Between Groups	5.145	4	1.286	1.611	.177
	Within Groups	83.057	104	.799		
	Total	88.202	108			
Overall_Quality	Between Groups	.294	4	.073	.105	.981
	Within Groups	72.697	104	.699		
	Total	72.991	108			
Extratime_Effort	Between Groups	2.261	4	.565	.516	.724
	Within Groups	113.941	104	1.096		
	Total	116.202	108			
Sustain_Technology	Between Groups	2.610	4	.652	.505	.732
	Within Groups	134.363	104	1.292		
	Total	136.972	108			
Syllabus	Between Groups	4.727	4	1.182	.913	.459

	Within Groups	134.595	104	1.294		
	Total	139.321	108			
Non_Acceptance	Between Groups	2.088	4	.522	.350	.843
	Within Groups	154.922	104	1.490		
	Total	157.009	108			
Concentration_Power	Between Groups	15.223	4	3.806	2.941	.024
	Within Groups	134.593	104	1.294		
	Total	149.817	108			

ANALYSIS

The results of the one-way ANOVA show that among the different dimension analysed, only a few variables have significant differences across groups training specifically training ($F=3.081$, $P=.019$), Trained Well ($f=3.273$, $P=.014$) and Concentration Power ($F=2.941$, $P=.024$) Exhibits significant variation at the 5% level. This means that participants have different perception of these factors based on their group classification. It suggests that training exposure the quality of preparation and concentration level differ among various respondent categories in contrast the other variable including ICT connectivity, integration of technology, teaching performance and job satisfaction, had “P” values greater than 0.05 showing no significant difference between groups. the non-significant findings for most variable suggest general consistency in respondents view on the integration of technology, digital learning, environments and teaching results. This uniformity indicates that perception about institutional support, digital platforms, and teaching quality are generally shared among different demographic are professional groups. The significant results for training and trained well the important role of faculty development programs in boosting confidence and readiness in using technology. Additionally, the difference in concentration power show variations in individuals’ cognitive engagement or adaptability to digital teaching environment.

Overall, the ANOVA result suggests that while most aspects related to technology enabled teaching are accepted consistently across respondent groups, specific differences in training factors require attention. Institution could improve by enhancing training programmes and offering where did professional development opportunities to ensure all educators have the necessary skills and engagement.

FINDINGS

- To prepare students for a future digital world, private colleges in Bangalore have set a significant emphasis on integration of technology in to their teaching pedagogy.
- By promoting flexible and personalised instruction based on the needs of each individual student, the integration of digital technology has bought revolution in the field of education.
- The faculty is exceptionally prepared, confident and skilled in implementing interactive environment and digital pedagogy.
- Effective technology adoption is strengthened by institutional support provided by technical staff, FDP (faculty development programmes) and digital infrastructure.
- ITC facilities, Connectivity, acquiring knowledge and accepting new technologies, digital platforms and e-Learning tools were found to be highly utilized and to have positive perceptions.

- The beneficial impacts on effectiveness of teaching, job satisfaction, interactive lesson planning, communication, and the general high quality of delivery of instruction were observed.
- Statistical analysis shows that attitudes towards technology integration are significantly positive across demographic groups, with a focus on cognitive engagement (Concentration Power) and training quality.
- There still remain issues, such as the requirement for more efficient training programmes and addressing faculty members varying levels of focus and flexibility.
- While everyone agrees that integrating technology is important, Opinions on how adequate training is vary.
- The study evaluates faculty and students preparedness for digital transformation and emphasizes, the role of AI and generative AI tools in customizing learning educational path.

SUGGESTIONS

- Several comments note that technology cannot be used in all aspects of teaching; its role should be balanced and not detract from essential face-to-face or hands-on experiences.
- Over-dependence on technology might lead to reduced student confidence, more copy-paste behavior, and excessive screen time, negatively impacting learning outcomes.
- Lack of infrastructure, such as outdated labs and insufficient devices, remains a major challenge in effective technology integration.
- Many teachers expressed the need for updated knowledge in basic computer skills and digital literacy for both faculty and students.
- Inadequate training, reluctance to adapt, and lack of personalized support hamper smooth adoption and optimal use of technology tools.

RECOMMENDATIONS FROM FEEDBACK

- Faculties must receive regular training workshops and continuous professional development in technological resources from their educational organisations.
- Enhanced infrastructure and prompt technical support and administrative encouragement are required to support the integration of technology
- Technology should be used to improve educational experiences, but it shouldn't entirely substitute conventional techniques or hands on task. To overcome resistance and make sure that teachers and students are prepared for the growing digitalisation of education.
- In addition, educational initiatives along with necessary training is required. Technology based activities with specific objectives should be incorporated into feasible curriculum educational programmes in order to ensure meaningful successful implementation rather than adoption for the novelty of it.
- It is necessary for educators to setup appropriate monitoring and feedback mechanisms in order to consistently evaluate and enhance the way that technology affects learning outcomes and engagement

CONCLUSION

- Using technology in Bangalore Higher Education is making the Learning and teaching Experience more effective how ever there are still Challenges with the infrastructure and recruiting skilled staff.
- The authorities and administrators need to redirect their funds through towards better initiatives.
- The Use of Digital resources and keeping faculty members up to date on new skills. Progress towards a mix of digital and conventional methods of instruction will require changes in institutional Policies and frequent input from both Teachers and Students and this will help to ensure that these modifications are permanent.
- Bangalore Higher Education Institutions should have equal accessibility to the resources in order to get the most out of technology in the learning Environment.
- Future research ought to investigate the long term consequences of these modifications and analyse the differential impact across various region to inform the development of more effective policies.

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