An Empirical Analysis of Government Initiatives in Advancing Digital Learning in Higher Education Institutions: A Study with Specific Reference to Arts and Science Colleges in Chennai

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Abstract

Multiple stakeholders, including students, parents, faculty, HEI administrators, alumni, and other interest groups, acknowledge the government's efforts in enhancing digital education as a valuable initiative. To evaluate stakeholder perspectives, a structured questionnaire was distributed among 209 faculty members from arts and science colleges in Chennai, and the collected data was analyzed using statistical tools such as percentage analysis, the Kruskal-Wallis test, and multiple regression analysis. The results indicate that gender and specialization significantly affect perceptions of "Support for Telecom Infrastructure" and "Provision of Uninterrupted Power Supply in HEIs," while academic experience influences views on the "Availability of E-Textbooks via the E-Pathshala Website" and "Faculty Capacity Building Training Programs." Regression analysis further reveals that strengthening telecom infrastructure holds the highest beta value of 0.61, demonstrating its critical role in the qualitative development of HEIs.

Digital learning involves acquiring knowledge and understanding various subjects through electronic devices such as mobile phones, laptops, desktops, and virtual platforms. It plays a crucial role in higher education institutions (HEIs) by eliminating time and space constraints, making education more accessible. Multiple stakeholders, including students, parents, faculty, HEI administrators, alumni, and other interest groups, acknowledge the government's efforts in enhancing digital education as a valuable initiative. To evaluate stakeholder perspectives, a structured questionnaire was distributed among 209 faculty members from arts and science colleges in Chennai, and the collected data was analyzed using statistical tools such as percentage analysis, the Kruskal-Wallis test, and multiple regression analysis. The results indicate that gender and specialization significantly affect perceptions of "Support for Telecom Infrastructure" and "Provision of Uninterrupted Power Supply in HEIs," while academic experience influences views on the "Availability of E-Textbooks via the E-Pathshala Website" and "Faculty Capacity Building Training Programs." Regression analysis further reveals that strengthening telecom infrastructure holds the highest beta value of 0.61, demonstrating its critical role in the qualitative development of HEIs. Based on these findings, strategic recommendations are provided to assist the government in further improving digital learning in arts and science colleges in Chennai.

Keywords: Digital learning –Multiple stakeholders of HEI- Role of Government

Introduction

Higher education encompasses the teaching and learning processes within colleges and universities that students engage in to attain advanced academic qualifications. Beyond credential attainment, higher education also fosters lifelong learning, enabling individuals to continuously upgrade their knowledge and skills in response to evolving societal demands.

Technological advancements have significantly transformed the higher education landscape, contributing to its expansion and increasing accessibility. The rise of online education, digital learning resources, and educational technologies has broadened learning opportunities, facilitating lifelong learning and extending educational access to a wider audience.

The National Education Policy (NEP) 2020 highlights the integration of technology to enhance teaching and learning experiences, emphasizing its role in making quality education widely accessible. The policy underscores the necessity of technological preparedness to ensure the continuity of quality education through alternative modes when traditional, in-person instruction is not feasible.

Digital education leverages multimedia components, such as digital textbooks, interactive videos, audio content, simulations, and online assessments, to enrich the learning experience. These elements enhance student engagement, comprehension, and retention of information. A well-designed learning management system (LMS) serves as the backbone of digital education, with platforms like Moodle, Blackboard, and Canvas providing essential tools for course management, content dissemination, assignment submissions, assessments, and interactive communication.

Effective digital learning integrates sound pedagogical strategies that promote student engagement and active participation. This includes structured course design, clear learning objectives, interactive activities, collaborative projects, peer discussions, and personalized instructor feedback.

Governments play a critical role in shaping higher education, as they influence policies and frameworks that define educational systems. They also engage in international collaborations and partnerships to foster knowledge exchange, research cooperation, and student mobility within higher education. This research study seeks to examine the government's role in fostering digital learning and to analyze its impact on the perceived qualitative growth of education in higher education institutions (HEIs).

Review of Literature

The integration of digital technologies in education, particularly in response to the COVID-19 pandemic, has significantly transformed the learning landscape by shifting from traditional classroom-based methods to technology-driven approaches. The pandemic necessitated the widespread adoption of online learning, prompting governments and educational institutions to implement various digital initiatives to ensure the continuity of education. In India, both central and state governments launched several e-learning platforms, including Diksha, Swayam Prabha, and PM eVidya, which played a crucial role in sustaining education during the lockdown (Singh et al., 2021)[10]. Despite the benefits of these initiatives, concerns emerged regarding accessibility, digital infrastructure, and engagement, as online learning lacked the interactive dynamics of traditional face-to-face instruction. While governments globally promoted e-learning as a viable alternative, challenges such as digital divide, technological preparedness, and the effectiveness of virtual pedagogy raised critical questions about the long-term sustainability of digital learning in higher education. As institutions continued to adapt, they explored

strategies to enhance digital learning experiences, incorporating innovative tools and platforms that catered to the diverse needs of learners, ensuring inclusivity, and addressing pedagogical limitations.

The shift toward digital learning also necessitated a broader examination of its sustainability, particularly in higher education, where digitalisation is increasingly shaping teaching and learning strategies. Research has emphasized the need for a structured framework to integrate sustainability into digital learning, addressing concerns such as resource efficiency, long-term viability, and the impact of digital technologies on learning environments (Qazi et al., 2024)[17]. A critical review of existing literature has led to the development of a research framework that categorizes sustainable digital learning into macro, mezzo, and micro levels, allowing educators and policymakers to assess the effectiveness of digital initiatives in higher education. While digital tools provide flexibility and enhance accessibility, they also present challenges, such as equity in access to technology, digital fatigue, and the need for strategic content design. Higher education institutions must therefore balance the advantages of digitalisation with the potential drawbacks, ensuring that digital learning remains an effective, inclusive, and sustainable model. The study underscores the importance of continuous assessment and adaptation of digital tools in education, aligning technological advancements with pedagogical best practices to support long-term learning goals.

In addition to addressing sustainability, the role of immersive technologies such as virtual and augmented reality has gained prominence in enhancing experiential learning, particularly in disciplines that traditionally relied on physical interaction, such as design education (Kee et al., 2024)[18]. By incorporating immersive technologies into higher education curricula, educators have been able to foster interactive and collaborative learning experiences that align with experiential learning theories, such as Kolb's framework. Empirical evidence from studies conducted in Hong Kong suggests that immersive digital tools promote student engagement, facilitate real-time feedback, and provide flexibility in learning environments. However, despite these advantages, the implementation of immersive technologies also presents challenges, such as cognitive overload, content development complexities, and disparities in access to digital resources. The findings suggest that while immersive learning has the potential to enhance digital pedagogy, it requires careful planning, well-structured content, and equitable access to technology. As higher education institutions continue to navigate the digital learning landscape, integrating immersive and sustainable technologies with well-designed pedagogical strategies will be essential for fostering effective and engaging learning experiences.

Need for the study

Digital learning enables learners to tailor their educational experiences to align with their schedules, allowing them to effectively balance work, family, and academic commitments. It fosters the development of essential functional skills and cultivates creativity, both of which are vital for personal and professional growth. Educational institutions can leverage technological advancements through Learning Management Systems, digital libraries, and cloud-based storage solutions to efficiently manage vast educational resources. Additionally, digital learning enhances faculty productivity by enabling them to meet the diverse expectations and specialized learning needs of students in higher education institutions. Given these advantages, digital learning is recognized as a crucial aspect from the perspective of all stakeholders, particularly highlighting the government's role in strengthening digital infrastructure and creating a conducive learning environment in higher education institutions.

Objectives of the study

1. To study the socio-economic characteristics and academic background of respondents from Higher Education Institutions.
2. To analyse the influence of demographic and professional attributes of teaching faculty on their perceptions of the government's role in fostering digital learning in Higher Education Institutions.
3. To assess the effectiveness of various government initiatives in enhancing digital learning and their impact on the perceived qualitative advancement of Higher Education Institutions.

Hypotheses of the Study

1. There is no significant influence of teaching faculties profile on their perception of govt. role in supporting digital learning in HEIs.
2. There is no notable impact of various governmental measures in promotion of digital learning on the perceived qualitative growth of HEIs.

Research Methods and Materials

Since, Exploratory nature of this study, a systematically designed questionnaire was administered to gather primary data from a sample of 301 teaching faculty members employed in various arts and science colleges in Chennai, selected through a convenience sampling method. The study adopts a qualitative approach, aiming to assess the perceptions of respondents regarding the role of the government in facilitating digital learning within Higher Education Institutions and its implications for the perceived quality of higher education. The reliability of the data was confirmed through a Cronbach's alpha coefficient of 0.918, indicating a high level of internal consistency, while factor analysis validated the research instrument by identifying a meaningful construct that effectively measures the intended dimensions. To address the research objectives, statistical techniques, including the Kruskal-Wallis test and multiple regression analysis, were employed, and the findings were systematically analyzed to derive informed recommendations.

Data Analysis and Results

Objective 1: To study the socio-economic features and academic background of faculty members of Higher Education Institutions.

A simple and clear frequency and percentage calculation of the background profile of the respondents are presented in the following table.

Table No.1: Frequency and percentage of socio economic variables

Demographic variables		Frequency	Percent
Gender	Male	96	45.9
	Female	113	54.1
Age	Less than 30 yrs	73	34.9
	31 yrs to 40 yrs	78	37.3
	41 yrs to 50 yrs	26	12.4
	51 yrs to 60 yrs	32	15.3
Designation	Asst. Prof	185	88.5

	Assoc. Prof	24	11.5
Marital Status	Unmarried	26	12.4
	Married	183	87.6
Nature of family	Joint	88	42.1
	Nuclear	121	57.9
Location of the College	Rural	6	2.9
	Semi- Urban	30	14.4
	Urban	170	81.3
	Others	3	1.4
Specialization	Arts	52	24.9
	Commerce	101	48.3
	Science	44	21.1
	Social Science	12	5.7
Classes Handled	UG	101	48.4
	PG	6	2.8
	UG and PG	102	48.8
Experience	Less than 5 yrs	43	20.6
	6 yrs to 15 yrs	60	28.7
	16 yrs to 25 yrs	84	40.2
	Above 25 yrs	22	10.5

Source: Primary Data

From the above table it has come to known that majority of respondents are female faculties accounting for 54.1 percent. Most of the respondents are falling in the age category of 31 to 40 years (37.3 percent) followed by less than 30 years age category (34.2 percent). 88.5 percent of the total teachers are serving in the capacity of assistant professors. 87.6 percent of the faculty members are married and most of them are residing in urban areas.48.3 percent of the teachers are specialised in Commerce followed by 24.9 percent in Arts major and 21.1 percent in Science major. 40.2 percent of Teachers are having teaching experience of 16 to 25 years and 29 percent of teachers are having teaching experience of 6 to 15 years. Hence the responses are collected from the matured segments of the teaching fraternity on the government role in promotion of digital earning and its perceived effect on qualitative growth of HEIs in Chennai.

Objective 2: To explore how the demographic and professional attributes of teaching faculty shape their perceptions of the government's role in fostering digital learning in Higher Education Institutions.

To study and analyse the differences between the medians of profile of teachers and their perception of govt. role in promotion of digital learning, Kruskal Wallis test is applied and the results of the same is produced in table No.2.

Table No. 2: Kruskal Wallis test for influence of faculty profile on govt. role in digital learning in HEIs

Govt. role in promotion of Digital Learning	Age		Qualification		Experience		Courses handled	
Variables/Values	Chi-Square	p value	Chi-Square	p value	Chi-Square	p value	Chi-Square	p value
Strengthening of IT infrastructure	5.28	0.15	3.49	0.63	3.90	0.27	25.15	0.29
Subsidy for e- gadgets to HEIs students	24.34	0.00	15.25	0.01	25.84	0.00	33.87	0.05
Ensuring continuous power supply	11.40	0.01	2.79	0.73	7.75	0.05	30.03	0.12
Provision of free Wi-Fi at common places	9.68	0.02	15.38	0.01	15.12	0.00	30.61	0.10
Relaxing norms for Open access materials	5.92	0.12	16.88	0.00	15.58	0.00	30.52	0.11
upkeep of e-platforms software infrastructure	8.51	0.04	20.30	0.00	25.10	0.00	46.21	0.00
Open access resources like Diksha, Swayam, NDL, etc.	8.27	0.04	17.13	0.00	14.30	0.00	24.54	0.32
Higher education sessions by MHRD Tele-Vision channels	5.43	0.14	10.19	0.07	19.23	0.00	37.46	0.02
Availability of e-textbook from e-pathshala website	5.01	0.17	18.61	0.00	11.82	0.01	40.70	0.01

Source: Primary Data

There is a remarkable influence of age of teaching faculty on the perception of government role in promotion of digital learning with respect to ensuring continuous power supply during day time (p = .001), Provision of e- gadgets at subsidy for e-gadgets to the students of HEIs (p =.000), Provision of free Wi-Fi at common places (p = 0.02) and upkeep of e-platforms software infrastructure (p = .04) and Relaxing regulations for Open access resources like Diksha, Swayam, NDL, etc (p = .04). Hence gender plays significant influence in identifying the promotional measures of govt. to develop digital learning.

There is a significant difference among the perception of teachers based on their specialisation/domain of subjects on the govt. role on promotion of digital learning with respect to the variables namely "Subsidy for e- gadgets to HEIs students (p=.01), Provision of free Wi-Fi at common places (p=.01), Relaxing norms for Open access materials (p=.00), Higher education sessions by MHRD Tele-Vision channels (p=.07) and Availability of e-textbook from e-pathshala website (p=.00)".

The experience of teachers are notably influence their perception on govt. role in encouraging digital learning in the higher education institutions. The courses handled by the teachers remarkably influence their perception on govt. role in promoting digital learning on subsidy for e-gadgets to HEIs students (p=.05), upkeep of e-platforms software infrastructure (p=.00), Higher education sessions by MHRD Tele-Vision channels (p=.02) and Availability of E-textbook from e-pathshala website (p=.01).

Objective 3: To assess the effectiveness of various government initiatives in enhancing digital learning and their impact on the perceived qualitative advancement of Higher Education Institutions.

To appraise the impact of various govt. steps in promoting digital learning on the perceived growth of HEIs, a multiple regression analysis is conducted with all the promotional tools as independent variables and the qualitative growth of HEIs as dependent outcome variable.

Table No. 3: Model Summary for influence of Govt. role in promotion of digital learning

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.738ᵃ	.544	.521	.479

a. Predictors: (Constant), Government role in promotion of digital learning
Source: Analysed from Primary Data

From the above model summary it is inferred that the variables are explaining the outcome factor to the extent of 54.4 percent and are closely related to each others by 73.8 percent.

Table No. 4: Anova for influence of Govt. role in promotion of digital learning

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	54.338	10	5.434	23.666	.000ᵇ
	Residual	45.461	198	.230		
	Total	99.799	208			

a. Dependent Variable: Expected qualitative growth of HEIs
b. Predictors: (Constant), Government role in promotion of digital learning
Source: Analysed from Primary Data

The Anova F value of 23.666 and p value of .000 implies that the independent variables of the study (govt. role in promotion of digital learning) are significantly impacting the outcome variable (the expected qualitative growth of HEIs).

Table No.5: Regression Coefficients of Government role in promotion of digital learning

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	.371	.113		3.273	.001
Teaching faculty academic competency building Program	-.080	.079	-.077	-1.008	.315
Strengthening of IT infrastructure	.604	.051	.703	11.761	**.000**

Subsidy for e- gadgets to HEIs students	-.024	.068	-.029	-.354	.724
Ensuring continuous power supply	-.051	.072	-.061	-.710	.479
Provision of free Wi-Fi at common places	-.155	.070	-.206	-2.214	**.028**
Norms relaxation of Open access materials	.078	.082	.094	.947	.345
upkeep of e-platforms software infrastructure	.145	.070	.158	2.068	**.040**
Open access resources like Diksha, Swayam, NDL,etc.	.148	.079	.161	1.879	**.050**
higher education sessions by MHRD Tele-Vision channels	-.107	.078	-.121	-1.367	.173

Source: Primary Data

The above exhibit explains the strong coefficient factors of govt. role in promotion of digital learning namely Supporting the infrastructure for Telecom companies (p =.000), Provision of free Wi-Fi at common places (p = .028), upkeep of e-platforms software infrastructure (p = .040) and Open access resources like Diksha, Swayam, NDL,etc. (p = .050). Among all these parameters the 60 percent change is resulted by the "supporting the infrastructure of telecom companies by the govt." on every cent percent change in the expected growth of HEIs. Other variables are accounting for 14 to 16 percent change in their values on the overall change in the growth factor of HEIs.

Findings and suggestions

- Most of the respondents are falling in the age category of 31 to 40 years (37.3 percent) followed by less than 30 years age category (34.9 percent).
- 88.5 percent of the total teachers are serving in the capacity of assistant professors.
- 87.6 percent of the faculty members are married and residing in urban areas.
- 48.3 percent of the teachers are specialised in Commerce followed by 25 percent in Arts and 21.1 percent in Science stream.
- Age, qualification, courses handled and experience of the teaching faculty members have significant influence over their perception about govt. role in promotion of digital learning in HEIs with respect to strengthening the infrastructure for Telecommunication companies, subsidy for e-gadgets to the students of HEIs, Provision of free Wi-Fi at common places and upkeep of e-platforms software infrastructure and relaxing regulations for Open access resources.

Suggestions to the Government

Government should encourage the manufacturers of Smart Class Digital Television by offering subsidies and tax exemptions considering the installation cost of smart classrooms in the HEIs. Rural areas should be focussed well in terms of infrastructure, digital equipments and support services by the govt. It is strongly felt by the teacher respondents about the training needs for improving the skills of teachers in

AI, Augmented reality, Virtual reality, big data analytics, automation of lectures and presentation and modification of course contents for making digitalised teaching learning process more fruitful and result oriented. Blended learning models should be combined with the traditional classroom teaching with online education.Every student and teacher should able to access the digital library for educational resources, industry institute collaborations and programmes, value added courses and research related activities. The govt must initiate public-private partnerships to support and employ digital initiatives. The policy makers should develop policies to combine digital learning into the curriculum, ensuring its implementation in all higher education institutions. Lastly, the state should ensure that only recognized authorities/ universities/bodies should conduct online courses with due accreditation and certification.

Discussion

The present study has the objectives of studying the socio economic and academic profile of the teaching faculty in Arts and science colleges in Chennai, analysing the influence of these variables on the perception of government role in promotion of digital learning in HEIs and finally the impact of the various digital learning measures by the govt. on the perceived qualitative growth of the HEIs. While analysing the primary data it has come to known that most of the respondents are falling in the age category of 41 to 50 years and living in rural areas. Approximately 90 percent of the total teachers are working as assistant professor out of which 50 percent of them are in commerce stream.The study found that there exists a significant influence of the academic profile of the teachers on the perception of govt. role in promotion of digital learning and addressed the impact of the measures of govt. on the qualitative growth of HEIs. The results are very significant in the context of development of further measures by the govt. in supporting the digitalised learning in all HEIs.

Amanjindal and bhupinder pal singhChahal (2020)[5] mentioned the initiatives of the government in promoting the digital learning by launching national optical fiber network, national digital library and provision of wireless fidelity to all the central universities to strengthen the digital infrastructure in india. The existing paper has extended the responsibility of the govt. beyond this and pushed it for venturing with private telecom companies to enhance broadband connectivity and network supply, provision of free wi-fi at prominent public places where waiting time can be shifted to digital learning pace, availability of electronic textbooks through e-pathshala website for higher education learners and software infrastructure maintenance for continued e-learning.

The existing study supported the research conducted by Komalavalli et.al (2020)[9] on the applications of Artificial intelligence on electronic gadgets where govt. has to take steps to stop unethical use of AI to avoid threats and cyber crimes. In order to attain this objective the govt. must create strong ethical software to build valid e-platforms and then relax the norms for accessing the open access educational resources for teaching, learning and research. The idea of compelling the govt. to provide e-gadgets at subsidised prices will benefit the intended beneficiaries only when all ethical measures and cyber security welfare of learners are protected.

The present research study is confined to the select Arts and Science colleges in Chennai city. Owing to time and resource constraint the structured questionnaire served through online mode to the respondents and not in person.Only apparent govt. measures in promotion of digital learning are considered for the study. As the data may not be totally free perceptual bias, they were cleaned objectively and was subject to validation and effectiveness before proceeding to final interpretation. At last, the research concluded with notable suggestions to the govt. like encouragement of smart classroom equipments, capacity

building exercises or workshops for faculty related to digital teaching and handling sessions, curriculum modification to combine the digital learning with existing system and building digital infrastructure in rural areas to encompass more higher education institutions and students spread across the country.

Conclusion

Having skills in digital literacy is vital for obtaining value results in life and plays a crucial role in economic transformation by offering job opportunities and providing access to digital content and online services. When it comes to addressing the effects of low levels of digital literacy, this presents difficulties for governments, particularly in nations that are emerging from or still in the process of development. Digital education will transform the future scenario in higher education when implemented in joint collaboration with universities, industries, business corporations, regulatory norms and government policies. Radical changes in curriculum are needed and learning process also need to be modified by making it more practical with the use of technology. Hence the role of govt. right from course modification for digital learning, content delivery of courses, building necessary digital infrastructure, maintenance of AI empowered software e-platforms, granting more access to electronic educational resources, regulating the norms of certifying authorities of digital learning courses till capacity building training for teaching faculty and academic administrators can never be undermined in the context of digital learning in Higher education institutions in India.

Scope for future study

Similar research studies can be conducted in engineering and medical colleges/universities for extending the benefits of digital learning to professional education too. Apart from govt. the role of respective higher education organisations in promotion of digital learning can be studied for comprehensive development of the HEIs. Future studies are advised on other geographical regions covering many rural and underprivileged areas of the nation.

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