

An Indian revolution in Digital learning technologies: assessing its impact on higher education and future trends

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Abstract—Technology dynamism has played an important role in the development and expansion of digitalization. The emergence of inexpensive and highly efficient information net works has increased the volume of available information. But it has also changed the way in which information is produced and distributed. While the impact of these changes on society is clearly far-reaching, its significance to higher education is particularly profound given the fundamental role of information in higher education. Accordingly many educational institutions have reported an increase in use of online tools. Several studies have reported cases related to the use of blogs to promote student collaboration and reflection. The journey of education in India, too, has been dotted with innumerable milestones- the most recent among these is e-learning. The digital revolution is also edging its way into the classroom. But significant challenges also loom. Given the fact higher education in India is plagued by the challenge of inadequate technology access and inequity couple with economic considerations and technological know-how, it remains to be seen how digital technologies can actually burgeon the students and how it can foster change in this aspect. This paper examines the impact of digital technology on higher education in India and its future trends.

Index Terms— Digital technology, higher education, digital assessment, learning analytics

I. INTRODUCTION

No generation is more at ease with online, collaborative technologies than today's young people—"digital natives", who have grown up in an immersive computing environment. Over the last several decades, the digital medium has become prominent in higher education. With this prominence, there is an increasing expectation that educators utilize, and even embrace, technology in order to enhance the delivery of course content in keeping current with societal and future workforce demands (Blake, 2013). The Indian higher education system is facing an unprecedented transformation in the coming decade. India will be the world's third largest economy, with a correspondingly rapid growth in the size of its middle classes. Currently, over 50% of India's population is under 25 years old; by 2020 India will outpace China as the country with the largest tertiary-age population. Technological innovation, long a hallmark of academic research, may now be changing the very way that higher education institutions teach and students learn. For academic institutions, charged with equipping graduates to compete in today's knowledge economy, the possibilities are great

II. Trends in the Growth of Higher Education in India

Higher education has its indispensable role in the development of our Indian economy. Over the years, this role has shifted from just transferring theoretical concepts from books to imparting pragmatic knowledge. Indian higher education system is one of the largest in the world. There were only 20 universities and 500 colleges with 0.1 million students at the time India attained independence. Over the years the number and nature and category of Higher Education Institutions has undergone a drastic change

India has one of the largest higher education systems in the world. There are 31,324 colleges of higher learning in the country as on August 2011 according to the 12th Five-Year Plan Report (2012-17). The number of students enrolled in the universities and colleges has increased since independence to 13,642 million in the beginning of the academic year 2009-10 with 1,669 million (12.24%) in the university departments and 11.973 million (87.76%) in the affiliated colleges (MHRD, Annual Report, 2009-10). However, this growth in numbers does not reflect much improvement in the delivery of higher education in the country

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Table – 1: Number, Nature and category of Institutions (As on August, 2011)

Type of Institutions	Number
Central Universities	43
State Universities	289
State Private universities	94
Deemed to be universities	130
Institutes of National Importance	50
Institutes established under state legislative acts	05
Total	611
Total colleges	31324
Grand Total	31935

Source: UGC 12th Five year Plan Report - 2011-2017

III. Digitalization of Higher Education in India

3.1. Key elements of the 12th Five Year Plan

The 12th plan is its holistic nature, with a clear focus on quality, or 'excellence', as an overarching guiding principle for expansion and equity. The excellence principle incorporates the diversification of higher education courses in response to changing economic and industry needs, the provision of greater choice and career paths for students and brings teaching quality to the fore, alongside research capability.

Key Elements are mentioned below:

- An emphasis on leveraging technology: a huge investment in ICTs and internet access under a 'meta university framework', which enables multi-disciplinary collaboration and development of technology-enhanced learning and teaching, including MOOCs and online courses

- A national mission for 'teachers and teaching'
- Further support for multi-disciplinary research
 - More autonomy and transparency for institutions, and better coordination between regulatory bodies

3.2 . Rashtriya Uchchar Shiksha Abhiyan (RUSA) support to Digital Technology

The greatest reform in the governance and funding of state universities will come through the central government's Rashtriya Uchchar Shiksha Abhiyan (RUSA) or National Mission for Higher Education programme, a key part of the 12th Five Year Plan. RUSA aims to "have a completely new approach towards funding, regulation and governance of higher education in state universities; it will be based on key principles of

performance-based funding, increasing allocations for introduction of digital technology in higher education institutions and decision-making through clearly defined norms."

This new framework was approved, with funding, by the Indian government in October 2013. Although it is too early to make any long term predictions, the initial stages of the programme, which lay the groundwork for national implementation, have been markedly swift. Under RUSA, the central government has committed extra funding to most states for higher education in the ratio 65:35 central to state funding. This represents a significant increase in ring-fenced funding to state universities. If successful, RUSA will bring in a new era of quality assurance ensuring huge investment in digital technologies which enables higher education institutions multi-disciplinary collaboration and development of technology-enhanced teaching and learning.

3.3. Support For Distance Education & Web Based Learning (NPTEL)

In order to enhance learning effectiveness in the field of technical education by using technology, the MHRD, in 2003, initiated the Project – National Programme for Technology Enhanced Learning (NPTEL) to enhance quality engineering education in the country by developing curriculum based video courses (at least 100) and web based e-courses (at least 115) to be prepared by seven IITs at Delhi, Bombay, Madras, Kanpur, Kharagpur, Guwahati, Roorkee and IISc, Bangalore as participating institutions with a total outlay of Rs. 20.47 crores.

In the first phase of the NPTEL, the Project had covered core courses of under-graduate curriculum in five major engineering branches, namely, Civil, Computer Science, Electrical, Electronics & Communication and Mechanical Engineering. These were supplemented by the core science and management programme, languages and other basic courses such as electronics, numerical methods etc. which are mandatory for all engineering students. The model AICTE curricula in engineering adapted by major affiliating universities, such as Anna University, Vishveshwarya Technical University and Jawaharlal Nehru Technological University were used to design the course content.

3.4. Indian National Digital Library in Engineering, Science & Technology (INDEST-AICTE) Consortium

The Ministry of Human Resource Development has set up the "Indian National Digital Library in Engineering Sciences and Technology (INDEST-AICTE) Consortium". The Ministry provides funds for access to electronic resources and databases to centrally funded institutions.

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The benefit of consortia-based subscription to electronic resources is also extended to all educational institutions under its open-ended proposition. AICTE approved Govt./Govt. aided engineering colleges are getting access to selected electronic resources with support from the AICTE and number of other engineering colleges and institutions have already joined the consortium on their own. A mechanism is in place wherein this consortium takes advantage of collective bargaining and passes on the benefit of e-journals to subscribing members. (indest.iitd.ac.in)

IV. Transformational effects of Digital learning technologies

Students have used print textbooks for centuries, but in recent years higher education Institutions have made the concerted effort to shift from print materials to digital tools. With this change, content has become more engaging and interactive, and the benefits are obvious. One of the greatest benefits of digital learning is its ability to bring the classroom to life with features that benefit both teachers and students:

4.1. Student Performance Increases

Studies have demonstrated that the use of digital platforms can increase student performance. Because students are more engaged, get immediate feedback and are easily able to build a foundation of knowledge, they become better able to learn and retain new concepts. Adaptive learning technology, an innovative component to learning platforms, is able to individualize lessons to assess the students' knowledge and assist them with concepts they need help with.

4.2. Helps Developmental Students Build Skills

The interactive elements of these digital course materials help developmental students build the skills they need not only in their future courses, but also in future jobs. The engaging platforms focus students on learning information and not doing more work than necessary.

4.3. Using Technology to Expand Knowledge

While digital learning platforms make learning more accessible and convenient, it is just a jumping off point, a catalyst to expanding student knowledge. These systems aim to encourage student curiosity and motivate them to seek out more information and apply it in their own way.

V. Future trends in digital learning technologies

For digital learning to make an impact till the last mile there has to be a larger vision of integrating technology into our complex education system. To achieve this, it is imperative that we put our stakes on digital infrastructure, ready access, quality e-content and affordability. The

government's focus is to integrate technology in digital learning for both urban and rural India.

5.1. MOOC-Enabling Technologies

Technologies that are included in the MOOCs do take a prominent position. An example of this is the use of innovative methods of using social learning or peer grading outside of the context of MOOCs. MOOC-enabling technologies are tools and platforms inspired by or replicating aspects of MOOCs and their ability to scale and facilitate learning using a combination of massive or open features. Technologies that are used in MOOCs show much promise for higher education because they facilitate new, didactic applications and can modernise on-campus teaching, enabling lecturers or educational institutions to serve larger groups of students.

5.2. Personal Analytics / Learning Analytics

Big data, gamification and adaptive learning are on a downward slope; personal analytics however is on the rise and learning analytics is at the peak. Personal analytics involves the collection and analysis of (education) data by individual end users themselves and its impact on the choices that are made based on that data. So the emphasis here rests with students, as opposed to learning analytics, which actually involves the collection and analysis of data about users / students with the aim of improving teaching, the teaching environment and study success rates.

5.3. Digital assessment

Digital assessment refers to the application of digital technologies to create, administer, report and manage tests and examinations. This is explicitly not the digitization of existing tests but a new type of assessment which is stimulated by the growth of online education and new technological possibilities (such as the possibilities for checking someone's identity). Digital assessment holds the promise of making significant improvements in how we understand, manage and improve learning.

VI. CONCLUSION

Overall, the research evidence over the last forty years about the impact of digital technologies on learning consistently identifies positive benefits. The increasing variety of digital technologies and the diversity of contexts and settings in which the research has been conducted, combined with the challenges in synthesizing evidence from different methodologies, makes it difficult to identify clear and specific implications for educational practice in higher education institutions. Since, e-learning is at a buoyant stage, live interactivity that empowers high engagement and social collaborative learning has rendered the conventional format of e-learning led by recorded

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lectures and course slightly inadequate. Digital learning as a format can work better across levels, courses and streams than conventional format.

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