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Revolution of ICT in Higher Education

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Abstract: ***The development of Information and Communication Technology has accelerated higher education in India (ICT). ICT is what makes it possible to successfully deliver high-quality higher education which is increasingly important for determining the economic development and progress of a nation. In today's globalized environment, there is a growing need for competent and professional labor. The Indian government sponsors students from primary school through higher education, but much more have to be done to create a well-educated, tech-savvy population. Open, distant, and online learning courses are becoming more important in order to expand access to higher education and extend its reach to the most outlying regions of the nation. Additionally, it supports desires for lifelong learning and does so at a reasonable price. These ICTs, however, only make up a small part of the technology that now shapes or transforms every aspect of who we are, including what we do, how we do it, how we exist, and even our external reality as we know it. The fourth industrial revolution, which has led to new technical prospects like 3D printing, Robots, Artificial intelligence, and Nanotechnology, is the talk of the day. Equally, ICTs are no longer facilitators but drivers of socio-economic development. ICTs will empower us to utilize technology in education for our country's socio-economic development simply because all humans are information-bearing. Therefore, it is crucial that we understand our role not only as information carriers but developers of solutions. This will influence future generations and civilization. Harnessing these opportunities and creating solutions that ensure we take our country forward - requires access to better quality data, sound assessment of the problems we seek to address, and innovative thinking about the most suitable interventions to address these. The technologies of this digital age facilitate anticipatory and algorithmic working that turn big data and algorithms into sustainable development solutions. Nonetheless, despite the many benefits and prospects, there remain some uncertainties and difficulties. As technology develops fast, shall we also develop fast enough to ensure that we can control or manage the destructive uses of these technologies? Are we grooming or educating people that are conscientious of these fast-paced developments? Our technological infrastructure is increasingly complex and interlinked, whereby the internet connects everything. I wish to challenge managers in higher education to spearhead the utilization of ICT-led innovation in universities and other institutions of higher learning in Uganda to help us shape our future and the thinking of our people; and drive greater ICT integration in our curriculum, system, and lives so that the products of our education system are competitive with the rest of the world. We need not be afraid of these technological developments because we are the source of information leading to these developments. We need to engage researchers across the globe, seek out the information required and innovate to realize the kind of education systems and products we want for today's world – systems that will transform the livelihood of the smallest person in society.***

Keywords: ICT, Higher Education, Information and Communication Technology

1. Introduction

Digital technologies have a profound impact on economies and societies and are changing the way we work, communicate, engage in social activities and enjoy ourselves. They also drive innovation in many different spheres of life. The innovative capacity of technology is very much conditioned by the level of digital skills of the population. No wonder there is a very strong correlation between education and skills and the uptake and use of digital technologies in various spheres of life. The role of education and skills in promoting innovation is critical.

Higher education systems have grown exponentially in the last two decades to meet the demands of quality education for all. This aspect has further gained momentum due to swift advancements in Information and Communication Technology (ICT). Demand for skilled and competent labour is ever increasing in the contemporary globalised society. In this backdrop, access to quality in higher education for all has emerged as determining factor of economic growth and development.

As we all know, Information and Communication Technology (ICT) is an umbrella term that includes any communication device or application, encompassing radio, television, cellular phones, computer, and network hardware and software, satellite systems, videoconferencing, and distance learning. At this very outset, let us acknowledge that ICT can be considered as a subfield of Educational Technology, technologies are used for educational purposes, namely, to support and improve the learning of students and to develop learning environments .In higher education, ICT is used for developing course material; delivering content and sharing content; communication between learners, teachers and the outside world; creation and delivery of presentation and lectures; academic research; administrative support, student enrolment etc.

As an educational reform agenda, often ICT is seen as indispensable tool to fully participate in the knowledge society. ICTs is seen as an essential aspect of teaching's cultural toolkit in the twenty-first century, affording new and transformative models of development that extend the nature and reach of teacher learning wherever it takes place.

It has been estimated that in the next 10 years, more than 50 crore Indians will be attending higher educational institutions. With demand for colleges projected to go up, innovation and changes in curriculum are required to meet the growing demand. We all know that globalised labour market requires students with new skills. In order to increase the access to higher education and improving its reach to the remotest parts of the country, contribution of open and distance learning facilities is on the increase. In addition, it

is catering to life-long learning aspirations and that too at an affordable cost. Society expects more and more of higher education each year.

In the current information society, people have to access knowledge via ICT to keep pace with the latest developments. In such a scenario, education, which always plays a critical role in any economic and social growth of a country, becomes even more important. Education not only increases the productive skills of the individual but also his/her earning power. It gives them a sense of well being as well as capacity to absorb new ideas, increases their social interaction, gives access to improved health and provides several more intangible benefits. The various kinds of ICT products available and having relevance to education, such as teleconferencing, email, audio conferencing, television lessons, radio broadcasts, interactive radio counselling, interactive voice response system, audiocassettes and CD ROMs have been used in education for different purposes.

The Information and Communication Technology (ICT) provides a broad perspective on the nature of technology, how to use and apply a variety of technologies, and the impact of ICT on self and society. ICT incorporates Bloom's taxonomy in which learners can communicate, inquire, make decisions and solve problems. It makes use of the processes, tools and techniques for:

1) Gathering and identifying information
2) Classifying and organizing
3) Summarizing and synthesizing
4) Analyzing and evaluating
5) Speculating and predicting

ICTs can improve the quality of education in a number of ways: By augmenting student enthusiasm and commitment, by making possible the acquirement of fundamental skills and by improving teacher training. ICTs are also tools which enable and bring about transformation which, when used properly, can encourage the shift an environment which is learner-centered.

Now, let us examine a few of the exciting technology trends in Indian universities:

Digitisation of books: Learning from the West, Indian universities are now creating their own digital repository of books so that students can be provided a digital learning environment. It enables students to learn through e-books, pictures, videos, simulations and visualisations.

New methods of teaching: Universities are also rendering content through radio, TV and satellite. The All India Council for Technical Education – Indian National Digital Library in Engineering and Technology (AICTE–INDEST) is a consortium which has been set up by the Ministry of Human Resource Development to make journals and bibliographic databases easily accessible to the students. University Grants Commission (UGC) has also created its digital library consortium access to journals and bibliographic databases covering subjects such as arts, humanities, technology and sciences.

Mobile phones: With the increased use of mobile phones, educational institutions can easily approach students to make them aware about the courses. Tasks like administration, sharing class notes, downloading lectures, instant messaging, etc have been made easy by a simple smart phone.

Social learning: The internet has provided students with a variety of options to get additional information on their courses. Delivery websites such as Youtube, iTunes U and Big Think are introducing a new trend in higher education. Students today are using various websites, blogs and social media channels, as well as new online video repository to get the content for a specific subject or course.Community service centres have started to promote e-learning throughout the country. Notable initiatives for implementing ICT in Indian education landscape include:

- National Programme on Technology Enhanced Learning: A concept similar to the open courseware initiative of MIT. It uses Internet and television technologies.
- Indira Gandhi National Open University (IGNOU) uses radio, television and Internet technologies to provide content and deliver lectures.
- **Eklavya initiative:** It uses internet and television to promote distance learning.
- IIT-Kanpur has developed "Brihaspati", an open source e-learning platform (Virtual Classroom).

Many institutes have **collaborated with NIIT** for providing programmes through virtual classrooms. Jadavpur University is using a mobile-learning centre. **IIT-Bombay** has started the programme of Centre for Distance Engineering Education Program (CDEEP) as emulated classroom interaction through the use of real time interactive satellite technology.

The UGC initiated a scheme called – ICT for teaching and learning process to achieve quality and excellence in higher education. Along with this, UGC has launched a mega programme namely – UGC INFONET. It is a network of Indian universities and colleges with integration to Information and Communication Technology (ICT) in the process of teaching, learning and education management. In addition, UGC is encouraging creation of e-content for improved teaching-learning processes in colleges and universities.

Use of ICT in school education in India receives UNESCO's recognition

With a mandate to deploy affordable technology to enhance the educational opportunities for all, augment the quality of education and bring equity into educational system in the country and keeping in view the recommendations of NEP 2020, the Ministry of education through CIET, NCERT has been working tirelessly and meticulously in designing ,developing and disseminating a large number of e-books, eContent – audios,videos, interactives, augmented reality contents, Indian sign languages videos, audiobooks talking books et cetera and variety of e courses for school and teacher education; organising digital events like online quizzes primarily for students and teachers truly bridging online/offline, on-Air technology ,one. -class-one -channel ,DIKSHA, ePathshala, NISHTHA, School MOOCs and so

on .To further the objectives of NEP and Samagra Shiksha and address the aforementioned pillars, PM eVidya- a comprehensive initiative which unifies all efforts and provides multimode access to digital ,online on Air education was launched in May 2020. It was this initiative that won the UNESCO's recognition.

Government of Tamil Nadu devotes special attention for strengthening the higher education system in the State to respond to the emerging demands of the new century. It is a matter of great satisfaction that the graduates of the technical institutions in Tamil Nadu have shown outstanding performance in the industry, both in India and abroad. Many of them have become major entrepreneurs. Notable integration in education among these are cloud infrastructure, artificial intelligence, and data analytics.

Tamilnadu Information Communication Technology Policy

The ICT policy promotes the growth of the IT & ITeS sector in the Tier-II cities. One of the primary focus is to attract investment in the Computer hardware sector as well. The ICT policy is evolved with following in mind:

1) Incentivising investment, employment and intellectual capital creation
2) Integration with initiatives of Vision 2013
3) Special attention to Start ups, MSMEs and employment of women

2. Objectives

The objectives of the policy are:

- Make Tamil Nadu the number one in the IT sector.
- To be a destination for foreign investors for their projects in the sector.
- For incremental direct investment from foreign and across the state.
- Create employment opportunities at large scale.
- Encourage youth of the state to the IT/ITeS sector.
- Enable Tamilnadu to be a cost-effective place for the development of IT/ITeS.
- Emphasise on the promotion of Green IT and ITeS.
- Improve the quality of life of the citizens through the IT/ITeS.
- Encourage entrepreneurs to begin Warehouse Start-ups.
- To make the usage of Tamil computing easier.
- The fast development of IT and ITeS in the southern districts.

Strategies

The following strategies are planned to make Tamilnadu a global hub for investment:

- Providing training for students at the industry level, so that it paves the way for employment.
- Support the Research and Development, Innovation and Entrepreneurship in the sector.
- Increase the IT base scope to animation, Gaming and Digital Entertainment, IT Product and Services in Engineering, Retail, Health Management etc.
- Support the technology start ups, providing with quality infrastructure.
- Special incentives to encourage entrepreneurs, SMEs, women and socially challenged people in the sector.

Area of Focus

To improve the sector of IT/ITeS, certain fields will be given more focus.

- Social, Mobile, Analytics and Cloud (SMAC).
- E-Commerce portal for the departments of government.
- E-Learning
- Massive Open Online Course content (MOOC)
- Content Creation
- Digital Management and Technology
- Business Intelligence Software and Analytics.
- Data warehousing
- Electronic System Design and Manufacturing (ESDM) training
- Tamil Computing
- Animation and Gaming

Skill Development

The Government has given focus to the area of skill development. A skill development Mission has been implemented.

- The students going to vocational streams will be guided about the academic stream.
- The government will impart employability skills to convey the challenges in the industry.
- Centre of excellence in technologies and research will be initiated by the government, through the collaboration of industries with colleges.
- To compete internationally, a skilled workforce will be created with the knowledge of foreign languages.
- National Knowledge Network (NKN) will be borrowed for the industry-academic purpose. The NKN is a National Level High-Speed Network which connects the academic institutions and also links with the global scientific community.

Benefits

The Government of Tamilnadu has decided to provide higher incentives to companies that invest in the Tier-II cities such as Coimbatore, Madurai, Trichy, Hosur, Salem, Tirunelveli and other rural locations.

Locations	Description – Districts classification
A	Chennai, Thiruvallur and Kancheepuram
B	Other than A and C (20 districts)
C	Madurai, Theni, Dindigul, Sivagangai, Ramanathapuram, Virudhunagar, Tirunelveli, Thoothukudi and Kanyakumari

'Digital India' is a dream which was envisaged by Prime Minister Narendra Modi. India is moving towards digitisation at a fast pace, but still there are many challenges like:

Limited access to computers: Higher education without laptops and computers cannot be imagined today, but there are a large number of colleges in rural areas where computers are yet to reach. Rural India is still far behind in

adoption of information technology. One of the main reasons for it is inadequate infrastructure.

3. Recommendations

Yet, despite the huge potential of digitalisation for fostering and enhancing learning, the impact of digital technologies on education itself has been shallow. Massive investments in ICT (Information and Communication Technology) in schools have not yet resulted in the hoped for transformation of educational practices, probably because the overriding focus on hardware and connectivity has kept back equally powerful strategies for increasing teachers' ICT skills, improving teachers' professional development, reforming pedagogies and producing appropriate software and courseware.

Discussions about the potential of digital technologies in education today increasingly place the issue as part of a more comprehensive approach to innovation in education. Education systems and institutions are not averse to change in themselves, but there seem to be very powerful barriers in place that prevent digital technologies from reaching their potential in educational institutions and teaching and learning practices.

However, the availability of several audio, video, textual components of several subjects ranging from school to post graduation had enabled the learners to continue their education and at the sametime maintain the pandemic prerequisites like social distancing etc. The e- resources that are developed should be mapped as per the requirements of the learners otherwise all the efforts undertaken would be void. The government policies should rework so that the outcomes of the usage of these online platforms are quantified and enhance the functioning of the higher education institutions. Also there is need to obtain continuous feedback from the users of these tools so that the necessary changes can be amended for the betterment of the learners.

I would like to conclude by saying that about three decades back , it was beyond imagination for all of us to think of using a visual image device in a classroom; however , now , it is impossible to think of a teaching- learning process without technological assistance. What we have created, are making us more creative!

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