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The role of emerging technologies in Indian higher education system

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Abstract
India has the third largest higher education system in the world, after the US and China, according to the World Bank. However, in terms of expenditure per student as well as per teacher, India falls behind. In the last decade, access to higher education has improved as more IITs, IIMs and central and state-level universities have been established. However, this proliferation has also raised concerns about an imbalance between excellence and inclusion. The regional-state-level universities suffer from a shortage of good-quality teaching staff and laboratories, although they are more inclusive in terms of their geographies and social groups. More than 70% of Indian students study at local and regional universities, but these institutes have smaller budgets and have become known for inflated grades, deflated quality and absenteeism among students, even teachers. However, it must be noted that technology is just an enabler, requiring a human to operate it and make use of it. Thus the perceived advantages or for that matter disadvantages of technology when it comes to students is merely an outcome of the way technology is used or handled. The technological penetration into the educational institutions at rural and local levels is the need of the hour. The present study is an empirical study involving 85 respondents comprising of the faculty members and students.

Keywords: technology, digital literacy, education sector

Introduction
Till last century, the education system in India was the traditional classroom based learning, where students didn't get opportunity to participate actively in lectures. To face the challenges of the changing time, it became necessary to make concepts more clear and students competent enough to cope up globally. Hence, the concept of digital learning evolved in 2002-03. With technology spreading its wing to the education sector, the typical classroom which was once characterised by boring hour-long sessions now transforming into an interesting, fun-filled environment. Digital education made life easier for both, students and educators.

The E-learning industry in India is a prolific one, witnessing a steady growth rate of 25 percent year-on-year and is projected to be a $ 1.96 billion industry by 2021. With a network of more than 1.5 million schools and 18,000 higher education institutes, the market for digital education in India is enormous. Today, digital learning is no longer a luxury but implementation of digital tools of learning has become a necessity in educational institutions.

The key factors leading to growth of digital market in India are: rising demand from various segments, growing number of smart phone users, improving penetration of internet, and increasing participation at the Government level. New age technology platforms help in assessing performance of students, teachers and institutions as a whole and are increasingly being adopted by educational institutions in India. Cloud based platforms which help classrooms go paperless are also finding takers. Also apart from the latest developments in ICT classrooms, Augmented Reality (AR) and Virtual Reality (VR) are being adopted in the field of education.

Further, the launch of a plethora of IT related platforms has generated huge entrepreneurship opportunities and many education startups have sprung up with new and improved versions of e-learning modules in line with the demands and ever changing needs of the students. E-learning contents are designed to present a holistic picture with audio supplements, which makes learning lot more interesting as learners now utilize both visual and audio senses.

Statement of the problem
The Indian education system is one among the largest ones across the world. There are Central Universities, public universities, and state universities. These universities are catering to distance, formal, general, professional, technical, and value educations. The point in case is that the higher education institutions are supposed to promote research and the same must be used for the collective advancement. In reality, this can be inculcated at undergraduate level provided the institutions support the cause with the necessary infrastructure. The present scenario is that there is mushrooming of the undergraduate colleges across India. The quality of the education imparted is definitely a matter of concern. Improving digital fluency, the evolving roles of faculty and advancing digital equity are among the most significant challenges slowing technology adoption in higher education.

Objectives of the study
1. To understand the relevance technology adoption in higher education.
2. To review the previous researches on the topic
3. To empirically test the reach and scope of technology in higher sample undergraduate institutions

Scope of the study
The study encompasses digital fluency, digital learning experience, digital solutions, digital learning innovations

and the like. The geographic scope of the study is confined to the city of Bangalore.

Review of literature

Dewan (2010) [1] aims at giving suggestions and recommendations to improve quality of higher education in India. The survey shows that the present state of technology in higher educational institutes is not good enough to effectively use technology in education. Thus, the merits of traditional classroom teaching and ICT tools should be integrated into a single system. E-learning is the buzz word in the field of education. Realising the advantages of using technology in education, the University of Delhi is launching its e-learning portal. Based on a survey of 240 college students from both private management institutes and colleges of University of Delhi, the paper focuses at gauging the existing state of technology in these institutes. This will provide a framework to promote Information and Communication Technology (ICT) in higher education.

Oliver, Ron. (2002) [2] highlights the various impacts of ICT on contemporary higher education and explores potential future developments. The paper argues the role of ICT in transforming teaching and learning and seeks to explore how this will impact on the way programs will be offered and delivered in the universities and colleges of the future. Information and communication technologies (ICT) have become commonplace entities in all aspects of life. Across the past twenty years the use of ICT has fundamentally changed the practices and procedures of nearly all forms of endeavour within business and governance. Within education, ICT has begun to have a presence but the impact has not been as extensive as in other fields. Education is a very socially oriented activity and quality education has traditionally been associated with strong teachers having high degrees of personal contact with learners. The use of ICT in education lends itself to more student-centred learning settings and often this creates some tensions for some teachers and students. But with the world moving rapidly into digital media and information, the role of ICT in education is becoming more and more important and this importance will continue to grow and develop in the 21st century.

Office of Educational Technology (2017) [3] iterates that just as rapidly changing technology has created new and constantly evolving job types and competencies requiring new skills, it has facilitated significant progress in accommodating the needs of a broader range of students. It can also revolutionize the delivery of education, allowing access to higher education for greater numbers of students at lower cost and with more flexibility.

However, for any technology solution to have a transformative impact on student learning and success, it must have as its foundation the specific goals, needs, and interests of the students themselves. While technology can be added to existing structures with the goal of making them marginally more efficient and flexible, technology also offers the opportunity to catalyze more significant reforms to educational structures and practices.

Pervez, Shahbaz & Zareen Ahmed, Saima & Shahbaz, Muazma & Abosaq, Nasser. (2018) [4] opine that it is a high time that teacher educators and institutions realize to extend educational technology field ahead of its present focus and build up a strong perceptive of pedagogical matter. The educational technology field desires to accomplish and reach out, not only to teacher training institutions. By pooling up resources with our teacher education colleagues, we can increase the power of educational technology and cure any possible rifts earlier than they occur especially technology verses teachers. Teacher Training Institutions and organizations all over the world especially in Pakistan are moving ahead of traditional teaching practices and putting their efforts in order to integrate the curriculum with modern technology for desired learning outcomes.

The function of education technology is constantly increasing from Overhead projectors to smart boards to smartphone apps that allow better interaction between teacher and students in the classroom. A variety of features of educational technology fitting as inbuilt part of the educational experience for students, teachers, parents, and management. Some institutes have started training of their faculty members so that they can take advantages of technology and connect their teaching with it effectively to get optimal results. However, there is still a school of thought that still believes that technology might distract students' attention from the main subject.

Mohan Lakhamraju (2017) [5] feels that technology has massively impacted every aspect of our lives over the past 30 years. It has transformed how we work, communicate, find information, stay in touch, travel, eat, shop, consume content, stay healthy and even get entertained. Remarkably, one of the most impactful aspects our life, namely higher education, has resiliently remained relatively undisrupted by technology.

By and large, at most of the higher education institutions (HEIs), students still attend classes taught by knowledgeable faculty, read from textbooks and handouts, take tests and exams, do projects, get grades and a degree certificate. This was the case half a century back and still remains the case. Of course, it has become easier for students to research online (as well as to plagiarise), share and learn from each other. And there are high tech projectors, computers, AV systems (and in some cases smartboards) in the classroom rather than slide projectors and chalk boards. But the basic teaching-learning process remains largely the same.

Shekhar A Bhattacharjee (2018) [6] feels that one of the core foundations that India needs to improve is its education sector. It has a population of 1.21 billion with 315 million students. When we take a closer look at the disparity between the number of eligible students and the ones who are currently perusing higher education, the figures are discouraging. Higher education institutions seem to have failed to inspire students to pursue further studies. The education system has fallen short of finding effective

[1] Dewan, "Scope of technology in higher education in India: A study," *2010 International Conference on Technology for Education*, Mumbai, 2010, pp. 234-235.

[2] Oliver, Ron. (2002). The role of ICT in higher education for the 21st century: ICT as a change agent for education.

[3] Reimagining the Role of Technology in Higher Education A Supplement to the National Education Technology Plan January 2017

[4] Pervez, Shahbaz & Zareen Ahmed, Saima & Shahbaz, Muazma & Abosaq, Nasser. (2018). Use of Cutting-Edge Technologies for Effective Teaching and Learning Environment In Higher Education

[5] How technology is reforming India's higher education landscape; Mohan Lakhamraju Last Updated at July 8, 2017 16:01 IST; https://www.business-standard.com

[6] October, 2018 by Shekhar A Bhattacharjee +http://www.businessworld.in; Future Of Higher Education In India

avenues to draw a picture of how beneficial higher education could be to climb the ladder in the Indian society.
The Indian education system is moving in the right direction but it needs a push. The education fraternity needs to collaborate with thought leaders and industry experts to form new strategies that can uplift the education system from its traditional roots to a new era of excellence. There are many ways to accomplish this task, but it needs to be a community effort, with all stakeholders participating to conceptualise a blueprint that redefines education in India. There are a few ways to achieve this objective, but few crucial steps need to be the bedrock of this new system.
Lilllejord, Sølvi & Børte, Kristin & Ruud and Erik. (2018) [7] propagates that the digital technologies and pedagogy should be an integral element of higher education institutions' strategies for teaching and learning, and in parallel, a competency framework for higher education teachers' digital skills must be developed
The full and informed consent of students is a requirement and the data should only be used for educational purposes. Online platforms should inform users about their privacy and data protection policy and individuals should always be allowed to anonymise their data
A systematic mapping of the effects of ICT on learning outcome showed that ICT has an impact on learning outcome when technology is implemented as a planned part of a comprehensive teaching environment with clear goals, teaching plans, teaching materials, supporting technical resources, teacher training and development.

Table 1

Authors	Country	Have Investigated	Methods Used
Avella *et al*. (2016)	USA	Learning analytics	Systematic review
Rienties & Toetenel (2016)	UK	Learning design	Multiple regression models
Lee, Morrone & Siering (2018)	USA	Pedagogy, space, technology	Convergent parallel mixed methods design, triangulation (interview, surveys, syllabi)
Maringe & Sing (2014)	South Africa	Development trends in HE	Theoretical
Toven-Lindsey *et al*. (2015)	USA	Pedagogical tools used in MOOCs	Qualitative multi-case study analysis

Source: Lilllejord, Sølvi & Børte, Kristin & Ruud, Erik. (2018). Teaching and Learning with Technology in Higher Education

Research GAP

The present study is about the role of emerging technology in the higher education institutions. It must be noted that the universities in the foreign countries update themselves rapidly with the latest technology. The same is not the case in India. The Indian universities at local and rural still rely on chalk and blackboard extensively as a delivery mode. The concept of emerging technologies and the adoption of the same are still not showed the required pragmatism. The present study becomes more relevant where there exists a huge gap in the demand and supply of the qualified graduates in the job market.

Methodology

The present research has adopted descriptive and analytical methods.

Sampling

The present research study has selected 85 respondents for the study comprising 25 teaching faculty and 60 students drawn from various undergraduate and Postgraduate courses in the Government colleges in the city of Bengaluru

Data Collection

A. Primary Data
The primary data is collected administering the questionnaire to the sample respondents.

B. Secondary Data
The secondary data is taken from published books, journals, websites and the like.

Results and Discussion

Table 2: Factors influencing in implementing technology to suit the pedagogy

Factors	*Responses (N=85)*	
	Number	Percent
Understanding the structure of the entire education model	19	22.35
Contribute to enriching learning experience	28	32.94
An Interactive and Dynamic Environment	28	32.94
Preferred Styles	10	11.77
Total	85	100

Source: Primary Data

A question regarding the factors influencing in implementing technology to suit the pedagogy was posed to the respondents with four factors. For the variable, Understanding the structure of the entire education model is opted by 22.35% of the respondents. 32.94% of the respondents contend that it must contribute to enriching learning experience. 32.94% of the respondents have gone with An Interactive and Dynamic Environment and Preferred Styles is chosen by 11.77% of the respondents.

Table 3: Classification of respondents on level of technology usage in the college

Level of Technology Usage	Category	*Responses (N=85)*	
		Number	Percent
Low	< 69.69 Score	25	29.41
Moderate	69.69-78.35 Score	41	48.23
High	> 78.35 Score	19	22.36
Total		85	100.0

Source: Primary Data

Analysis and Interpretation

The data reveals that the classification of Level of Technology Usage based on mean and standard deviation obtained on the sample respondents. It is evident from the results that 48.23 percent of the residents showed moderate usage of technology followed by low level with 29.41 percent and 22.36 percent found with high level of technology usage.

[7] Lilllejord, Sølvi & Børte, Kristin & Ruud, Erik. (2018). Teaching and Learning with Technology in Higher Education

Hypothesis Testing

Table 3: Association between graduation level and type of stream with level of technology usage in the college

Characteristics	Sample (n)	Level of Technology Usage						χ^2 Value	P Value
		Low		Moderate		High			
		N	%	N	%	N	%		
Graduation Level									
UG	23	13	52	11	26.82	9	47.36	3.46 NS	P=0.178
PG	62	12	18	30	73.18	10	52.64		
Stream of Study									
SCIENCE	27	12	37.5	8	25	7	33.33	41.91 **	P=0.000
COMMERCE	36	10	31.25	16	50	10	47.61		
ARTS	22	10	31.25	8	25	4	19.0		
Total	85	32	100	32	100	21	100		

* * Significant at 1% Level, NS: Non-significant

Source: Primary Data

Analysis

From the results, 47.36% of respondents belong to UG background noticed with high Level of Technology Usage as compared to UG background respondents (52.64%). With respect to respondents from Arts background noticed with (19%) high level of Technology Usage followed by respondents from Science background (33.33%) and Commerce stream (47.61%).

Interpretation

The data reveals that Stream of Study has high association with level of Technology Usage whereas Graduation Level does not have any significance on the level of Technology Usage. The data was subjected to find the statistical significance to test the hypothesis which is formulated i.e

$H2_a$:- There is significant association between Stream of Study and level of Technology Usage

H2b:- There is significant association between Graduation Level and level of Technology Usage

The hypothesis H2a is rejected and hypothesis H2b is accepted

$H2_a$:- There is significant association between Stream of Study and level of Technology Usage

H2b:- There is significant association between Graduation Level and level of Technology Usage

Findings

- The penetration of technology is very less in the Government colleges because of lack of technology and digital fluency among the teaching faculty
- The Postgraduate students tend to have exposure to the technology usage than that of the Undergraduate students
- The Government colleges still lack the up-gradation to the new technology
- The Government policies are in the direction of increasing the Gross Enrollment Ratio the flip side of technology up-gradation and imparting the same takes a back seat.

Conclusion

The higher education in India has always been the priority of the Government. The schemes and the policy framework have been successful enough in working out the quantity of the students been enrolled in the higher education. It is appreciable no doubt. But the pace of adoption of technology with the time is a concern. The supply and demand gap of the job market has to be addressed by the educational institutions. Technology Enhanced Learning with the differentiated approach in the higher education could bring about productive learning among the students.

Suggestions

- As more and more institutions realize the need to keep pace with the rapidly changing education domain, they need new ideas and better data on the shortcomings of the current policies.
- The higher education system in India has to start exploring the benefits of new pedagogical approaches assisted by digital technologies.
- The higher education institutions have to take the first step of implementing robust technology to get student feedback in real time and make the necessary changes, hence keeping them ahead of the curve.
- Updating with the technological requirements in the job market is the utmost necessity.
- Innovative deployments of ICT solutions are needed in transcending multiple barriers in providing access to education in the country.

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