

IMPACT OF ICT ON EDUCATION SECTOR – A FUTURISTIC ANALYSIS

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ABSTRACT

Information Communication Technology (ICT) has been steadily growing and significantly contributing to the education sector. Digitization of education is the need of the hour and the phenomenon was ignited by the need to enable the “Right to Education for all” which is a cause supported globally especially by the developing nations. Education is the panacea to a host of socio-economic, psychological, moral and cultural crisis and uplifts societies in general.

In modern times of new age pedagogy where due importance is provided to remote learning, un-schooling, home schooling, self-paced learning and open universities recognising the power of meta cognition and free information for all, ICT plays a significant role on enhancing value added education initiatives for diverse sects of learners.

ICT provides a platform to interact with students digitally and provide courses across frontiers with learners and educators getting global exposure. It facilitates immersive and inclusive learning. This research paper explores the potential contribution by introducing ICT within the folds of formal education.

Keywords: *legal, protection, infringement, IPR, education*

INTRODUCTION

Education is often regarded as a crucial milestone in any civilization. The progress of every nation is heavily contingent upon the quality of its education system. India is not exempt. The education system of ancient India was mostly founded on the 'Gurukula System'. Indian education has had several phases, ranging from the Vedic era to the post-independence era. Contemporary education extends beyond the confines of the classroom. The recent advancement of technology has expanded the scope of learning beyond the confines of the classroom. Information and Communication Technology (ICT) is essential in this regard. It is considered a crucial component for implementing educational changes and advancements in secondary and upper secondary schools and universities. "The National Policy on Education (1986), with modifications in 1992, emphasized the use of educational technology to enhance the standard of education. In 2004, the policy statement resulted in the merging of two major centrally sponsored schemes, Educational Technology (ET) and Computer Literacy and studies in School & Colleges (CLASS), to create a more comprehensive scheme called Information and Communication

Technology (ICT) for schools. ICT is an acronym for Information and Communication Technologies. In the context of this primer, ICT refers to a wide range of technical tools and resources that are used for communication, as well as for the creation, distribution, storage, and management of information. The technologies included in this set consist of computers, the Internet, e-mail, web-based PCs, mobile phones, wireless devices, projectors, interactive boards, broadcasting technologies (radio and television), and various interactive boards. ICT is a system that utilizes contemporary technology to collect and transmit various information or data over long distances.” The incorporation of ICT into education is seen as the capacity of the new technological system. ICT serves as both the foundation of the Information Age and a crucial driver and instrument for implementing educational changes that transform our students into efficient knowledge workers. There is a common argument that the information acquired by pupils is mostly formal and their ability to understand new ideas is somewhat limited. Hence, we are confronting the possibility of using ICT and contemplating how this alarming scenario may enhance the educational systems of society, in line with constructivist theory, where both instructors and students acquire the essential information and skills required in this era of digitalization. Therefore, many countries worldwide are prioritizing the incorporation of ICT in education to enhance the quality of learning and teaching. This emphasis is placed on developing competencies such as critical thinking, decision making, adaptability to changing circumstances, teamwork, and effective communication. Various educationists have done several studies to assess the impact of ICT on the quality of education at the secondary

and upper secondary levels. Although all of these studies addressed the problem of ICT in education, to our knowledge, no thorough effort has been done to examine the effect of ICT in education. This research aims to analyze the influence of ICT on improving the quality of education in contemporary times.

REVIEW OF LITERATURE

“With the advent of computers, which laid the foundation for our present-day information and communication technology (ICT), and the promising capabilities of computer-based instruction and learning, numerous researchers and funding agencies were motivated to allocate significant resources to explore the feasibility of computers taking over teachers' crucial instructional responsibilities (Roblyer, Castine and King, 1988).”

In addition, the “Everest Syndrome’ (mentioned in Roblyer et al., 1988, p. 5) led many people to believe that computers should be introduced into education solely because they exist. This further perpetuated the misconception that students would automatically benefit from computers by merely providing them with software and hardware. Nevertheless, the initial excitement and sense of novelty gradually waned as it became more clear that the expected fulfillment of promises and beliefs was not materializing.”

“In his keynote presentation titled, ICT in Education: The Future Research and Policy Agenda” Reynolds (2001) expressed his concern about being stuck in a cycle of failed innovation. He argued that when a new technology is implemented poorly and is not very effective, it leads to little or no improvement in outcomes. “This lack

of improvement then results in a lack of commitment to the innovation and a reluctance to implement more advanced stages of the technology. These advanced stages are more likely to generate the desired improvement in outcomes, which would then increase the commitment to using ICT. (Reynolds, 2001, p.2).”

IMPAC Project “The initiative known as IMPAC (Instructional Microcomputer initiative for Arkansas Classrooms) used four distinct set-ups (McDermott, 1985).” The arrangement included providing each student with access to a computer for a certain duration on a daily or weekly basis.

Roblyer et al. (1988) conducted comparative research both before and after 1980 and then published their results in their review. During the research conducted before 1980, almost all of the approximately 200 studies showed favorable evidence that computer-based therapies provided advantages compared to other approaches. However, it is worth noting that there were only a few instances of obvious discrepancies among the evaluations.

“The results could be summarized as follows:

- There was a decrease in the amount of time needed to learn.
- There was only a slight increase in motivation to learn.
- Computer-based treatments were generally successful in improving skills in mathematics and reading/language.
- Computer-aided learning (CAI) was significantly effective as an additional tool for students in lower grade levels.
- Students who struggled or did not perform well academically benefited more from computer-based methods compared to high-achieving students.

Computer-based approaches tend to be more efficient when used at lower grade levels. The efficacy of computer-managed instruction (CMI) seems to improve as grade levels climb, but the impact of computer-assisted instruction (CAI) tends to diminish at higher levels. In the post-1980 study conducted by Roblyer et al. (1988), favorable impacts were seen in the achievement outcomes of 85 research, with the exception of ESL, problem-solving CAI, accomplishment among females, and attitudes toward computers as instructional medium.”

“The review concentrated on five main areas as shown below:

- **Attitudes-** The evaluation only included three research with relevant data, all of which consistently shown a favorable tendency towards computers.
- **Content Area-** The computer program was shown to be most successful in the field of Science, followed by Mathematics, Cognitive abilities, and Reading/Language.
- **Application Type-** Analyses were conducted for Reading and Mathematics based on enough data, and both were determined to be equally efficacious.
- **Grade level-** Among the three levels, the effectiveness of Computer-Assisted Instruction (CAI) was highest for the college/adult level, with an effect size (ES) of 0.57. In comparison, the elementary and secondary levels had effect sizes of 0.32 and 0.19, respectively.
- **Types of Students-** There was evidence suggesting that computer applications were more effective for lower-achieving students compared to regular, on-grade students, although the difference in effects was not statistically significant.”

In light of the diminishing importance of its priority, Roblyer et al. (1988) emphasized the necessity and immediacy of conducting research in this field. They advocated for a shift in the perception of the significance of behavioural research in various ways.

“Educational institutions must revise their outlook on research, acknowledging it as an imperative for progress and expansion, and allocate funding to it as a top priority alongside hardware and software.

Funding agencies should acknowledge the necessity for increased and enhanced research in instructional computing methods, allocate the necessary funds to facilitate it, and actively seek ongoing research projects to address crucial inquiries.”

“Practitioners should start depending on research findings to determine the credibility of their beliefs and hypotheses, and demand that their organizations furnish the necessary data.”

In light of the results, there was also an encouragement for further study in other domains. The following fields of study are listed:

- Utilization in diverse skill and subject domains.
- Implementation of computer applications in ESL (English as second language) education
- Utilization of software tool like word processor.
- Problem-solving and creativity skills through Logo (a programming language) and CAI (Computer Assisted Instruction)
- Examination of the impact of computer use on attitudes and dropout rates
- Analysis of the differential impact of use of computer on the

academic achievement and results between female and male gender.

“Significant academic inquiry into ICT has been carried out in the last decade, primarily originating from the United States and the United Kingdom. However, there are also accounts of research conducted in various regions of Europe. Literature reviews in this field are crucial for both educators and policy makers, particularly those who are hesitant to allocate funds for extensive longitudinal studies. Yelland (2001) emphasized the necessity of funding in Australia to facilitate a range of research studies, which should incorporate a mixed-method research design (Yelland, 2001, p. 36). This research would acknowledge the beneficial impacts and identify any adverse influences. By employing this approach, we can ascertain the most effective methods to enhance learning in order to achieve better results.”

The school can be conceptualized as an ecosystem, where different species interact and adapt to each other within the system (Zhao, 2003). Zhao reiterated that any invasive species must undergo adaptation to the ecosystem it infiltrates, but it has the potential to alter both the ecosystem and its indigenous species. “The integration of ICT in schools can be compared to the introduction of an invasive species into an ecosystem. The principals, teachers, and students will undergo a period of acclimation and modification as they strive to establish their roles within the new educational setting and engage with the new technology. ICT development in schools typically progresses through four distinct phases: emerging, applying, and transforming (UNESCO, 2002).”

RESEARCH GAP

- Research in ICT does not adequately cover all the factors. In this study we attempt to understand the relevance of ICT from the end-user point of view.
- Correlation between concept of ICT & its usage are not clearly defined in many studies, which is attempted here.
- Comparative study of eastern (Asian) and western (European & American) mindset regarding ICT is used for combined study in this paper.

OBJECTIVES

The following objectives are formulated in our study:

- To study the effect of ICT in improving quality of education & its impact.
- To compare diverse views regarding the implementation and effectiveness of ICT worldwide.
- To suggest the best possible outcome regarding long-term usage and adaption of ICT.

RESEARCH METHODOLOGY

Primary data collection method: “The investigators make use of the survey method for the collection of primary data. Surveys will serve as the main tool for making strong discussions and elaborating the outcome of the issues framed. One hundred respondents' views have been recorded for the study.

Secondary data collection method: Secondary data which is used for the study includes the study of tourism industry with reference to

travel and hospitality sector and sustainable tourism practices. Reference books, research papers and publications along with reputed journals and websites are also consulted.

Data collection: The data has been collected from both the primary, as well as secondary data collection sources. The Primary data has been collected by means of a questionnaire as survey instrument.

Sample size: Total number of Respondents - 102

Area of Study: Mumbai, India

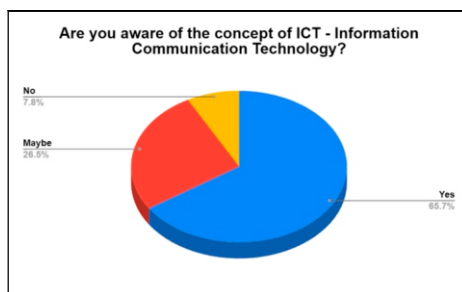
Population: The Majority of the respondents included are from student learners from diverse courses and from diverse socio-economic background.”

DATA ANALYSIS

- Primary data was collected from 102 respondents.
- Sample was taken from student learners from diverse courses of higher education.
- The sample is gender fluid and from diverse socio-economic background.

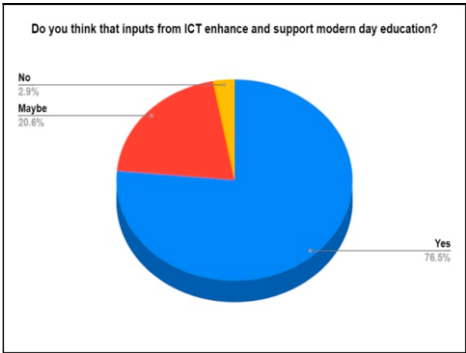
Q1.) Are you aware of the concept of ICT - Information Communication Technology?

Description	Percent
Yes	65.70 %
No	07.80 %
Maybe	26.50 %



Q2.) Do you think that inputs from ICT enhance and support modern day education?

Description	Percent
Yes	78.04 %
No	02.90 %
Maybe	20.06 %



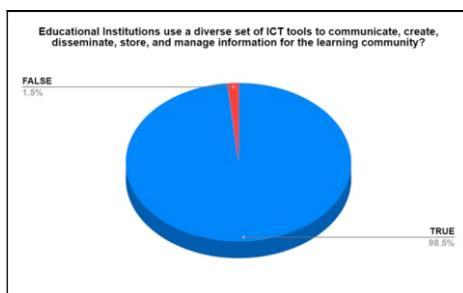
Q3.) What according to you are the salient points of incorporating ICT in education sector? [ICT enables online educational platforms to act as educational platforms.]

Statements	Absolutely correct	Partially correct	Neutral	Partially Incorrect	Absolutely Incorrect
ICT enables online educational platforms to act as educational platforms.	41.70 %	33.00 %	21.40 %	01.00 %	2.90 %
It encourages digital educational applications to be used for learning.	46.60 %	33.00 %	16.50 %	2.90 %	1.00 %
It improves student engagement & retention due to repeated viewing.	39.80 %	29.10 %	25.20 %	2.95 %	2.95 %
When PDA (Personal Digital Assistance) device is used as a learning devise it makes learning more engaging and fun-filled.	32.00 %	35.90 %	24.30 %	5.80 %	1.90 %

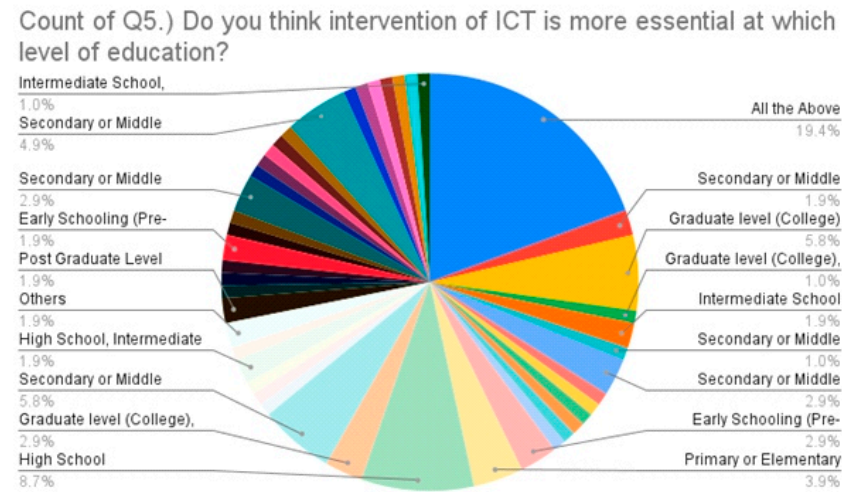
The plethora of information available on digital repositories and search engines and help self-paced learners excel in their area of interest.	34.00 %	35.90 %	24.30 %	1.90 %	3.90 %
Experts from diverse fields across the globe can be contacted as tutors due to ICT support.	50.50 %	24.30 %	19.40 %	1.90 %	3.90 %
Learner can access international courses at their choice of time and convenience.	48.50 %	27.20 %	20.40 %	2.90 %	1.00 %
ICT is a growing concept that is likely to be more user-friendly and developed over the period of time.	44.70 %	31.10 %	16.50 %	4.90 %	2.90 %

Q4.) Educational Institutions use a diverse set of ICT tools to communicate, create, disseminate, store, and manage information for the learning community?

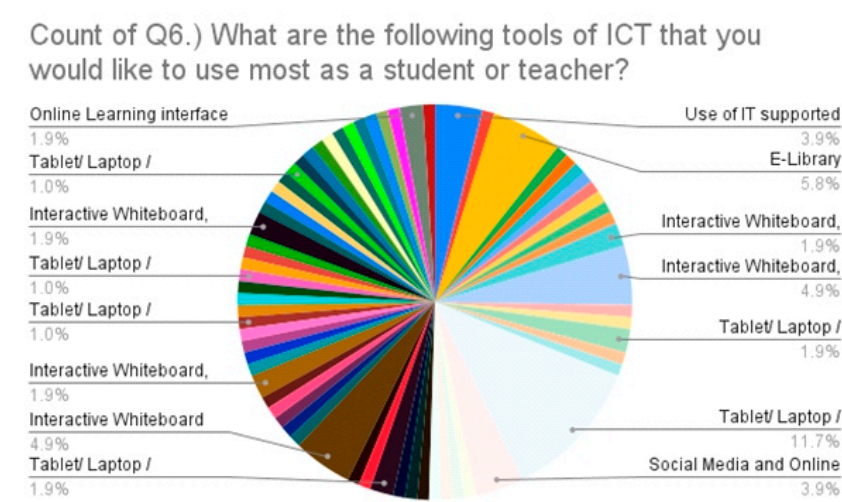
Description	Percent
Yes	78.04 %
No	02.90 %
Maybe	20.06 %



Q5.) Do you think intervention of ICT is more essential at which level of education?



Q6.) What are the following tools of ICT that you would like to use most as a student or teacher?



Q7.) ICT uses an integrated approach towards education. What are its areas of reach?

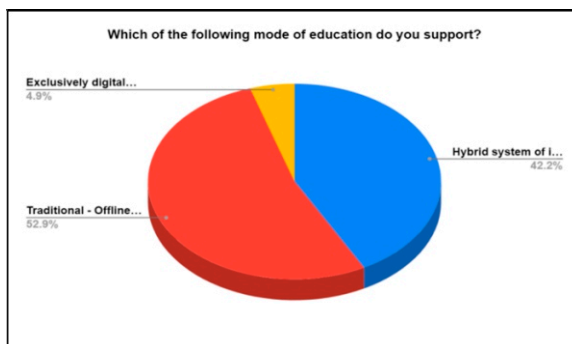
Statement	Absolutely True	Partially True	Neutral	Partially Untrue	Absolutely Untrue
It helps to reach out to rural learners vide online and digital platforms.	47.60 %	35.00 %	14.60 %	0.90 %	1.90 %
It helps to connect with those who cannot travel to school but would like to study from remote access location.	46.60 %	36.90 %	15.50 %	0.00 %	1.00 %
It helps to integrate rural, urban, global and remote access students under one platform of learning.	49.50 %	30.10 %	17.50 %	0.00 %	2.90 %
It helps in peer learning by understanding cultural diversities and exchange of other learners.	42.70 %	35.00 %	16.50 %	3.90 %	1.90 %
It helps to keep records for student, guardian, teaching & non-teaching staff and other stakeholders of the education system.	50.50 %	27.20 %	18.40 %	1.90 %	1.90 %
Teaching-learning is a part of life-long learning activity. This integration is enabled with help of ICT for learners across age groups & socio-economic profile	36.90 %	37.90 %	19.40 %	1.90 %	3.90 %
ICT engages learners of various age groups to learn together in a cohesive academic environment.	42.70 %	31.10 %	17.50 %	5.80 %	2.90 %
This platform provides no discrimination to learning community and encourages high participation.	44.70 %	31.10 %	17.50 %	1.90 %	4.90 %

Q8.) Are these drawbacks valid with respect to ICT?

Statement	Absolutely correct	Partially correct	Neutral	Partially Incorrect	Absolutely Incorrect
There are higher number of dropouts in ICT enabled educational courses	37.90 %	31.10 %	26.20 %	1.90 %	2.90 %
Many learners use this mainly as a networking platform.	30.10 %	42.70 %	21 3.90 % 40 %	3.90 %	1.90 %
Reliability and authenticity of shared data is uncertain.	29.10 %	30.10 %	34.00 %	1.90 %	4.90 %
Expenditure of online courses and devices	38.80 %	31.10 %	23.30 %	1.90 %	4.90 %
Higher enrollment in multiple courses could be demanding and exhausting.	32.00 %	29.10 %	23.30 %	11.70 %	3.90 %
Psychological impact of incompletion of program which makes the learner feel incompetent.	24.30 %	38.80 %	29.10 %	2.90 %	4.90 %
Member of multiple groups which may not be the choice of many learners.	28.20 %	38.80 %	28.20 %	2.90 %	1.90 %
Over-ambition and burnout due to over-exposure of the digital world of information.	28.20 %	35.90 %	26.20 %	6.80 %	2.90 %

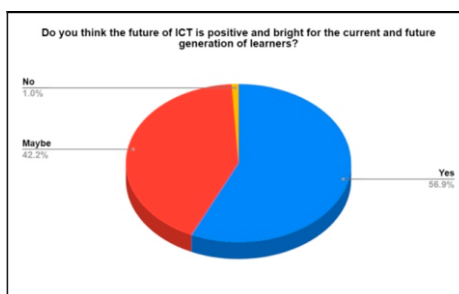
Q9.) Which of the following mode of education do you support?

Description	Percent
Traditional - Offline - Classroom education - face-to-face learning	52.90 %
Hybrid system of integrated and immersive education using traditional & IT supported approach	42.20 %
Exclusively digital education - Online educational platform	04.09 %



Q10.) Do you think the future of ICT is positive and bright for the current and future generation of learners?

Description	Percent
Yes	56.80 %
No	01.00 %
Maybe	42.20 %



Data Analysis:

- It is observed that 65.70% of the sample size are aware of the concept of ICT - Information Communication Technology, whereas 25.50% are unsure about it & 7.80% are unaware of the same.
- Regarding inputs from ICT to enhance and support modern day education, 78.04% of the sample population are in favor if it, whereas, 20.06% are neutral & 2.90% are not in agreement with the statement.
- Regarding the views on educational Institutions use a diverse set of ICT tools to communicate, create, disseminate, store, and manage information for the learning community, 98.50% of the respondents agree whereas only 1.50% of the respondents disagree.
- Regarding intervention of ICT at level of education maximum respondents opted for all the levels including primary, intermediate, high school, graduation, post graduation, doctorate and others at 19.4% which suggests the preference of the aspirants of education for ICT supported education.
- The most preferred ICT tools by learners and educationists are laptop/ tablet (11.7%) e-library (5.8%) followed by interactive whiteboards (4.9%) and others.
- 52.90% of the academicians & learners prefer traditional mode of education which uses the Classroom method of face-to-face learning, 42.20% of them opted for Hybrid system of integrated and immersive education using traditional & IT supported approach and 4.09% preferred exclusively digital education i.e. the online educational platform only.

- As per the future of ICT being positive and bright for the current and future generation of learners, 56.80% of the respondents were positive, 42.20% were neutral or unsure & only 1% of the population were negative about its successful implementation in future.

LIMITATIONS

- Current research focuses primarily on the learners community as the universe and does not include all stakeholders for study.
- 90% of respondents submitted adequately filled survey reports.
- School learners have different perceptions based on their level (elementary, middle, high school) here we have considered only adult learners at graduate level & above.
- Ambiguity in responses due to unawareness of certain concepts related with ICT.
- Hesitation in divulging privileged information about cost, usage rate and future investment in the area of governance of ICT.

FINDINGS

ICT is viewed as a supportive aid in education industry. Study indicates that use of ICT is not seen as a replacement to traditional classroom teaching which involves face-to-face interaction.

Use of ICT is in its developing aspect, most educational institutions including educationists and learners view it as an accompanying alternative or supporting aid to the formal method of education.

ICT is more popular among younger generation as the youth is well acclimatized with the online platforms. Use of digital applications, social media platforms, communication options, search engines and e-commerce websites create familiarity among the youth regarding the use of online platforms and this makes use of ICT in education more adaptable as there is less reluctance or hesitation towards its use.

The facilities of ICT platforms are well appreciated among the stakeholders of elementary as well as higher education and more and more willingness is seen towards investment in ICT by educational institutes.

FUTURE SCOPE

The usage and adaptation of ICT are widely used and accepted. This study contributes in understanding specific areas such as mainstream education.

This paper can be used to further study the grass root level impacts of specific zones where it is implemented for diverse learners such as first-generation learners, women, adult learning, regular learners, open education institute learners and others.

Factors such as cost of implementation and role of stakeholders can be studied in depth as well using the current study as base.

“Interdisciplinary research on how the brain learns and how ICT can be used effectively in the creative learning process; to stimulate the memory process, leading to effective learning can be studied with a dedicated sample size.”

CONCLUSION

Adaption and use of ICT is rapidly growing world-wide and reaching remote corners of classrooms to enable reach of education to all deserving candidates. Right to Education is a global phenomenon and its far reaching benefits are spreading across the world.

“The Right of Children to Free and Compulsory Education Act, also known as the Right to Education Act (RTE), is a legislation passed by the Parliament of India on 4 August 2009. This Act outlines the specific details regarding the significance of providing free and mandatory education to children aged 6 to 14 years in India, as mandated by Article 21A of the Indian Constitution. On 1 April 2010, India joined the group of 135 nations that recognized education as a basic right for every child.

'Free education' refers to the provision that no child, except for those attending non-government supported schools, should be required to pay any form of fees, charges, or expenses that could hinder their ability to access and complete primary education. The term 'compulsory education' imposes a duty on the relevant government and local authorities to guarantee that all children between the ages of 6 to 14 are enrolled, attend, and successfully complete primary school. India has progressed towards a framework that emphasizes the rights of individuals and imposes a legal duty on the Central and State Governments to enforce the basic right of children, as stated in Article 21A of the Constitution, in line with the requirements of the RTE Act. 17.”

For practical implementation use of virtual mode and digital platforms will have to be adopted so that the education initiatives

reaches remote areas where transport and migration challenges are severe.

Use of ICT will be like elixir for aspirants of education and deserving candidates worldwide. In future more research, awareness and investment is likely in the field of IC based education.

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