Service Oriented Implementation of Information and Communication Technologies in Education

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Abstract:

Internet has enabled the people to involve the use of information and communication technologies (ICT) in every routine. Easy graphical interface of such technologies has made it so popular that anyone can utilize technologies and associated applications by just visualization. It has attracted educationists to utilize the ICT in the routine education delivery and evaluation system. It has been observed that the teaching and learning process has been very effective while ICT and its associated tools are included. Many government policies throughout the globe have been focusing on providing the ICT based education but many analysis reported that educational system were lacking in the use of ICT for its routines. Due to COVID19, regular educational routines are not possible to avoid contacts. ICT has been continuing the teaching learning process in the education system. But ICT technologies have their own issues and face many challenges while being implemented as a service. in developed and developing countries. This paper aims to find out the role of ICT to enhance the education delivery specially in the pandemic situations.

Keywords:
Information Technology Education Government Service Society

I. INTRODUCTION

Education system demand a very rapid sharing of knowledge, research outcomes and opportunities through web resources. Involvement of technologies requited for it are computing, storage and communication, leading to ICT[1] [17]. In the era of computing we cannot even think for education delivery without using IT aided technologies. A very simple form of IT utilization in the education system has been presentations for last about three decades and so on. Traditionally, over head projector with transparencies as storage media and multimedia projectors with electronic storage media like CD,DVD and pen drive have been used for this purpose. But when

we talk about the global scenario of education system, web resources and web communication is involved with use of email, social networking. ICT driven education is based on sharing and transmission of knowledge, research facts transferred through electronic mode without physical contact. Inclusion of ICT methodologies and services are making major differences in the pedagogical approaches. ICT enhanced learning environment facilitates collaborative, creative and evaluating learning as an advantage over the old methodologies[22]. ICT based education is successor of computer-aided teaching and learning which is based on the computer-aided instruction over communication channels. Use of such instructions are flexible, broad viable and more opportunistic. Involvement of Information and Communications Technology (ICT) has motivated the teaching, learning and research tremendously for last about one decade. Its ease of use, access has made it a major component of educational system with the use of handouts, documents or presentations.ICT supportive tool have been very popular as a pedagogical means in education. It drives the cognitive, pedagogical and affective benefits of using ICT for teaching and learning process[2]. Higher education system in all countries undergoing a big transformation phase for access, equity and quality of educational are research facts. It has been possible the rapid evolution of information and communication technologies (ICT) around the world. ICT has influenced almost all the components of educational process like access, equity, management, efficiency, pedagogy and quality[3]. ICT has transformed the learning process of education system to the next level where teaching learning tools are based on technology and helping students, teachers and also updating to the parents or guardians. ICT has transformed the method of dissemination of knowledge. ICT has also helped to modify the teaching learning process model. ICT has replaced the traditional methods of research, education and provided the more feasible and reliable education delivery system concept instead of the traditional methods. Even nowadays people also prefer the ICT tools and methodologies to access the knowledge as it can also be recorded latest advances in different areas of education and research and allied domain. Education is backbone of a country's social and economic growth to increase the productive capacities and upliftment of individual and society individually. Education helps to develop the sense of a good social living and many other intangible benefits. ICT has a variety of products available related to the education like online platforms, teleconferences, online sessions, web based sessions and many storage devices.

II. ICT IN EDUCATION

Technological enhancements have affected the industrial sector and different productive/service centric sectors including education[23]. ICT is viewed as a "major tool for building knowledge societies" (UNESCO 2003) and particularly, as a mechanism for education that could provide new method for rethinking and redesigning of the educational contents and processes, thus leading to quality education for all[4] . Appropriate use of ICT has already been proven in Europe school education and has been considered a key factor in improving quality of educational level. It motivated them to introduce the promotion ICT in teaching-learning processes through their e-Learning plan. UNESCO and UNICEF with the association of government of India, have started a pilot project in India for internet access in every school, college. But due to constraints like no electricity connections,

poor geographical conditions, non availability of public infrastructure, it got limited in urban areas only. ICT has many applications in area of education. ICT has been proved as booster to enhance the quality as well as delivery scope of education to any of the nation. ICT enables the remarkable change in the nature and quality of education by facilitating students or audience with many methodologies associated to ICT. ICT technologies attracted its audience such as students, teachers, educationists and the community even who were never been habitual of such technologies. ICT improves the teaching-learning process through the more interactive education methodologies and tools to attract the learner's motivation. It is a way of level placing of each and everyone to get access of same education platform, bringing education to the doorstep of everyone, living remote or rural geographic areas[5].

ICT strengthens the student learning and better teaching skills. It has been proved that more involvement of ICT in education, curriculum designing and integration have resulted much better goals achievement by student and teacher both. It has been remarkably recorded in subjects like science, physics, and mathematics [6]. However use of technology between teacher and students requires both to be digitally literate. Use of ICT in the education system can lead better content addressing, mutual information exchange between both and to create better teaching environment [7]. However budget constraints are always there to be considered for it. Digital literacy enables higher order thinking skills, positive creations, smooth exchange of the dialogues between teacher and student. Use of ICT in education also leads to meet the with ongoing technological change in society and surroundings[8][18]. ICT in education leads inclusion of interesting, colourful and much graphical images in the delivery content for better understanding, pictorial and animated presentation of complex instruction by the use of appropriate technology. It helps to create interactive classes with much enjoyable contents to attract more attention of the students to improve attendance. ICT helps a lot to the distance learners to use online educational materials and ease access of the online resources, leading to the resource assist learning. But implementation of ICT meets with many issues like rapid changes in the society, economy, and parallel technologies. Introduction of ICT in the system cannot become fruitful until the users are also literate to access and avail its benefits. General crowd of the developing countries are still not much aware and capable of using technology or its advanced tools. It has been recorded as serious issue while implementing ICT [9].

III. CHALLENGES FOR ICT IMPLEMENTATION

a. Reengineering of Education System:

Use of ICT in education should follow use in society, not lead or impose it. Programmes that use cutting-edge technologies have been observed failed in long term. The teachers, students and parents or guardians have been habitual of traditional education systems for many decades. Formulation of new technique or approach for education contents delivery and its evaluation need to create a zeal of adapting new trends. In general, societies

lack on initiations for observing, understanding and adapting new concepts. They limit the use of the internet based technologies for entertainment or social networking only. The main reason for it is the lack of trust on technology. Hence there is a demand of reengineering of education system with the involvement of government, administration and society itself to motivating the trust and inclusion the technology in daily routines and education system and avoid the contacts in case of disasters like COVID19.

b. Infrastructure Building:

Inclusion of ICT technology need infrastructure at hardware, software, courseware levels. In most of the countries existing old infrastructure cannot sustain the load of electrical wiring, heating/cooling and security systems required for implementation of ICT technology. In many developing countries, obstacles as no constant and steady supply of electricity, communication channel are far away. These countries have very poor wireless telecom infrastructure. Many schools, universities in the developing countries lack computers, electricity and telecom connectivity and their sustainability[10][19]. Geographical inequity and imbalance make it tough to provide and maintain ICT infrastructure. However developed countries take advantage in this area.

c. Integration of Technology and pedagogical innovation:

New innovations in the current pedagogy are required to get integrated with ICT technology driven education. Policymakers at government, institution, and administration level are required to make appropriate regional, national and global policies to motivate the integration of ICT with education pedagogy. The effectiveness of ICT in education depends on how ICT is included, used and for what purpose. ICT does not for everyone, everywhere and in the same manner. Enhancing gradual but constant access , enhancing the quality of ICT based educational contents and placing those contents at same level at diversified geographical, economical areas of the continents. Using proper audio, video and animation technologies, interesting contents can be developed to attract the attendance. Contents and evaluating assessments based on ICT are very much helpful for distance learners. A research has already claimed that there was “no significant difference” between the grade scores of learners taking education through ICT-based distance courses and those who were getting it in a class room or auditorium in face-to-face instruction method.

d. Capacity Building:

Administrators of education organisation, proper fiscal management, motivating policies for teachers also play important role for implementation of ICT in education system. Teachers of the educational institutes do not take interest to learn new methodologies to deliver the contents and assessment subsequently. It is due to the lack of interest to teach ICT, lack of ICT literacy among teachers and students, lack of knowledge of development of pedagogy and its modification for ICT, limited access to ICT facilities. Technical trainings are also needed for teachers, staff and management team of the organisation.

e. Cost, Equity and Sustainability:

The importance of information and communication technology (ICT) in education in the current era cannot be overemphasized. Many literature reviews has shown that ICT tools and methodologies have become indispensable in today's information age, drastically impacting on the global living. ICT has efficiently supported entire globe during latest faced pandemic also when there is no any provision of physical contact anyhow [11]. ICT infrastructure needs lot of investments in areas like purchase of devices, equipments , trainings to the technicians, teachers and maintenance of the equipments. In developing countries money investments matter a lot as those face its scarcity. Cost effective solution in the area of ICT are to be deployed, especially in the countries where economy is too low or government policies don't prefer such investments on high priority. Equity is related to the implementation of ICT enabled environment globally among the developing, less developed and developed countries. All these three have their own meaning and ways of money investments for education system and then implementation of ICT in it. ICT solutions have to be sustainable for meeting the economical growth, environmental protection, society, eco-system and democracy of any country or region. The use of technology in any sector should not affect any type of sustainability.

IV. CONSTRAINTS FOR SOLUTION

While designing or thinking for an effective solution, many factors are to considered at teacher, student and infrastructure level. For example, perceptions about ICT and its associated curriculum by student, teachers parents and also by society. Awareness and literacy about ICT in all. Pedagogical history and approach of students and teachers. Availability and sustainability of ICT infrastructure for students and teachers[12][19][20].

There is need of complete guidelines on successful inclusion of the ICT based curriculum in the education system or curriculum. Educating and creating positivity for use of ICT among the teachers and students is also secondary task for successful implementation of ICT. It has been observed that many education system and their counterparts avoid ICT or resist it due to lack of full information about its productivity. It has been observed for last about two decades that multimedia based animated teaching contents, animated case studies of the subjects, bring to more learning. However lack of ICT infrastructure and poor quality of available infrastructure hinder it. When we talk about the home or family support for ICT, it totally differs from the college, universities. For example children have more interest in animated contents, girls have another approach to use ICT contents. Many parents or guardian find animated contents useless as teaching aids. Main concern about avoiding the ICT is its out of reach either technically or economically specially in developing countries[13]. Governments also have a major role to promote the ICT usage by providing better infrastructure, education or awareness

programmes for teachers, students and even entire society for its usage and providing the subsidies to the related authorities to promote ICT infrastructure.

Many myth and worries with the implementation of ICT are also there. These are to be addressed while implementing ICT solution in the education system. For example will exposure and use of ICTs affect the future employment in education sector? Or What will be the impact of computer aided instruction in education Or How gender will impact on ICTs in education Or Is ICT suffice for use to present, comment on and discuss student work or are all educational setup and their curriculum are suitable for ICT integration than others? Many findings suggest that ICT companies may result enriched in education sector also not only for its deployment in boosting circular economy in the service-oriented technology sectors [24]. Further ICT era may be involved with the help of IOT in village 4.0 and machine learning will also help for better communication [25-30].

CONCLUSION

ICT has been proved as necessity and an opportunity in education system specially in pandemics when there is no option except dependency on digital mode of connectivity. While using any technology, issues and challenges are there to limit the scope of it. In developing countries implementation of ICT technologies and support for it is a big obstacle14]. Introduction of ICT methodologies motivated the teachers as well as learner to explore more components of it for its optimum utilization. Though the ICT technologies have faced many social, ethical, technological, economical challenges, cost and power solutions but it has attracted people to explore and enjoy its factors which were hidden for a long time.

Many developing countries face lack of resources for implementation of ICT technologies specially in educational sector educational is one of the hindrance in its implementation[15]. Governments, Management bodies avoid to such investments. Secondly, less exposure to the computer, ICT and technologies of the students and teachers is also responsible for it. The education system needs to be alert for ICT enabled technologies in its system for regular routines of education as enhancement and as a preventive action in the case of pandemic. Since, implementation of ICT major dependent on the mentors and academic management, government, allied corporate sectors, can help by providing infrastructure, in-service service centric training to the society. Private sectors can be collaborated for this novel cause.

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