INFORMATION & COMMUNICATION TECHNOLOGY IN EDUCATION

(An Edited book for UG & PG
Students of Education)

Edited By
Dr. Venkateswar Meher
Dr. Rajkumari Singh
Dr. Pradeep Kumar Tiwari

Dr. Venkateswar Meher is working as a Faculty of Education, Anchal College, Padampur. He possesses MA., M.Phil., Ph.D., JRF in Education, and MA, NET in Sociology.

Dr. Rajkumari Singh is working as Professor and Director, School of Social Sciences, IFTM University, Moradabad. She possesses M.Ed., M.Phil., Ph.D. in Education.

Dr. Pradeep Kumar Tiwari is working as Assistant Professor & Head, Department of Education, School of Social Sciences, IFTM University, Moradabad. He possesses MEd. & Ph.D. in Education., & MA in sociology.

Chapter Contributors
1. Dipanjali Sahu, G.M. University Sambalpur, Odisha
2. Dipanjali Meher, G.M. University Sambalpur, Odisha
3. Rachna Saxena, IFTM University, Moradabad, UP
4. Neha Sharma, IFTM University, Moradabad, UP
5. Laxmipriya Moharana, G.M. University, Sambalpur
6. Dr. Bhupendra Kaur, IFTM University, Moradabad, UP
7. Nikita Yadav, IFTM University, Moradabad, UP
8. Rashmi Pathak, IFTM University, Moradabad, UP
9. Neetu Chauhan, IFTM University, Moradabad, UP
10. Dr. Phool Chandra, IFTM University, Moradabad, UP
11. Rashida Khatun, G.M. University Sambalpur, Odisha
12. Dr. Sanjukta Bhuyan, G.M. University Sambalpur, Odisha
13. Dr. Rajashree Baral, Govt. Women's College, Sambalpur
14. Sanjiv Gahir, IGNTU, Amarkantak, MP
15. Pooja Gupta, IFTM University, Moradabad, UP
16. Bikram Kumar Jena, Model Degree College, Deogarh
17. Dr. Luxmi Mishra, IFTM University, Moradabad, UP

Sanjeev Bjarawa
Registrar
IFTM University
Moradabad.

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Sanjeev Agrawal
Registrar
IFTM University
Moradabad.

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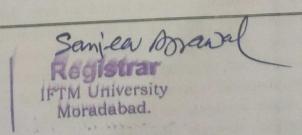
Dr. Bhupender Kaur

Assistant Professor
Department of Education, School of Social Sciences
IFTM University, Moradabad, UP

Introduction

In the contemporary era, society has been equipped with a variety of new communication capabilities in the domain of Information and Communication Technology. Many social networking sites like Whatsapp, Linkedin, Facebook, Twitter, etc. allow users around the world to communicate with each other in real-time. Similarly, Voce over Internet Protocol (VoIP), instant messaging, and video conferencing have removed the place and distance barriers to communication.

We are living in a "Digital World" where people can communicate around the world as they are communicating with their neighbors. Therefore, ICT education is essential in the present scenario. There is no globally accepted definition of ICT because the concerts, methods, and applications involved in ICT constantly developing on an almost daily basis. Let us focus on the three words behind ICT:

- ➤ Information
- ➤ Communication

> ➢ Technology

Information:

The word technology is derived from the Latin word 'informare' which means "give form to". The etymology thus connotes an imposition of structure upon some indeterminate mass. Information means any fact or set of facts, knowledge, news, or advice, whether communicated by others or obtained by personal study and investigation or a specified arrangement that conveys a message to a receiver. The information does not exist on its own. It is connected to something and is coded. In other words, information may be defined as data that is

1. Precise and Appropriate
2. Specific and arrange for a purpose
3. Presented within a context that gives it meaning and relevance
4. Can appropriate to an increase in understanding

Communication:

The word communication is derived from the Latin word 'communicare', meaning "to share". Communication is the act of transferring or exchanging information from one place, person, or group of people to another and it involves two groups one is the sender and the other one is the receiver, a sender transmits an idea, information, or feeling to a receiver through the effective method. Effective communication occurs only if the receiver understands the exact information or idea that the sender intended to transmit.

Technology:

The word technology is derived from two Greek words, transliterated techne and logos. Techne means art, skill, craft, or the way, manner, or means by which a thing is gained. Logos means word, the utterance by which inward thoughts are expressed. Technology means the practical application of electrical knowledge and science to achieve a commercial or industrial objective. Electronic or digital products and systems helps improves a pre-existing solution to a problem, achieve a goal, handle an applied input/output relation or perform a specific function.

Thus, by integrating the three terminologies, we may arrive at a commonly accepted definition of ICT, which is:

ICT covers any product that will store, retrieve, manipulate, transmit or receive information electronically in a digital form, For example, personal computers, digital television, email, and robots. So, ICT is concerned with the storage, retrieval, manipulation, transmission, or receipt of digital data. Importantly, it is also concerned with the way these different uses can work with each other.

"ICT may be defined as the use of information to meet human need or purpose including reference to the use of a contemporary device such as the Internet"

G.B. Harrison

Importance of ICT in Education-

The education sector now a day facing many challenges. We all are living in a world where frequent changes occur in all areas the biggest instance is the corona pandemic. Covid 19

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has changed the whole world. Due to lockdown, everyone is working from home whether he is a student, employee, employer, or from the education sector.

This pandemic has bought a new model of learning which is online for people. In today's scenario from waking up in the morning to time to sleep we all are surrounded by media line Television, Computers, Radio, Mobiles, Newspaper, etc. So using information and communication tools is very important in the changing society. If we use and adopt ICT in our education system can prosper and the country would become a knowledge superpower. This makes ICT a lifestyle choice for a large segment of the population.

These lifestyle choices change the way we communicate, increase consumption and change the way we interact and collect information.

ICTs have permeated and changed many aspects of our lives. The aspect of our life when we live in an environment is dominated by technology consumers (Semenow, 2005) No matter how we perceive their presence, it cannot be denied that it is an important part of our life and is here to stay

Some issues to remember concerning the importance of ICT in Education-

> ➤ E-Learning or Online learning-
> ➤ ICT brings inclusion-
> ➤ ICT promotes higher-order thinking skills-
> ➤ ICT use develops ICT literacy and Capability-
> ➤ ICT enhances subject learning-

- ➤ ICT use encourages collaboration-
- ➤ ICT use motivates learning-
- ➤ ICT in education improves engagement and Knowledge Retention-
- ➤ ICT integration is a key part of the national curriculum-
- ➤ ICT use allows for effective differentiation instruction with technology-
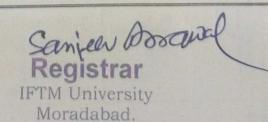- ➤ We live in an "Economy of knowledge-

Categorization of ICT

ICT is often categorized into two broad types:

1. The traditional computer-based technologies (things one can typically do on a personal computer or using computers at home or work)
2. The more recent, and fast-growing range of digital communication technologies (which allow people and organizations to communicate and share information digitally)
3. Let's take a brief look at these two categories to demonstrate the kind of product and ideas that are covered by ICT:

Traditional Computer-Based Technologies

These types of ICT include:

Application	Use
Standard Office Application	
Word processing	MS Word – e.g. Write letters, Reports, etc.

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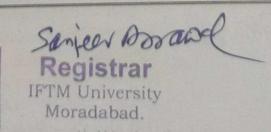|	
Spreadsheets	MS Excel - Analyses financial information; calculations; create forecasting models, etc.
Database Software	E.g. Oracle, Microsoft SQL Server, Access, Managing data in many forms, from the basic list (e.g. customer contact to complex material(e.g. catalogue))
Presentation Software	E.g. Microsoft PowerPoint; make presentation either directly using a computer screen or data projector. Publish in digital format via email or over the internet
Desktop Publishing	E.g. Adobe Indesign, Quark Express, Microsoft Publisher, Produce newsletters, magazines, and other complex documents
Graphics Software	E.g. Adobe Photoshop and Illustrator, create and edit images such as logos, drawings, or pictures for use in DTP, websites, or other publications

Specialist Application - Examples

Accounting Package	E.g. Sage, Oracle; Manage an organization's accounts

	including revenues/sales, purchases, bank accounts, etc. A wide range of systems is available ranging from basic packages suitable for small businesses to sophisticated ones aimed at multinational companies.
Computer-Aided Design (CAD)	Computer-Aided Design (CAD) is the use of computers to assist the design process, Specialized CAD Programs exist for many types of design; architectural, engineering, electronics, and roadways.
Customer Relation Management (CRM)	Software that allows businesses to. better understand their customers by collecting and analyzing data on them such as their product preferences, buying habits, etc. Often linked to software applications that run call centers and loyalty cards for example.

Tools of ICT

Using multimedia in education results in increased productivity and retention rates, because people remember 20% of what they see, 40% of what they see and hear but

about 75% of what they see and hear and do simultaneously. It means by using multimedia tools we can create a learning environment, where the communication of the information can be done more effectively and it can be an effective instructional medium for delivering information. Multimedia application design offers new insights into the learning process and gives possibilities to represent information and knowledge in a new and innovative way.

The following example of ICT tools, devices, and infrastructure provides a preview of some of the technologies encountered while teaching and interacting with learners of all ages.

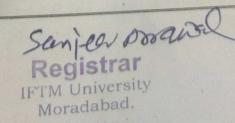| Example of Tool, Device. Infrastructure	Definition
Web-based tools and applications for managing, learning, and teaching	
Learning Management Systems	Internet-based software that deploys. Manages tracks and reports on the interaction between the learner and the content and the learner and the instructor. They enable student registration, track learner progress, record test score, and indicate course completions. They also allow the instructor to assess student performance. Example: Web CT

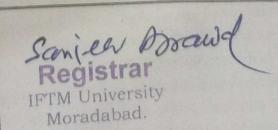|	
Student Management Systems	May include financial, timetabling, student records, and reporting. It May also enable parents to review their child's performance online Example: Power School
Digital Student Report Card Systems	A digitized system for transmitting student information can embed real examples of a student's work from an e-portfolio
Plagiarism Detection Systems	Examining digital text and comparing the nature of any frequency of particular word strings, provides feedback to the educator on the likelihood that a particular piece of work has been plagiarized, for Example Turnitin software.
Online Collaborative workspaces	Online communication tools to enable collaboration, for Example Bulletin boards, and email discussion lists.
Virtual Classroom Software Systems	Deliver an interactive learning environment to students with a computer and an internet connection. The software presents the student with a screen consisting of an instructional area, bordered by

	items such as class location, message board, etc.
e-Portfolios	Electronic (or digital) portfolio-digital storage enables an individual to maintain an ongoing record of their work, achievements, awards, and assessments.
Learning and Teaching Tools	
Interactive Whiteboards	A whiteboard surface that displays digital files from a computer via a data projector. It May function as a standard whiteboard i.e. teacher or student may write on it and then digitize the marked-up material.
Personal Communication	Digital communication enables an individual to talk to one person or more E.g. web forums internet relay chat, or SMS (short messaging services) on mobile phones.
Mobile Delivery Devices: The Digital Backpack	
Storage Devices	Device for transferring-electronic work between various devices and physical locations and the backup work e.g. USB memory stick
Personal Digital Entertainment Devices	Enables users to download, store and play audio, photo, and video

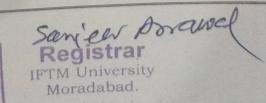|	
(PDEs) and MP3 Players	files and in many cases to take part in interactive activities.
Mobiles Phones	Increasingly these allow communication via photo and video as well as text messaging
Laptops	A mobile computer that is operated with a battery and away from power sources. Newer versions are now wireless and connect to the internet in wireless hotspots
Assistive and Adaptive Technologies	Technology that supports students with disabilities such as screen readers and virtual pencils
Content Delivery Methods	
Podcasts	A podcast is a method of publishing audio files via the internet, allowing users to subscribe to fees to receive new files automatically.
Blogs	A web-based journal or log book. Logs are chronologically ordered web-posting by an author or group of authors. They may be personal, individual records, group collaboration, or representatives of an institution.
Voice over Internet Protocol (VoIP)	Enables transmission of voice across the internet. Example: Skype

Digital TV	Similar to analogue TV but can deliver a rich multimedia learning experience. It enables interactivity

Benefits of using ICT Tools in Education-

1. **Creation of Independent Learning Environment** – With the help of ICT, People learn as individuals and not as a homogenous group. ICTs allow each individual to relate to the medium and its content.

2. **Relativity to the content -** A person can relate to the content and perform interactivity easily. He can go forward and backward in the content and start at any point depending upon prior knowledge instead of always in a sequential way.

3. **Economically Good** – ICTs reduce the cost of education from very high to very low.

4. **Unaffected by distance and climate** – It does not matter where you are or how the weather is, you can still access and learn from ICTs.

5. **Versatility** – ICTs can be useful in drill and practice, to help diagnose and solve problems, and for accessing information and knowledge about various related themes.

6. **Availability of Information is Quick and Instant** – There is instant delivery of information.

7. **Removes Economic and Social Barriers** – A good quality and well-produced content is can be delivered to any strata of society whether rich or poor, urban or rural, equally and at the same cost.

Sanjeev Agrawal
Registrar
IFTM University
Moradabad.

Limitations of ICT Tools in Education-

1. **Require high Finance** – Setting up an ICT-based system and its maintenance required high financial investment.

2. **Ignores Individuals Differences** – The economies of scale work here. This means that sometimes we try to reach large numbers so we make content common not taking into account individual differences.

3. **Fails to Solve Culturally and Socially sensitive Problems** – The ICTs address the problem in a general way but they cannot solve local and culturally sensitive problems.

4. **The problem of Accessibility** – Everyone cannot have equal access, so not everyone benefits equally from the use of ICTs.

5. **Widening the knowledge gap** –ICTs widen the knowledge gap between the rich and the poor, as people who have an access to the technology can avail its benefits, while, the poor remain deprived.

6. **Do Not Bring Behavioral Changes** – A medium is different from the content; and often we forget that we can deliver any content because ICTs are essentially meant only to deliver content, not to change attitudes or bring about behavior change.

7. **Problem (Difficult) in Evaluation** – Learning from ICT-delivered content is Difficult to assess since such learning is of a multidimensional and long-term kind, rather than from immediate learning assessment as in a class test.

8. **Regular Orientation Required** – The trainers and instructors also need to be retrained and regularly apprised of the innovations in the technology.

9. **Requires Attitudinal Change** – ICT includes a variety of media and has a different way of teaching from the conventional methods-Therefore, if a teacher is inefficient and fails to change his attitude towards implementing ICT in the teaching-learning process, its use will not bring about the desired change.

So, ICTs are a mixed bag and it is necessary that we recognize some limitations, strengths, and weaknesses, before planning to use them in the learning setup.

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Sanjeev Agrawal
Registrar
IFTM University
Moradabad.