

EMERGENCE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY (ICTs) IN EDUCATION DURING THE COVID-19 PANDEMIC

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ABSTRACT

Use of Information and Communications Technology (ICTs) in education is not a new concept and it is pre-requisites in India and elsewhere in the world for various field of education. However, its role emerges drastically during the Covid-19 pandemic era in India and elsewhere around the world due to lockdown condition. Therefore, our objective for this article was to see and understand how ICTs scenario changed over time in India before and after Covid-19 pandemic. Various field of education exist from school to higher learning institutes in which major streams are science, engineering and arts. No doubt science and engineering students and teachers are very much familiar with ICTs as compared to arts discipline learners and educators. Therefore, we also looked into that which fields of education are using ICTs and how it progressed over time from 2001 to 2021? We found that ICTs were used since the beginning of 2001 and there role increased over time while during the Covid-19 pandemic era its role emerges drastically. We also found that computer science, electronics engineering, physics, science etc. discipline were using ICTs for education purpose since the beginning of pandemic. However, ICTs role have been increased during pandemic irrespective of schools students or higher education as well as discipline. We can clearly see that now arts students and teachers are well sufficient in using ICTs. In near future role of ICTs will bloom due to generation alpha, who has started technological tools during preschool education.

Keyword: Information, communication, technology, virtual education, online platform, generation alpha

1. INTRODUCTION

Currently, whole world is living in Covid-19 pandemic era. It was born in China around December 2019, and It was spread around the world after Chinese New Year in 2020 silently and had no time in controlling it [1]. Both developing and developed countries did not have a chance to stop to control it and they were not fully prepared in terms of infrastructure and strategies to cope with covid-19 pandemic [1]. The Covid-19 infection started to spread in the month of February and March, 2020 in India [2]. Due to Covid-19 most of the countries faced lockdown situations for more than a month. Everyone despite being rich or poor faced its impact as well as industries and other business [3]. It also shakes the Indian and world economy and including other various fields like education [4, 5]. During pandemic period, most of the universities, colleges and schools in India were supposed to conduct exams. During that time 10th and 12th board exams were on going while all of sudden exams supposed to be stopped in the middle due to Covid-19 pandemic lockdown. During that time most of the universities and colleges were planning to start new semesters and conducting exams but everything was postponed. Because, Use of information and communications technology (ICTs) in education was not a new concept and it is pre-requisites in India or elsewhere in the world of education field such as in form of EDUSAT—educational satellite, SWAYAM PRABHA e- classes, DTH channels, conduction of competitive exams in online mode, use of PowerPoint lectures and presentation and along with various other forms [6]. We are using phones, tabs, laptops and other devices usually for personal uses

before covid-19 pandemic however, scenes and scenarios was changed totally after covid-19. During pandemic whole world including India feels helpless then ICTs proves one of the milestones for the government and educationalists [7]. Everyone started to use in despite of job and field ICTs that were focused on online teaching as well conducting online meetings. That is where in India online or virtual teaching took place on a priority basis rapidly during the pandemic.

Several applications and platforms such as Zoom, Google classroom, Google Duo, Imo, Whatsapp, Microsoft team, YouTube and other various sites were frequently applied for education. These applications and platform were already exists before pandemic, however, most of the teachers, lecturer and professors and students were not user friendly to operate and use these applications [8]. Moreover, during Covid-19's situation, circumstances and time demand, all educationalists had to use these tools and techniques as a first priority to fulfill their jobs. The ICTs proves to be a milestone for everyone at that moment. In pre Covid-19 period YouTube channel [9] act as an informative and entertaining platform, While during Covid-19 period YouTube channel proves to be the best platform for teachers because they can post and share their lectures video online and every student can access it any time all over the world. Before Covid-19 most of the areas of teaching was face to face and teacher centric and thus they had command and demand towards their students to become more creative and active in every field [10]. Thus this study is to understand how ICTs were evolved overtime and how their use became useful in the pandemic time. Also though pandemic occurred but it was good or bad it is still a debate issue in terms of climate change mitigation or improved education in 21st century.

2. PURPOSE OF THE STUDY

The aim of the study were

- (1) To see the how ICTs scenario changed over time in India as compared top before and after Pandemics. The ICTs were used before Covid-19 pandemic era however its role increased during last two years due to virtual education under lockdown condition.
- (2) Which field of education was using ICTs? Science and technology fields were using ICTs more than art fields before or after pandemic due to user friendly environment of the field of education.

3. METHODOLOGY

To fulfill our objectives, myself searched keywords such as “India online education” and “India information communication technology education” from 2001 to 2021 to extract number of publications and various field of education data using web of science search engine. I used this time frame from 2001 to 2021 to understand the role of online and ICTs in Indian education system. Although, online and ICTs were used in educations before 2001 but it was properly used only after 2001 due to technological development.

4. RESULTS

4.1 Online and ICTs based education scenario in India from 2001 to 2021

The keyword “India Online Education” searched resulted into 2692 publication on web of science database (Fig. 1). More than fifty percentages related literature was published in last five years from 2016 to 2021. That confirms online education was initiated before Covid-19 in India though it was surprisingly increased during 2020 to 2021 due to lockdown condition in pandemic (Fig. 1). It is almost clear from the figure 1 that online education exponentially increased from 2001 to 2019 and in 2020 to 2021 increased unexpectedly due to pandemic.

The keyword “India Information Communications Technology Education” searched resulted into 1301 publication on web of science database (Fig. 2). More than fifty percentages related literature was published in last four years from 2017 to 2021. That confirms that ICTs education was initiated before Covid-19 in India while it was increased during pandemic (Fig. 2). It is almost clear from the figure 2 that role of ICTs in Indian education system exponentially increased from 2001 to 2019 and in 2020 to 2021 increased unexpectedly due to pandemic.

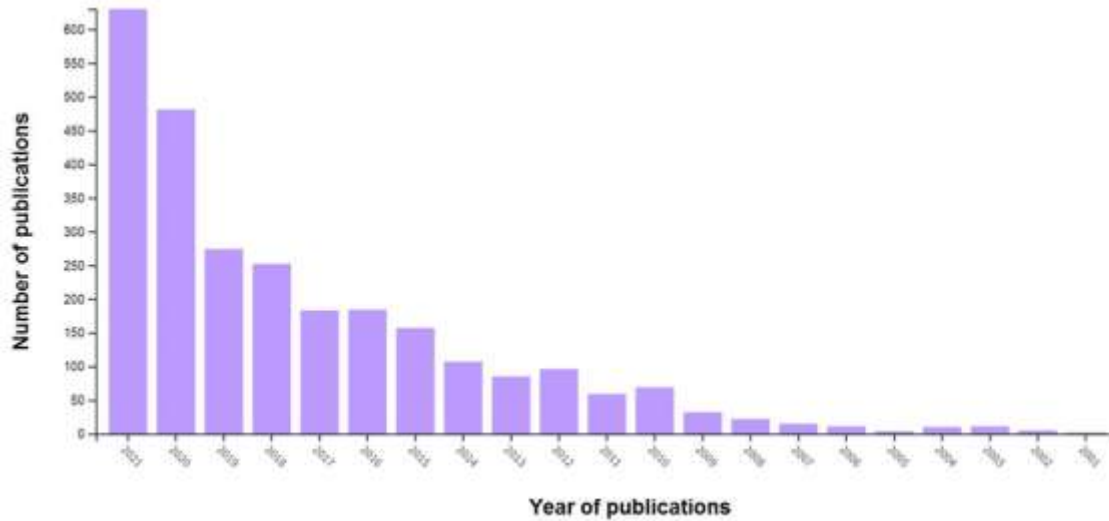


Fig - 1 Number of publications published using keyword “India Online Education” from 2001 to 2021.

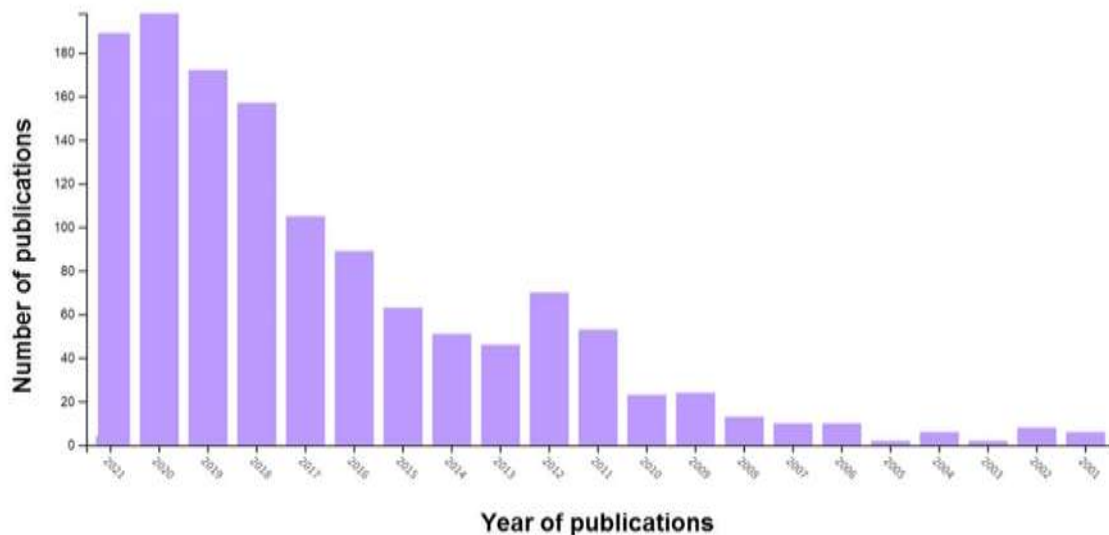


Fig - 2 Number of publications published using keyword “India Information Communications Technology Education” from 2001 to 2021.

4.2 The ICTs scenarios in different field of Indian education system

The keyword “India Online Education” searched resulted into 2692 publications from different field of education on web of science database (Fig.3). Figure 3 shows top twenty different field of education used in online education system in Indian system. Educational teaching and research comprised of 15% of total publications published from 2001 to 2021 (Fig. 3). Engineering and technology fields such as electrical and electronic engineering, computer science research and technology were in second and third place in the field of education where online education was used (Fig. 3).

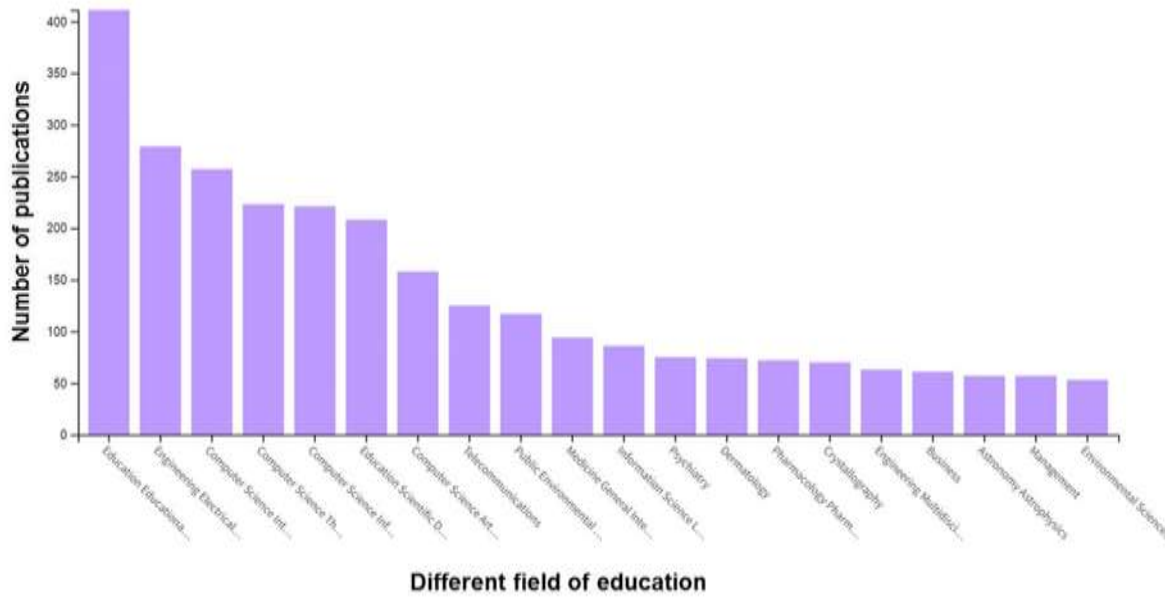


Fig - 3 Number of publications published using keyword “India Online Education” in different field of education from 2001 to 2021.

The keyword “India Information Communications Technology Education” in different field of education searched resulted into 1301 publications on web of science database from 2001 to 2021 (Fig.4). Figure 4 shows role of ICTs in top twenty different field of education system in Indian system. Engineering and technology fields such as electrical and electronic, computer science research and technology, and telecommunications engineering were top four field of education where ICTs was used (Fig. 4). Educational teaching and research comprised of 10% of total publications published from 2001 to 2021 and was fifth field where ICTs were used in the education system (Fig. 4).

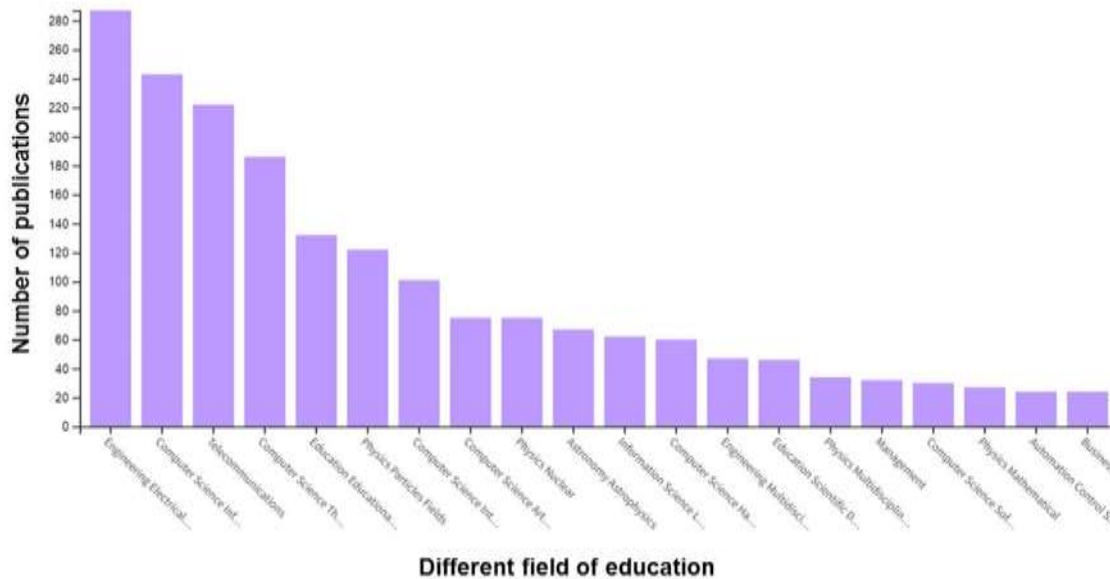


Fig - 4 Number of publications published using keyword “India Information Communications Technology Education” in different field of education from 2001 to 2021.

5. DISCUSSION

At present time where situation demands towards teachers to make them more active, creative and friendly with the technologies. Current information and communications technology (ICTs) have been rapidly increased over time to improve the students learning and increase the productivity of teachers [11]. This study also showed that role of ICTs and online education became evident (Fig. 1 and 2). Educators have need to learn multiple tools, methodologies, approaches and theories to be the best however, it is not always possible and difficult [12]. It may be due to generation gaps where technologies have been changing and developing in enormous numbers in short period of time. Moreover, there was no generation differences in Canada where it was completely depends on particular persons behavioral characteristics [13]. Though how behavioral characteristics differ from developing and developed countries educators need to be considered in this context. A classical study showed that ICTs supported learning system gradually and helped in developing and apparent new strategies in pedagogical evolution [14]. Capacity building is needed for educators from developing countries to use ICTs platforms in developing countries in the past when ICTs were introduced. While, that is not the situation in the present condition where most of the teachers and educators are having smartphones, tab and laptops as well as internet availability. In spite of that educators felt difficulties in using ICTs platform or had anxious nature in adopting technologies in teaching. Lots of schools, college and Universities including corporate world scheduled the programme for conducting seminars, conferences and meetings face to face before covid-19 however everything was cancelled. However, someone well said that “necessity is the mother of invention” and that is what happened during Covid-19 pandemic era. Because, under Covid-19 scenario the situation related to use of ICTs was changed completely and took another direction. New hope generated in little time spun and seminar became webinar and it has given a chance to participants to enhance their knowledge and updating themselves at their comfort and places. Because when first announcements was made for online teaching due to pandemic lockdown, that created a panic situation for most of the academicians, especially those who were not familiar with ICTs. But they learned how to use technology to teach students in that situation.

Most of the colleges and universities started to conduct various online FDP programmes during Covid-19 and that gave hope to everyone. However, participants lost interest and attention for attending these courses from online mode because they were not familiar and used to it and prefer face to face learning environment in the past or before pandemic. While, now they are taking and showing interest in online courses. That is where everyone started to realize the importance of ICTs as well as became confident to potentially handle and operate several ICTs tools. We were familiar with the technology before pandemic but we thought it was not user friendly. In fact, technology advancements also allows for a user-friendly integration by non-technologically educators using successful mix of strategies that eventually enhance the learning experience [15].

Different educators form respective field of education use ICTs differently. Most of the times literature and arts students are not much familiar with the ICTs and it is because they never try new technology independently. For instance, they need someone else help to prepare teaching materials in other word mostly depended on related technological persons but in during Covid-19 they have to do every work themselves and therefore got chance to realize and understand the role of ICTs. They also realized their potential and became more confident in using ICTs. No doubt ICTs makes our lives much easier and reachable. Though, this is not the case for engineering educators who are mostly very much familiar with ICTs and its role in education. In Africa a positive shift was found to improve the quality of education system in science, engineering and technology using ICTs for example development of living lab [16]. Engineering and technology education in India has changed over the last two decades. High quality education have substantially increased and led to adopt ICTs [17]. Thus, Indian government had initiated NPTEL, EDUSAT (education satellite), virtual classroom and laboratories to enhance the education quality. That is clearly depicted from the results shown in the figure 3 and 4, where ICTs were highly used in the engineering field as compared to other discipline.

Most of the teachers had no prior training for online teaching before pandemic. If most of them had knowledge how to use ICTs then still in the 21st century where we are talking about digitalization and internet banking in India and exist around the world, but still many places do not have internet facilities or connection is slower. During pandemic what government and people learned is that accessibility of smart devices and technologies are prerequisite condition to use ICTs. In most of the developing countries several teachers and students had no accessibility to these things and it was quite obvious to use ICTs. Both central and state government has actively engaged to develop ICTs solutions to deal with the evolving situation in India during pandemic [18]. Governments

need to ensure that the use of ICTs is proportionally important before and after pandemic in India [18]. Because teaching is a two way communication process and therefore both teachers and students should have accessibility to technologies. No doubt online teaching proves a milestone in the period of Covid-19 but still government officials need to concentrate on solutions to make it more effective which exist in use of ICTs.

In some priorities areas the government needs to provide capacity building for teachers on a prior basis at basic level. In cities teachers and students have internet facilities and thus they are facilitated with online teaching, but on the other hand in remote areas no internet facilities are available. Therefore teachers and students are still in doubt and confused about the future of ICTs. We can hope for the betterments in future. Though, Covid-19 pandemic is not really good for any country or individuals because several families lost loved ones [19], lost jobs [20], slow or negative economy [21], individuals personal and professional problems [22] etc. However, this pandemic has taught something to be prepared for worst situation in the future where climate change is the biggest threat [23]. The ICTs also help in achieving Sustainable Development Goal 4 that inclusively includes quality education for the world.

6. CONCLUSIONS

In near future we will be completely depending on technology based education system around the world which has been already started. However, Covid-19 pandemic have already taught us a lesson and therefore we are prepared in using ICTs irrespective of learning institutes such as schools and Universities, of place either in India or elsewhere in the world, of discipline either it is a science or engineering based education or arts. Also several higher education institutes have started very specific online courses around the globe and learners could easily earn at home.

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