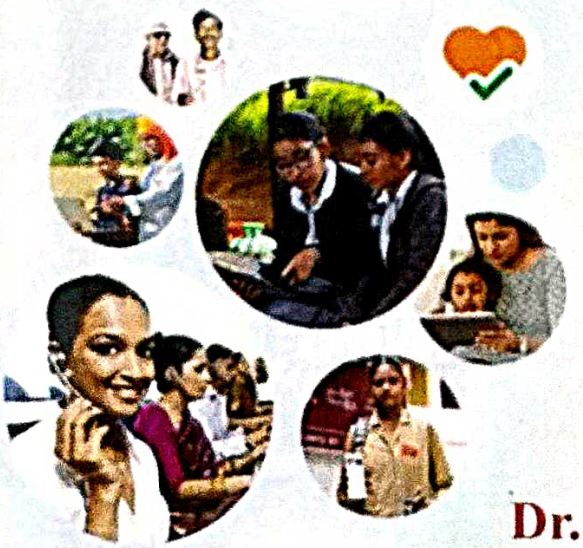
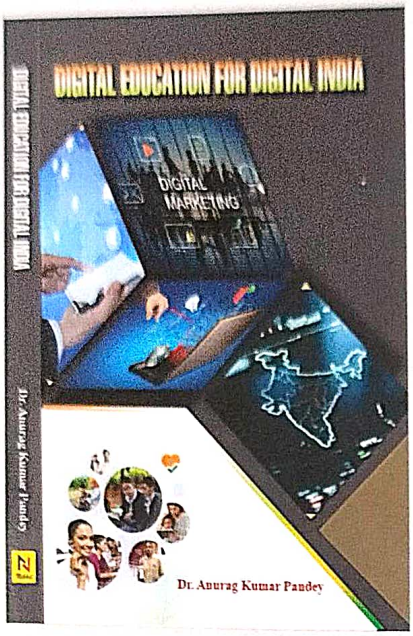
DIGITAL EDUCATION FOR DIGITAL INDIA



Dr. Anurag Kumar Pandey



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Dr. Anurag Kumar Pandey

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Dr. Anurag Kumar Pandey

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6.

Significance and Integration of ICT in Teacher Education and National Education Policy 2020

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Introduction

Education will be crucial in transforming the entire country into a digitally empowered society and knowledge economy, and technology will be equally important in enhancing educational practices and outcomes. As a result, there is at least a bidirectional relationship between technology and education. Technology will undoubtedly have an impact on education in a variety of ways, only some of which may be imagined at this time. AI, machine learning, block chains, smart boards, handheld computers, adaptive computer testing for student development, and other types of educational software and hardware will not only change what students learn in the classroom but also how they learn, necessitating extensive research in these and other related fields on both the technological and educational fronts.

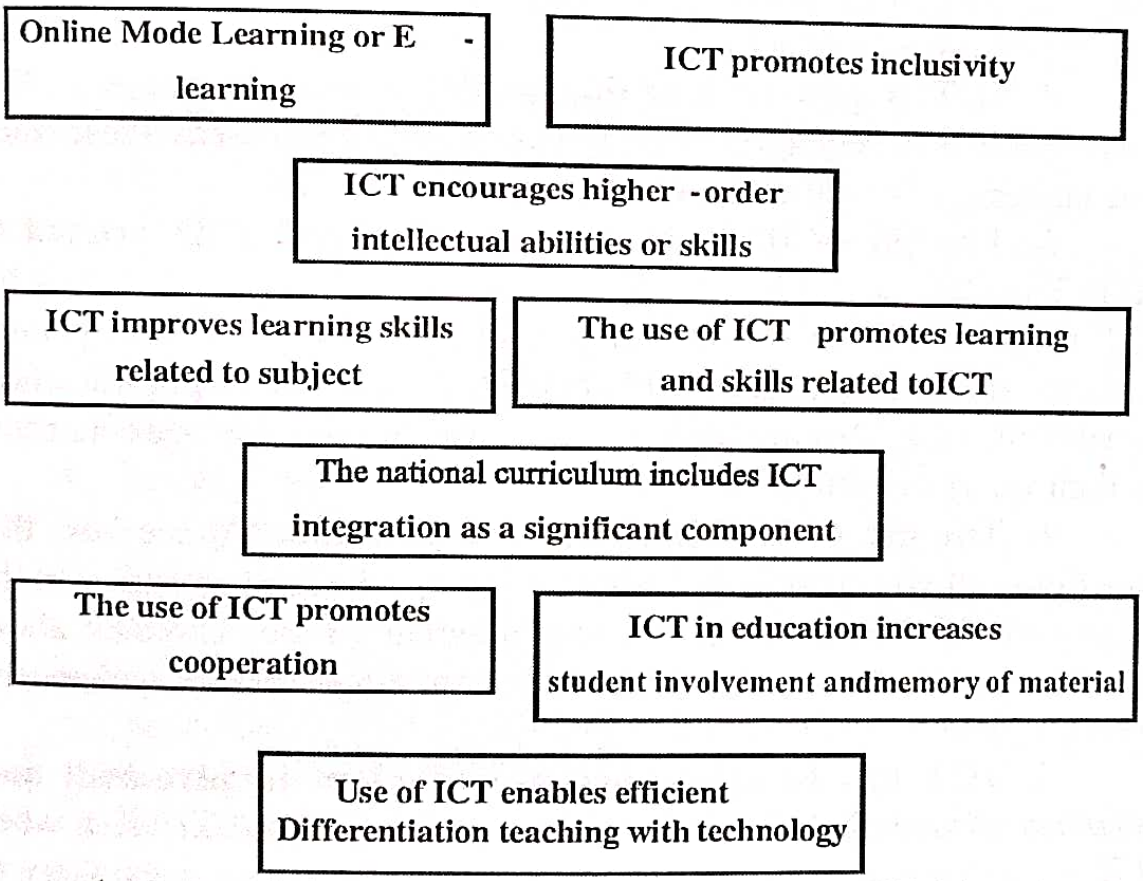
Information and communication technology is referred to as ICT. It is described as the use of technology to process information and communication, which includes using computers and software to process information in addition to converting and storing it. ICT is defined by the national policy on ICT (NCF 2005) as all digitally capable devices, tools, content, resources, forums, and services that can be used to realize the objectives of teaching and learning, expanding access to and use of resources, developing capacities, and managing the educational system. With the blending of technologies, it is essential to thoroughly examine

all information and communication technologies that could be used to enhance teaching.

Significance of ICT

Today, we do not even need to leave our rooms or homes to find some type of ICT in our daily life. We all use them in some capacity, whether it be a computer, plasma TV, or cell phone. As ICT consumers in today's society, people all aspire to live linked lives, which is the one dream that unites them all.We now live in an environment that is dominated by technology, which is consumer–driven, as ICT has infiltrated and affected many facets of our life. No matter how we choose to view it, it is undeniably a significant aspect of our lives and is here to stay.

Significance of ICT in Teacher's Education and main key points related to it:



1. Online Mode Learning or E– learning: ICT in education enables both students and teachers to learn in innovative ways. With numerous unprecedented events occurring in our lives, e–learning is growing in popularity. This presents opportunities for schools to guarantee that students have access to curriculum materials while in

the classroom, as well as to guarantee that students can learn outside of the classroom, such as at home or even in hospitals.

2. ICT promotes inclusivity: All of the kids in the classroom can profit from the curriculum, thanks to the advantages of ICT in education. Because they have access to necessary materials and can use specialized ICT tools to meet their own educational needs, children with special needs are no longer at a disadvantage. Despite this, it raises fresh concerns about the "digital divide" and giving those who are less fortunate access to ICT tools and resources.

3. ICT encourages higher–order intellectual abilities or skills: One of the essential abilities for the twenty–first century, along with assessing, planning, monitoring, and reflecting. ICT in education requires certain skills in order to be used effectively, including the ability to explain and defend the use of technology in problem–solving. The many tactics that the students will employ need to be discussed, tested, and hypothesized by them.

4. ICT improves learning skills related to subject: The value that ICT in education offers to important subject areas like literacy and numeracy is well acknowledged today.

5. The use of ICT promotes learning and skills related to ICT: The ideal way to acquire both of these 21st–century talents is for ICT to blend seamlessly into subject–specific learning. The greatest strategy to help students build their ICT skills is to provide them worthwhile tasks that are incorporated into contexts that are connected to their course of study.

6. The use of ICT promotes cooperation: To see how this functions, all you need to do is place a laptop, iPad, or computer in the classroom. ICT naturally draws kids together so they can chat about what they are doing for school and open up communication channels, which promotes language development.

7. ICT in education increases student involvement and memory of material: Students are more engaged in their work when ICT is incorporated into lessons. This is because using technology to teach the same concepts in various ways can make learning more entertaining and fun. It is believed that students will be able to retain information more effectively and efficiently as a result of their increased participation.

8. Use of ICT enables efficient Differentiation of teaching

with technology: Since everyone learns at a different pace and in a different way, technology makes room for this to happen.

9. The national curriculum includes ICT integration as a significant component: As more governments throughout the world realize the importance of ICT in education, they are following the Australian Curriculum, for instance, which makes extensive use of digital technology or ICT.

Integration of ICT in Education: Key Challenges

ICT's Place in Today's Education

ICTs can contribute to our information and communication processes and the results of those processes in the same way that other technologies have contributed to the comfort and purposefulness of our lives. These days, ICT is evolving quite quickly. Because conventional learning was difficult, the arrival of ICT has changed the traditional paradigm, and the entire educational system needs to be reformatted in order to achieve balance. It has the power to alter how education is provided. ICT and their role have a great deal of potential to advance a cause and benefit everyone involved in the process and result in various ways. ICT's role or educational benefits include:

1. ICT has the potential to enhance the country's educational system.
2. Allow students to showcase their accomplishments in ways that a traditional method might not allow.
3. Students' needs for curiosity, inventory, and construction may be satisfied with the use of ICT.
4. ICT improves education quality by enabling novel ways for students, teachers, school staff, and the community to interact.
5. ICT serve as new instruments that help students and teachers learn and teach more effectively and contribute to the development of skills.
6. ICT enhances the syllabi's structure and quality by requiring a competency– and performance–based approach.
7. Learners have access to the learning programme at any time and from any location by logging in.
8. The instructor receives enough assistance from ICT to carry out their instructional duties.
9. It broadens the range of instructional services and media.

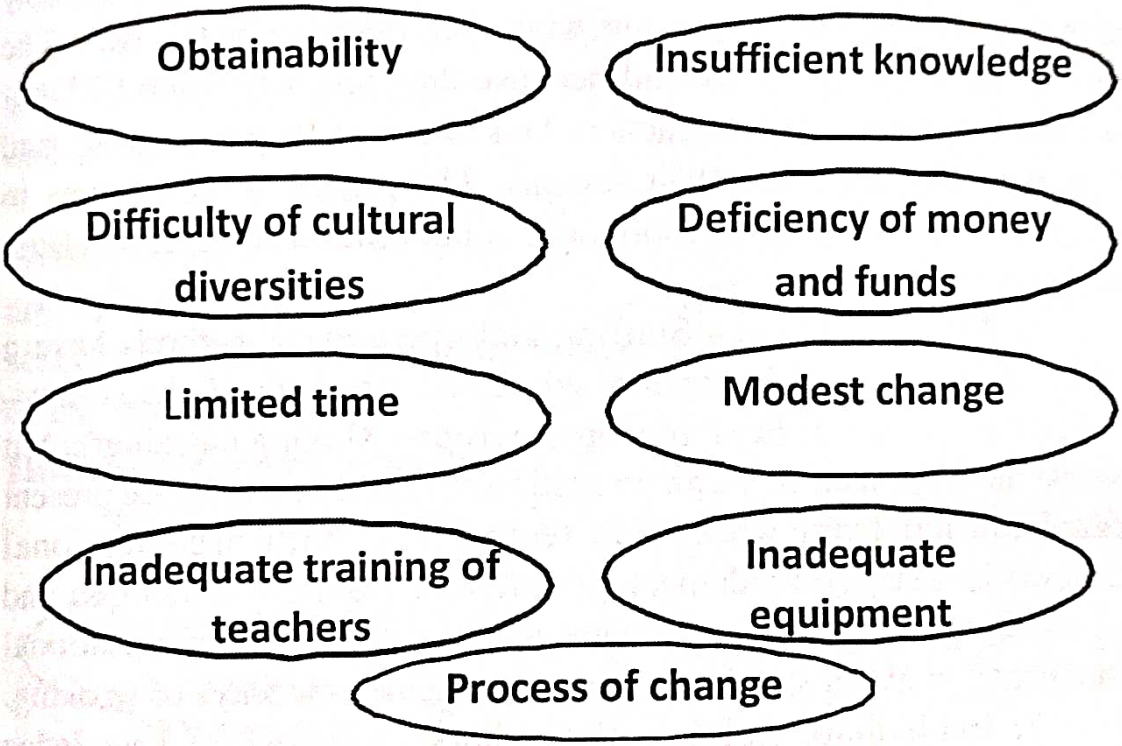
10. It enhances the learning process by offering more engaging educational materials that boost learner motivation and make the acquisition of fundamental skills easier.
11. By facilitating distant learning, ICT makes education more accessible for everyone and brings it to the doorstep of kids living in isolated rural areas.
12. Enhancing the effectiveness of educational administration and management at all levels, starting in the classroom and moving through the school and the library to the entire sector.

ICT Integration in Classroom Instruction

1. Knowledge of technology–Basic technological literacy skills include the ability to choose and use appropriate software, including the internet, in computer labs or in classrooms with fewer resources to support standard curriculum objectives, assessment strategies, lesson plans, and informative teaching techniques. ICT skills also include the ability to manage student data and support one's own skilled improvement.
2. Deep understanding– Ability to organise information, set up tasks for solving problems, incorporate open–ended software tools and subject–specific applications with student–centered teaching strategies, collaborative methods, and collaborative projects, and use network resources to support students' collaboration, access to information, and communication with experts to analyse and solve their chosen problems.
3. Creation of knowledge– ICT–based learning material's design and environments that support the growth of students' critical thinking and knowledge creation abilities, encourage students' on–going reflective learning, and foster the formation of knowledge communities for Students and colleagues.
4. Result in the classroom– Opportunities to use cutting–edge teaching techniques and more engaging materials that pique students' interest, better classroom management that increases both the tutor and student productivity, the teacher's ability to focus on other tasks like research and consulting, the ability to use resources to their fullest potential and enable resource sharing among institutions to lower the cost of implementing ICT solutions,andmore.

Important ICT Challenges in Higher Education

The use of ICT to expand educational opportunities has the potential to be very effective. However, there are numerous problems and difficulties with ICT deployment in the twenty–first century. The difficulties are:



1. Obtainability– The school does not have any ICT resources. Most schools are unable to pay for the equipment's purchase, upkeep, and other costs associated with its use.

2. Insufficient knowledge – Lack of proficiency with ICT equipment is the biggest or most relevant challenge of the twenty–first century. One of the greatest obstacles to the adoption of ICT in education is teachers' lack of knowledge and expertise. Simply put, they lack the necessary organisational skills, knowledge, and competence.

3. Difficulty of cultural diversities– The introduction of ICT in education is further hampered by the diversity of cultures in different parts of the world. The majority of instructional software produced for the global market is likewise in English. But in India, where English is not the national tongue, this poses a significant obstacle to the adoption of integrated ICTs in the educational system.

4. Deficiency of money and funds– The ability to use technology effectively and efficiently depends on the availability of the necessary hardware, software, and resources for teachers, students,

and support staff. Because it costs a lot of money, integrating technology into the educational system in developing nations is a challenging endeavour. The infrastructure, upkeep, and support of ICT facilities are some of the issues that the educational institution is dealing with, in addition to the high cost of the teaching aids for ICT.

5. Limited time– The main predictors of the use of new technology in educational settings have been found to be teachers. The teachers have a tough workload because they not only teach ICT but also other subjects. These teachers lack the time to plan, create, and integrate technology into their lessons. The instructor needs time to practise using hardware and software, collaborate with other teachers, and learn new techniques.

6. Modest change– Staffing and operational methods have a strong momentum in the modern education structure of the twenty–first century that is difficult to stop or reroute. Making meaningful but modest development, ICT can be used to maintain and enhance present organisational frameworks and techniques. With organisational frameworks that are fundamentally different from the status quo and call for a change in strategy, competency, skills, and organisational structure, it is extremely challenging to imagine new ways of working.

7. Inadequate training of teachers– The lack of knowledge and skills is a significant barrier to ICT adoption in the twenty–first century. The shift to new teaching and learning methods is something that the teachers do not want to experience. They will choose the broadcast model of instruction over the interactive one created with the aid of ICT.

8. Inadequate equipment– The development of an ICT infrastructure depends on the resources that are available. Not all institutions have access to resources like computers, printers, projectors, scanners, etc.

9. Process of change– The shift itself is the biggest obstacle to integrating information and communication technology into the teaching and learning process. According to CEO (1999), there are five steps to integration and overcoming obstacles:

a. Entry: Learners who are just entering the field are taught how to use ICTs;

b. Adoption: Teachers enhance conventional teaching and learning techniques with the use of technology;

c. Adaptation: The curriculum is expanded upon and enhanced using technology;

d. Appropriation: Utilization of technology because of their outstanding and distinctive traits;

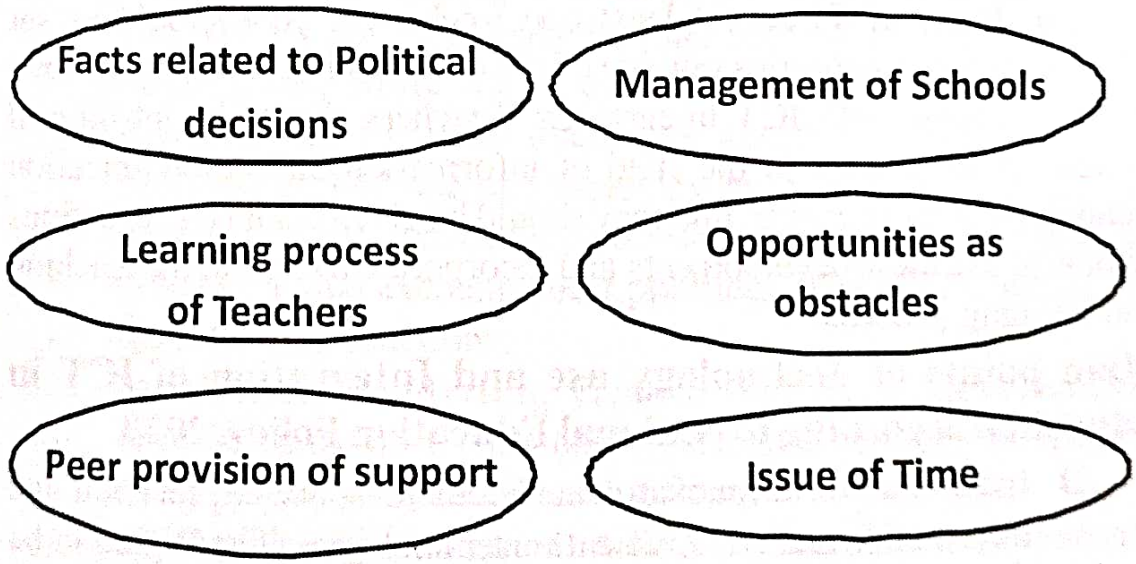
e. Invention: New fields are created in which technology is useful.

In stage one (Entry) learners, not the teacher, gets acquainted with information technologies. Technologies are treated as a problem and inconvenience.

The prescribed school curriculum, the exam and evaluation system, the accessible teaching materials, and the school's infrastructure are all insufficient to enable the usage and application of ICT in the school's teaching–learning and other beneficial activities for the benefit of the students.

How to get over these Obstacles

The main solutions are as follows:



1. Facts related to Political decisions: The most challenging aspect of using information and communication technologies in the classroom is integrating them into the current curriculum in order to improve teaching and learning. Unless the Ministry of Education and Science organizes and supplies schools with adequate resources, this endeavor to incorporate information and communication technologies could be ineffective and wasteful.

2. Management of Schools: Schools have a significant impact on how ICT is incorporated into the educational system. It is important to note that in addition to ministries telling how the integration process

should be set up, schools might provide input on the challenges they are having integrating ICT into the curriculum and make suggestions for what could be done better.

3. Learning process of Teachers: Teachers must assume the role of a student. Learning new subjects is made simpler when the teacher adopts the role of the learner and presents a pleasant setting for the students. In order to feel free and unrestricted when teaching a teacher must. Only these emotions will motivate the instructor to continue learning and growing.

4. Opportunities as obstacles: The challenges that have surfaced should be seen as development opportunities. It should not sap motivation, but rather be transformed into an effective teaching/ learning process that could facilitate ICT integration more effectively.

5. Peer provision of support– Reliable colleagues could teach internal "technology" classes in small, convenient groups. By reviewing benchmarking projects or exchanging best practices with other instructors in the same school, teachers might receive assistance.

6. Issue of Time: At least one week each year should be set aside for teacher activities outside of the classroom if the school wants to have success with ICT integration. Teachers should be introduced to new developments in the field of information and communication technology at these events, and they should be given detailed instructions on how to use these developments and incorporate them into the teaching and learning process.

Main points of Technology use and Integration of ICT in Education according to National Education Policy, 2020

- India is a world innovator in fields like space exploration and information and communication technologies. The Digital India Campaign is assisting in the transformation of the entire country into a knowledge–based society and economy. The interaction between technology and education at all levels is reciprocal, and while education will be crucial to this transition, technology will also be crucial in improving educational procedures and outcomes.
- Given the rapid pace of technological advancement and the sheer imagination of tech–savvy educators and businesspeople, especially student entrepreneurs, it is clear that technology will have a significant impact on education in a variety of ways.

only some of which are currently foreseeable. Artificial intelligence, machine learning, block chains, smart boards, handheld computing devices, adaptive computer testing for student development, and other types of educational software and hardware will not only change what students learn in the classroom but also how they learn, necessitating extensive research in these and other related fields on both the technological and educational fronts.

- As long as these interventions are systematically and openly tested in pertinent contexts before they are scaled up, the use and integration of technology to improve a variety of areas of education will be supported and implemented. To provide a forum for the open exchange of thoughts on the use of technology to promote learning, evaluation, planning, administration, and other aspects of both secondary and higher education, an independent organization called the National Educational Technology Forum (NETF) will be established. The NETF's goal is to make it easier for leaders of educational institutions, State and Central governments, and other stakeholders to make decisions about the introduction, deployment, and use of technology by giving them access to the most recent knowledge and research as well as the chance to network and exchange best practices. The NETF will have the following functions:

a. In addition to advising Central and State Government organizations on technology–based interventions based on independent, evidence–based guidance
b. developing institutional and intellectual capacities in educational technology
c. conceiving of strategic thrust areas in this field
d. State new lines of investigation and invention.

- The NETF will maintain a steady influx of legitimate data from many sources, including educational technology innovators and practitioners, and will work with a wide group of scholars to examine the data in order to stay relevant in the quickly evolving field of educational technology. The NETF will host numerous regional and national conferences, workshops, and other events to gather input from national and international educational

technology academics, business owners, and practitioners in order to encourage the creation of a robust body of knowledge and practice.

- The main goals of technological interventions will be to enhance educational access, support teacher preparation and professional development, and improve teaching, learning, and evaluation processes. They will also aim to streamline educational planning, management, and administration, including procedures for admissions, attendance, assessments, and other related tasks.
- For all of the aforementioned objectives, a wide range of instructional software will be created and made accessible to students and instructors at all levels. All such software will be accessible to a wide range of users, including students in distant places and Divyang students, and will be available in all major Indian languages. The NCERT, CIET, CBSE, NIOS, and other organizations/bodies will continue to create teaching–learning electronic content in all regional languages, and this content will be published on the DIKSHA platform. Through e–content, this platform can also be used for the professional development of teachers. To advance and broaden DIKSHA and other educational technology efforts, CIET will be strengthened. Teachers will have access to the proper tools in the classrooms so they may effectively incorporate e–contents into teaching–learning activities. In order to help content creators produce user–friendly and high–quality content, technology–based educational platforms like DIKSHA/SWAYAM will be more incorporated into K–12 and higher education settings. These platforms will also feature user ratings and reviews.
- Emerging disruptive technologies that inevitably affect the educational system will require special attention. The disruptive impact that the internet would have brought was difficult to foresee when the 1986–1992 National Policy on Education was being developed. In a world that is becoming more and more competitive, our incapacity as a nation and as a people to adapt to these quick and disruptive changes puts us all at risk. For instance, despite the fact that computers have outperformed humans in the use of factual and procedural information, our

educational system at all levels overburdens students with this knowledge at the price of helping them build their higher–order competencies.

- This strategy was developed at a time when Artificial Intelligence (AI) 3D/7D Virtual Reality had certainly emerged as a disruptive technology. When it comes to some predictive jobs, even qualified professionals like doctors will benefit from AI's ability to match or even surpass them as the cost of AI–based prediction decreases. There is little doubt that AI has the potential to revolutionize the workplace, and the educational system needs to be prepared to act rapidly. Emergent technology categorization based on potential for disruption and anticipated duration for disruption will be one of the NETF's ongoing responsibilities. The NETF will periodically report this analysis to MHRD. MHRD will formally identify the technologies whose emergence necessitates reactions from the educational system based on these inputs.
- Not only will HEIs actively explore disruptive technologies, but they will also develop the first iterations of educational materials and online courses in cutting–edge fields and evaluate their effects on particular fields like professional education. HEIs with thousands of students will be in a great position to grow these teaching and skilling activities, which will include targeted training for job preparedness, once the technology has reached a level of maturity. Because disruptive technologies will render some jobs obsolete, approaches to skilling and deskilling that are effective and guarantee quality will become increasingly crucial to generating and maintaining employment. Institutions will be free to choose which institutional and non–institutional partners will conduct this integrated training. This will be connected with frameworks for skills and higher education.
- Universities will try to provide Ph.D. and Masters programmes in professional domains like medicine, agriculture, and law as well as in fundamental disciplines like machine learning and "AI + X." They might also create and offer courses in these subjects on websites like SWAYAM. HEIs may combine these online courses with conventional instruction in undergraduate

and vocational programmes for quick uptake. In order to support the AI value chain, HEIs may also provide targeted training in low–skilled jobs like speech transcription, image classification, and data annotation. The teaching of languages to schoolchildren will go hand in hand with initiatives to improve Natural Language Processing for India's numerous languages.

- As disruptive technologies proliferate, education, both formal and informal, will help raise public awareness of their potential disruptive consequences and solve related challenges. To have educated public consent on issues relating to these technologies, this awareness is required. Disruptive technologies like those mentioned by NETF/MHRD will be discussed as part of the study of current events and ethical concerns in schools. For ongoing education, appropriate reading and discussion materials will also be created.
- Data is the primary source of energy for AI–based technologies, so it is crucial to spread awareness of privacy concerns, as well as the laws, regulations, and standards related to data management, data protection, etc. It is also important to draw attention to moral concerns related to the creation and application of AI–based technology. A major component of these attempts to raise awareness will be education. The use of clean and renewable energy, water conservation, sustainable agriculture, environmental preservation, and other green initiatives are additional disruptive technologies that are anticipated to alter how we live and, consequently, alter how we educate students; these will also be given priority attention in education.(Source: Ministry of Education India website)

Suggestions for Effective Infusion of ICT in Teacher Education

It may be advised that school administrators, in collaboration with parents and other stakeholders in the school, come together and contribute meaningfully in their own small ways towards the provision of ICT facilities to their school. This is because a lack of adequate facilities has a negative impact on the application of ICT in the administration of schools. This will aid in enhancing the school's ICT–related facilities' sufficiency.The management of the school should implement optimal resource management techniques to speed up the process of assessing the sufficiency and condition of the ICT–related

resources that are now accessible. Furthermore, guidelines and norms should be established in this area to guarantee that the facilities are adequately secured against theft and virus–caused destruction.The school's management and administrators should strongly encourage students to enroll in ICT classes so they may learn more about how to utilize ICT properly.

Conclusion

In society, teaching is a noble profession. ICT helps teachers educate effectively. It increases the efficiency of the teaching and learning process, enhancing the quality of education. ICT is now largely responsible for changes in our daily lives. Due to the usage of ICT, we are already seeing a significant and quick transformation in the educational sector. ICT and related technologies have emerged as the best and most efficient venues for the teaching and learning process in the form of online classrooms during the COVID–19 pandemic also. The number of businesses, organizations, and educational institutions that provide education through ICT platforms, such as online classes, recorded lectures, podcasts, app–based classes, YouTube classes, and online meeting apps like Zoom and Meet, has increased as a result of the pandemic.The current state of affairs demonstrates that having access to ICT is essential for participating in a technology society. In order to use ICTs to give access and continuity, a society that has not yet absorbed adaptive dynamics must first close its digital gaps.Once the educational system is able to design meaningful learning generated by experiences and reflective material, capable of having both students and teachers generate knowledge, there is debate of incorporating ICT in education. The aforementioned isn't just relevant to the classroom. Every location and time where learning takes place must envision themselves as having achieved this important milestone.In addition to creating venues for training, information, debate, and reflection, among other things, ICTs as technological tools have improved the degree of significance and educational conception. They have also broken down traditionalist barriers in the classroom.With the goal of internalizing a methodology to make the most of technological tools, the teaching–learning process in the classroom using ICT calls for a set of skills to be developed by the teacher. Teacher training should be viewed as one of the first options before facing new educational challengesthe ability

to be flexible and adapt to an environment that is changing rapidly is without a doubt how ICTs contribute to education and society as a whole. Although initially this process mostly affected labour, time has demonstrated that society increasingly depends on a technology method to assist it create and amass information.

The information and communication technology revolution has reduced national borders to arbitrary lines on maps. In this scenario, one of the services that must be opened up to allow for free trade between nations is education. The employment of ICTs in contemporary education can help the government save a lot of money. Additionally, a lot of quality development can be witnessed as the best in the world resource people for the training. By integrating ICT into different educational phases, we can improve the quality and standards of education.The use of ICT in 21st–century development is hampered by a shortage of resources in the educational sector. There are many difficulties in employing and integrating ICT in contemporary education issues such as the availability of ICT resources in educational institutions, a lack of training in using ICT tools, language barriers, a lack of funding, etc. But we can overcome the obstacles by raising awareness about ICT education, developing policies that support widespread access to knowledge and abilities for learning and using ICT, increasing community involvement for self–sustaining ICT applications, and building out supportive infrastructure like electricity and the internet. Government needs to be proactive. These obstacles must be overcome by the responsible authorities so that the recent education can be benefited.

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