Unit-8
Information and Communication Technology

Strengths and limitations of ICTs application in livestock sector and farmers capacity building. Information kiosk, E-learning, CAD, virtual class room, virtual reality, multi-media etc.Cyber extension- problems and prospects in livestock extension. Computer networking: (LAN, MAN, WAN, Internet, tele-conferencing, tele-text, radio-text, video-text, interactive cable distribution system, satellite communication, internet, www, etc.).

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Information and Communication Technologies (ICTs)

Information and Communication Technologies (ICTs) can be broadly defined as the means of creation, storage, management and dissemination of information by electronic means. The ICT sector as a whole (telecommunication, broadcasting, computer hardware and software related technologies) has emerged as a strategically important sector driving social and economic change in India.

ICTs are those technologies that enable the handling of information and facilitate different forms of communication.

Different forms of communication.
- Capturing technologies: (camcorders)
- Storage technologies: (CD-ROMs, DVDs, Pen drives, etc)
- Processing technologies: (application software)
- Communication technologies: (local area networks)
- Display technologies: (computer monitors, LCDs)

ICTs include old (radio, television) and new technologies (internets, information kiosks, mobiles) that facilitate the storage and transfer of information. This distinction may also be not appropriate as radio, television, satellite technologies and the internet are being combined in innovative ways. Browsing the web on television or from a cell phone, making phone call from computer, seeing an unfinished movie in a TV in the cell phone, SMS are indications of these convergence trends.

The newer technologies in communication system include
- Expert Systems (ES),
- Geographic Information Systems (GIS),
- Desk Top Publishing (DTP),
- Databases(DBS),
- Compact-Disc-Read Only Memory (CD-ROM), Networks, Electronic Mail(E-Mail),
- Electronic Bulletin Boards (EBB),
- On-line Service (OLS),
- Electronic Journals (EJS),
- ICTs, Kiosks,
- Teleconferencing and
- Electronic Information Retrieval System (EIRS).

Information Kiosks

An Information kiosk is a computer terminal featuring specialized hardware and software designed within a public exhibit that provides access to information and applications for communication, commerce, entertainment, and education.

Types of kiosks
1. Telekiosk
2. Financial services kiosk
3. Internet kiosk

    4. Visitor management and security kiosk

Types of kiosks
1. Telekiosk: The telekiosk can be considered the technical successor to the telephone booth, a publicly accessible set of devices that are used for communication. These can include email, fax, SMS, as well as standard telephone service.
2. Financial services kiosk: The financial services kiosk can provide the ability for customers to perform transactions that may normally require a bank teller and may be more complex and longer to perform than desired at an ATM.
3. Internet kiosk: An Internet kiosk is a terminal that provides public Internet access. Internet kiosks sometimes resemble telephone booths, and are typically placed in settings such as government offices, veterinary dispensaries, panchayats, for fast access toe-mail or web pages. Internet kiosks sometimes have a bill acceptor or a credit card swipe, and nearly always have a computer keyboard, a mouse and a monitor.
4. Visitor management and security kiosk : A visitor management and security kiosk can facilitate the visitor check in process at businesses, schools, and other controlled access environments.

Points to be considered in the design of a kiosk
1. The aesthetic and functional design of interactive kiosks is a key element that drives user adoption, overall usage time and affordability.
2. Aesthetic design: The design of the enclosure is often the driving factor in user adoption.
3. Graphic messaging: Plays a key role in communicating with potential users.
4. Maintenance and thermal design: Critical in order to maximize up-time (the time between failures or crashes).
5. Component specification: Typical components include touch-screen, P.C., pointing device, keyboard, bill acceptor, mag-stripe and/ or bar-code scanner, surge protector, UPS etc.
6. Ergonomic: Is important to ensure comfortable and easy user accessibility.
7. Interface design: Designing for information kiosks typically requires larger buttons and simpler decision trees than designing for a web or computer based interactive. Catchy attractive animations and short dwell times are important.

Self Learning

    Self learning is one in which the student assesses his or her own learning needs and goals and then plans and implements how to attain those goals. According to Malcomknowles(1975), self learning or self-directed learning describes a process "in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes."

E-Learning

- E-learning is the effective learning process created by combining digitally delivered content with learning support services.
- E-learning consists of the transfer of skills and knowledge using electronic applications and processes. This may include Web-based learning, computer-based learning, virtual classrooms, and digital collaboration, use of audio or video recording, satellite or land-based broadcasts, CD-ROM, and even the phone system.

- E-Learning can be broadly defined as use of any electronic technology to create learning experiences.

Types of e-learning
- Learner-led e-learning: Learner-led e-learning also called stand-alone or self-directed e-learning consist of the delivery of learning experiences to independent learners. The learners then lead/manage their own learning. Content may consist of web pages, multimedia presentations, and computer applications; however, the majority of e-learning now makes use of the web.
- Facilitated e-learning: Facilitated e-learning makes use of the capabilities of Learner-led e-learning and add the benefit of having an instructor guiding the learner. This requires the use of e-mail, discussion forums, and chat capabilities depending on whether communication will be synchronous or entirely asynchronous.
- Instructor-led e-learning: Instructor-led e-learning makes use of technology to deliver traditional classes real-time. This is done via the use of teleconferencing, audio conferencing, chat, audio graphic systems (screen-sharing and whiteboards), or even via the telephone.

Advantages of e-learning
1. Accommodate multiple learning styles through the use of media, text and even live technology mediated interactions.
2. Offer individualized instruction through assessment and remediation addressing the learners' needs.
3. Provide self-paced instruction for learners wanting to move ahead or learners wanting extra practice.
4. Offer on-demand access to learning when needed. The learner determines when he/she wants to learn.
5. Allow collaborative learning so learners do not feel isolated and maximize learning.
6. Engages users with stimulating content and interactivity that teaches and reinforces.
7. Increase retention by using reinforces more consistently than other approaches.
8. Increase consistency when the learning is captured and delivered by technology.
9. Reduce learning time
10. Track learners and provide proof of their work and skill development.

Limitations of e-learning
1. High initial investment: E-learning is a capital intensive endeavor and its costs are often underestimated.
2. Reduced face to face interactions: E-learning can be isolating if care is not taken to balance the learning modalities. While adult learners can often adapt, young or traditional age learners should have a balanced learning approach with enough interaction.
3. Dependency on technology: Technology can be a blessing or a curse as it requires resourced, certain know-how from the learner, and maintenance.
4. Inappropriate match of technology, content, objectives, and approach: Appropriate instruction requires a four way match between the technology, the nature of the content and how it is presented, the objectives that must lend themselves to the medium, and the approach taken to produce learning. If any of these fails e-Learning is suboptimal.

World Wide Web (WWW):

The World Wide Web (WWW) is combination of all resources and users on the Internet that are using the Hypertext Transfer Protocol (HTTP). A broader **definition** comes from the World Wide Web Consortium (W3C): "The World Wide Web is the universe of network-accessible information, an embodiment of human knowledge."

The **World Wide Web** ("WWW" or "The **Web**") is the part of the **Internet** that contains websites and webpages. It was invented in 1989 by Tim Berners-Lee at CERN, Geneva, Switzerland. Sir Tim Berners-Lee created a new markup language called HTML. Websites are composed of pages linked by hypertext links.

The **Internet** is a global network **of** networks while the **Web**, also referred formally as World Wide **Web** (www) is collection **of** information which is accessed via the **Internet**. Another way to look at this **difference** is; the **Internet** is infrastructure while the **Web** is service on top **of** that infrastructure.

Internet:

Vint Cerf is known as a "Father of the Internet". Cerf is the co-designer of the TCP/IP protocols and the architecture of the Internet. Radia Perlman is an American computer programmer often described as the 'Mother of the Internet' for her invention of the spanning-tree protocol, an algorithm which allowed early networks to cope with large amounts of data.

The *internet* is a globally connected network system that uses TCP/IP to transmit data via various types of media. The *internet* is a network of global exchanges – including private, public, business, academic and government networks – connected by guided, wireless and fiber-optic technologies.

The Internet is not synonymous with World Wide Web. The Internet is a massive network of networks, a networking infrastructure. It connects millions of computers together globally, forming a network in which any computer can communicate with any other computer as long as they are both connected to the Internet.

Virtual Classroom-Introduction

Virtual classrooms are teaching and learning environments located within computer-mediated communication systems that support collaborative learning among students, enabling participation at their own time, place and pace - these electronic virtual environments are meant to supplement or replace the physical class environment in support of classroom-like experiences. "Virtual" is used here to characterize the fact that the course is not taught in a classroom face-to-face but through some substitute mode that can be associated with classroom teaching, which means people do not have to go to the real class to learn.

Virtual Classroom is a simulated classroom via Internet, which provides a convenient communication environment for distance learners just like traditional face-to-face classroom. A virtual classroom allows learners to attend a class from anywhere in the world and aims to provides a learning experience that is similar to a real classroom. When we go to college we have a schedule of lectures, which we must attend. Student must arrive on time, and when he enters the classroom, he finds a teacher, fellow learners, a black board or whiteboard, LCD projector, optionally a television screen with videos.Likewise, a Virtual Classroom is a scheduled, online, teacher-led training session where teachers and learners interact together using computers linked to a network such as the Internet.

A virtual classroom enables to bring learners from around the world together online in highly interactive virtual classes while greatly reducing the travel, time, and expense of on-site teaching/training programs. It can be used as a solution for live

delivery and interaction that addresses the entire process of creating and managing our teaching-learning process. It facilitates instructor and student in teaching-learning events, such as a seminar, online discussion or a live training for employees in company. As in traditional classroom, there are professor and fellow learners present with the student; we have many participants present in virtual classroom. They can talk with each other as in the traditional classroom via chat. Similarly presenter uses whiteboard, gives notes/resources, gives presentation as given in traditional one. Thus, virtual classroom can be visualized as a classroom where a lecture or session is conducted using Internet.

In a virtual classroom or in a virtual learning environment the learner
1. is at a far off place from the tutor or teacher or instructor
2. uses some form of technology (obviously internet connected computer) to access the learning resource materials which are web-based
3. also interacts with the teacher/tutor or instructor and other learners
4. is provided with some form of support to meet his/her needs.

Characteristic Features of Virtual Classrooms

Virtual learning environments are
1. It facilitates self learning at the learner's convenient time and place.
2. Electronic publication is cheaper and faster.
3. It facilitates faster and cheaper delivery of the material.
4. It promotes better teacher-student interactivity.
5. It enables to update learning materials speedily.

Advantages of Virtual Classrooms: (over traditional classroom model)
1. Removal of geographical barriers (Anywhere learning) A virtual classroom allows learners and teachers to attend a single live training session from any place in the world, provided they have a computer and Internet connection.
2. Sessions can be recorded If learners miss a traditional classroom-based training session, they have very little opportunity to engage in the learning experience that took place. A virtual classroom has a facility to record the session so learners or teachers can replay it afterwards. Teachers too get an opportunity to review their own or their colleagues' performance.
3. Quicker to organize Training can be organized more quickly than traditional classroom-based training. Classrooms and projectors do not need to be reserved, materials do not need to be distributed. The sessions are easier to schedule or reschedule since attendees will not be traveling to the venue of the session.
4. One to one communication In a virtual classroom environment, learners can talk to the teacher and to each other, and although this communication is not as rich in a traditional classroom, it still can help learners, since it is one to one.

❖ **Limitations of virtual classroom (over traditional classroom)**
1. Teachers and students need to become familiar with the tools Teachers and students are familiar with the workings of a traditional classroom, that is, they understand the concepts of hand raising, the whiteboard, assignments, and so forth. With a virtual classroom, all attendees must become familiar with the way the virtual classroom works before virtual classroom based training starts.
2. Time dependency for live sessions Attending virtual classroom training is restricted to a certain scheduled time.
3. Infrastructure for the participants PC needs to be prepared Virtual classroom sessions need to be scheduled, teachers need to beinvited, and participants' PCs need to be prepared.

4. Technical limitations Technical issues such as bandwidth, speed of the connection or power failure may create problem while presentation is going on.

Virtual reality

Virtual reality (VR) means experiencing things through our <u>computers</u> that don't really exist. From that simple definition, the idea doesn't sound especially new. When you look at an amazing Canaletto painting, for example, you're experiencing the sites and sounds of Italy as it was about 250 years ago—so that's a kind of virtual reality. In the same way, if you listen to ambient instrumental or classical music with your eyes closed, and start dreaming about things, isn't that an example of virtual reality—an experience of a world that doesn't really exist? What about losing yourself in a book or a movie? Surely that's a kind of virtual reality?

If we're going to understand why books, movies, paintings, and pieces of music aren't the same thing as virtual reality, we need to define VR fairly clearly. For the purposes of this simple, introductory article, I'm going to define it as:
A believable, interactive 3D computer-created world that you can explore so you feel you really are there, both mentally and physically.

Putting it another way, virtual reality is essentially:
1. Believable: You really need to feel like you're in your virtual world (on Mars, or wherever) and to keep believing that or the *illusion* of virtual reality will disappear.
2. Interactive: As you move around, the VR world needs to move with you. You can watch a 3D movie and be transported up to the Moon or down to the seabed—but it's not interactive in any sense.
3. Computer-generated: Why is that important? Because only powerful machines, with realistic 3D computer graphics, are fast enough to make believable, interactive, alternative worlds that change in real-time as we move around them.
4. Explorable: A VR world needs to be big and detailed enough for you to explore. However realistic a painting is, it shows only one scene, from one perspective. A book can describe a vast and complex "virtual world," but you can only really explore it in a linear way, exactly as the author describes it.
5. Immersive: To be both believable and interactive, VR needs to engage both your body and your mind. Paintings by war artists can give us glimpses of conflict, but they can never fully convey the sight, sound, smell, taste, and feel of battle. You can play a flight simulator game on your home PC and be lost in a very realistic, interactive experience for hours (the landscape will constantly change as your plane flies through it), but it's not like using a real flight simulator (where you sit in a hydraulically operated mockup of a real cockpit and feel actual forces as it tips and tilts), and even less like flying a plane.

Types of virtual reality
1. Fully immersive
2. Non-immersive
3. Collaborative
4. Augmented reality

What equipment do we need for virtual reality?
Where an ordinary computer uses things like a keyboard, mouse, or (more exotically) speech recognition for input, VR uses sensors that detect how your body is moving. And where a PC displays output on a screen (or a printer), VR uses two screens (one for each eye), stereo or surround-sound speakers, and maybe some forms of haptic (touch and body perception) feedback as well. Let's take a quick tour through some of the more common VR input and output devices.

- Head-mounted displays (HMDs)
- Immersive rooms
- Data gloves

Multimedia

Multimedia is the field concerned with the computer-controlled integration of text, graphics, drawings, still and moving images (Video), animation, audio, and any other media where every type of information can be represented, stored, transmitted and processed digitally.

Media in the press, newspaper, radio and TV context -mass media
Media in communications: cables, satellite, network –transmission media
Media in computer storage: floppy, CD, DVD, HD, USB –storage media
Media in HCI context: text, image, audio, video, CG –interaction media

- **Text** -ASCII/Unicode, HTML, Postscript, PDF
- **Audio Sound-** music, speech, structured audio (e.g. MIDI)
- **Still Image** -Facsimile, photo, scanned image
- **Video (Moving Images)** –Movie, a sequence of pictures
- **Graphics** –Computer produced image
- **Animation** –A sequence of graphics images
- **Discrete Media** (DM, Static): text, image, graphics
- **Continuous Media** (CM, Dynamic): audio, video, animation
- **Captured vs Synthesized media-**Standalone vs Networked media

The Basic Elements of Multimedia

Text: characters that are used to create words, sentences, and paragraphs.

Graphics: A digital representation of non-text information, such as a drawing, chart, or photograph.

Animation: Flipping through a series of still images. It is a series of graphics that create an illusion of motion.

Video: Photographic images that are played back at speeds of 15 to 30 frames a second and the provide the appearance of full motion.

Audio: Music, speech, or any other sound.

Usage:

1) Multimedia finds its application in various areas including, but not limited to: Advertisements Art Education Entertainment Engineering Medicine Mathematics Business Scientific research

2) In education, multimedia can be used as a source of information. Students can search encyclopedias such as Encarta, which provide facts on a variety of different topics using multimedia presentations.

3) A multimedia presentation can also make it easier for pupils to read text rather than trying to read a teacher's writing on the board.

4) Multimedia is used for advertising and selling products on the Internet.

5) People use the Internet for a wide range of reasons, including shopping and finding out about their hobbies.

- Computer-Based Training
- Teaching Aid
- References
- Entertainment
- Simulation
- Virtual Reality
- Virtual Surgery

- Information Kiosk
- Advantages of using Multimedia

Advantages of using Multimedia:
1. It is very user-friendly. It doesn't take much energy out of the user, in the sense that you can sit and watch the presentation, you can read the text and hear the audio.
1. It is multi sensorial. It uses a lot of the user's senses while making use of multimedia, for example hearing, seeing and talking.
2. It is integrated and interactive. All the different mediums are integrated through the digitization process. Interactivity is heightened by the possibility of easy feedback.
3. It is flexible. Being digital, this media can easily be changed to fit different situations and audiences.
4. It can be used for a wide variety of audiences, ranging from one person to a whole group.

Disadvantages of using Multimedia
1. Information overload. Because it is so easy to use, it can contain too much information at once.
2. It takes time to compile. Even though it is flexible, it takes time to put the original draft together.
3. It can be expensive. As mentioned in one of my previous posts, multimedia makes use of a wide range of resources, which can cost you a large amount of money.
4. Too much makes it unpractical. Large files like video and audio has an effect of the time it takes for your presentation to load. Adding too much can mean that you have to use a larger computer to store the files.

Cyber Extension:

Cyber extension is defined as "utilization of power of online networks, computer communication & digital interactive multi-media to facilitate the dissemination of technology."According to Wijekoon (2003) Cyber extension is "an agricultural information exchange mechanism over cyber space, the imaginary space behind the interconnected computer networks through telecommunication means".

Why cyber extension is revolutionary?
1. Written are READ (Eg: Newspapers, circular letters, leaflets, hand-outs and bulletins).
2. Spoken are HEARD (Eg: Farm and home visits, office calls, Agricultural clinics, and radio and discussion meetings).
3. Visuals are SEEN (Eg: posters, charts, exhibitions, maps and pictures).
4. Audio visuals are READ, HEARD & SEEN Eg: emails, video conferencing, CD's, and video Demonstrations; cyber extension).

Due to their multi interaction between audios and visuals cyber extension methods are way ahead in efficiency than other ordinary extension methods. But there are advantages and drawbacks of cyber extension systems. Following are the advantages of cyber extension.

Advantages of cyber extension:
1. It's the most revolutionary method of agricultural extension teaching methods.
2. Due to its convenience, the latest technologies invented in the other end of the world will reach in a minute to the local farmers.

3. Rural communities do not feel "we are isolated", instead of that they feel "we are connected to the world".
4. Farmers become computer-literate.
5. The Internet will become a rich source of education not only for the farmer, also for his/her family.
6. Farmers will feel good about their personality when using cyber extension; they feel honored.
7. Free access to the websites will increase the farmer participation in extension programs.
8. Farmers will be well educated and aware of agricultural technologies by seeing, hearing and watching the demonstrations.
9. Farmers will be well informed of latest issues related to agriculture around the world.
10. Due to cyber extension systems up to date data, farmers are able to forecast the weather, their harvest and even market trends.
11. Reading newsletters on the websites, farmers do not face the drastic situations such as price fix, price fluctuations, intermediaries smuggling, black market prices etc.
12. Unlike traditional farming, farmers can seek new ventures for their excess production (starting jam, cordial production, investing in mushroom cultivation, compost production, milk and meat processing etc.).
13. Due to technological advancements, the young generation tend to involve in agricultural activities.
14. Extension officers can deal with extension programs without worrying about the other office work, time and transportation costs etc.
15. Extension officers can pre-record their demonstrations and deliver it later to the farmer community.
16. Unlike the traditional lazy extension officials, use of cyber extension will make them actively participated in the extension programs.
17. The dynamic nature of extension programs will be increased.
18. The extension officers will have to work less effortlessly (as farmers know new methods due to cyber extension) due to pre-awareness of the farmers.
19. Predictions on field trials, locality trials can be done very accurately by the use of cyber extension.
20. Extension officers can follow up the work; create progress reports done by farmers online without reaching them.
21. Extension officers can change extension programmes according to its compatibility (
22. Problems and risks related to trialabilty is reduced to a major extend.
23. Observability of agricultural aspects not only in local, also in international level is open to general public.
24. Extension programs will be no longer extensive; it will be close and easy as just as a click of a mouse

Drawbacks of Cyber Extension:
1. As cyber extension facilities are not available in every village, farmers may have to travel far for it.
2. Due to rapid changes occur in technology, farmers will be left with a doubt and they will find it difficult overcome the situation of "information overload".
3. Most of the rural farmers are still illiterate. For such people it will be harder to become computer literate.

4. As still a developing country, seeing the latest agricultural advances in developed countries (E.g.: Canada) will leave the farmers and the general public a feeling of shame (like they have it all, we have nothing), a doubt within themselves.
5. The cyber extension will loosen the bonds of a family (the children will consume their time logged in Facebook, My space etc. rather than helping the farming).
6. Free access to the internet will degrade the quality of the cyber extensions.
7. False information, fake facts will be a great threat not only to the agricultural activities but for the general awareness also.(E.g.: one website may tell that using heavy metals in minimal amounts in the fertilizers may not be a risk for your health, and in another website you may see the traces of heavy metals is lethal)
8. As the cyber extension is available in Agrarian Service Centers during the office hours, the farmer will have to give up farming operations during the daytime.
9. New ventures illustrated in cyber space are not modified into locality. Adaptation of such technology will risk the harvest.
10. Some of the materials used in foreign cyber extension networks, are not available in our country.
11. If there is a malfunction in the cyber extension system, there is a risk of losing all the data kept for years. A back-up plan should always be available.
12. As there are thousands of information available in cyber extension, extension officers may include false data in their reports (Like copying and pasting from another website, unaware of what to be done).
13. Most of the cyber extension systems do not issue their data free. They require endless registrations, sign-ups, passwords, private details etc.
14. Most of the cyber extension systems aren't situational and cultural compatible.
15. Information provided is not in local languages.
16. Dissemination of technology through cyber extension in highly remote areas, extreme corners of the country is a difficult, unattainable task.
17. Observability of data is banned in certain regions of the world (like saying "these information is not available for your region, its available only to citizens of US, EU etc.)
18. Reaching some cyber extension systems, will leave the user with nothing, only with a huge waste of time.

Computer networking:

Net work: A network is a set of devices (often referred to as nodes) connected by communication links. A node can be a computer, printer, or any other device capable of sending and/or receiving data generated by other nodes on the network.

Distributed Processing: Most networks use distributed processing, in which a task is divided among multiple computers. Instead of one single large machine being responsible for all aspects of a process, separate computers (usually a personal computer or workstation) handle a subset.

Network Criteria: A network must be able to meet a certain number of criteria. The most important of these are performance, reliability, and security.

Performance: Performance can be measured in many ways, including transit time and response time. Transit time is the amount of time required for a message to travel from one device to another. Response time is the elapsed time between an inquiry and a response. The performance of a network depends on a number of factors, including the number of users, the type of transmission medium, the capabilities of the connected hardware, and the efficiency of the software. Performance is often evaluated by two networking metrics: throughput and delay. We often need more throughput and less delay. However, these two criteria are often contradictory. If we try to send more data

to the network, we may increase throughput but we increase the delay because of traffic congestion in the network.

Reliability: In addition to accuracy of delivery, network reliability is measured by the frequency of failure, the time it takes a link to recover from a failure, and the network's robustness in a catastrophe.

Security: Network security issues include protecting data from unauthorized access, protecting data from damage and development, and implementing policies and procedures for recovery from breaches and data losses.

Star Topology: In a star topology, each device has a dedicated point-to-point link only to a central controller, usually called a hub. The devices are not directly linked to one another. Unlike a mesh topology, a star topology does not allow direct traffic between devices.

Bus Topology: The preceding examples all describe point-to-point connections. A bus topology, on the other hand, is multipoint. One long cable acts as a backbone to link all the devices in a network Nodes are connected to the bus cable by drop lines and taps. A drop line is a connection running between the device and the main cable. A tap is a connector that eithers plices into the main cable or punctures the sheathing of a cable to create a contact with the metallic core.

Categories of Networks

Local Area Networks: Local area networks, generally called LANs, are privately-owned networks within a single building or campus of up to a few kilo-meters in size. They are widely used to connect personal computers and workstations in company offices and factories to share resources(e.g., printers) and exchange information. LANs are distinguished from other kinds of networks by three characteristics: (1) Their size, (2) Their transmission technology, and(3) Their topology. LANs may use a transmission technology consisting of a cable to which all the machines are attached, like the telephone company party lines once used in rural areas. Traditional LANs run at speeds of 10 Mbps to 100 Mbps, have low delay (microseconds or nanoseconds), and make very few errors. Newer LANs operate at up to 10 Gbps Various topologies are possible for broadcast LANs.

Metropolitan Area Network (MAN):

A metropolitan area network, or MAN, covers a city. The best-known example of a MAN is the cable television network available in many cities. This system grew from earlier community antenna systems used in areas with poor over-the-air television reception. In the severely systems, a large antenna was placed on top of a nearby hill and signal was then piped to the subscribers' houses .At first, these were locally-designed, ad hoc systems. Then companies began jumping into the business, getting contracts from city governments to wire up an entire city. The next step was television programming and even entire channels designed for cable only. Often these channels were highly specialized, such as all news, all sports, all cooking, all gardening and so on.

Wide area network (WAN):

A wide area network (WAN) is a network that exists over a large-scale geographical area. A WAN connects different smaller networks, including local area networks (LANs) and metro area networks (MANs). This ensures that computers and users in one location can communicate with computers and users in other locations. WAN implementation can be done either with the help of the public transmission system or a private network. Wide-area networks are often established with leased telecommunication circuits.

A WAN connects more than one LAN and is used for larger geographical areas. WANs are similar to a banking system, where hundreds of branches in different cities are connected with each other in order to share their official data.

A WAN works in a similar fashion to a LAN, just on a larger scale. Typically, TCP/IP is the protocol used for a WAN in combination with devices such as routers, switches, firewalls and modems.

Tele-conferencing:

A teleconference is a telephone or video meeting between participants in two or more locations. **Teleconferences** are similar to telephone calls, but they can expand discussion to more than two people. **Teleconferencing** uses communications network technology to connect participants' voices

PBX stands for Private Branch Exchange, which is a private telephone network used within a company. Users of the PBX phone system share a number of outside lines for making external phone calls. Conference Bridge - Technology used to connect two or more people over a telephone or broadband internet connection, such as for a conference call.

Video-conferencing:

Video Teleconference Combines audio and video to provide voice communications and video images. Can be one-way video/two-way audio, or two-way video/two-way audio. It can display anything that can be captured by a TV camera. The advantage is the capability to display moving images. In two-way audio/video systems, a common application is to show people which creates a social presence that resembles face-to-face meetings and classes and enables participants to see the facial expressions and physical demeanor of participants at remote sites. Graphics are used to enhance understanding.

Video conferencing is also an effective way to use one teacher who teaches to a number of sites. It is very cost effective for classes which may have a small number of students enrolled at each site. In many cases, video conferencing enables the institution or a group of institutions to provide courses Rural areas benefit particularly from classes provided through video conferencing when they work with a larger metropolitan institution that has full-time faculty.

Tele-text:

Tele text is a one-way, or non-interactive, system for transmission of *text* and graphics via broadcasting or cable for display on a television set. ... It is a closed loop of pages of information that are transmitted one after the other, over and over again.

Radio-text:

Radio Data System (RDS) is a communications protocol standard for embedding small amounts of digital information in conventional FM **radio** broadcasts. RDS standardizes several types of information transmitted, including time, station identification and program information.

Video-text

A means of providing a written or graphical <u>representation</u> of <u>computerized</u> <u>information</u> on a <u>television</u> <u>screen</u>

An electronic data retrieval system in which usually textual information is transmitted via telephone or cable-television lines and displayed on a television set or <u>video</u> display terminal

Videotex was one of the earliest implementations of an end-user information system. From the late 1970s to early 2010s, it was used to deliver information to a user in computer-like format, typically to be displayed on a television or a dumb terminal.

Interactive cable distribution system:

In an interactive cable system having at least one processor at a headend in communication with subscribers through an information service distribution network, a frame grabber is provided for grabbing a frame of video and storing the frame in a storage medium. A video frame may be requested from the storage medium in response to control data received from a subscriber selection device, wherein a processor retrieves the video frame from the storage medium, transforms the frame into a television information signal and sends the frame to the subscriber's home interface controller for display on the subscriber's television.

Satellite communication:

A communications satellite is an orbiting artificial earth satellite that receives a communications signal from a transmitting ground station, amplifies and possibly processes it, then transmits it back to the earth for reception by one or more receiving ground stations

How do Satellites Work

1. Two Stations on Earth want to communicate through radio broadcast but are too far away to use conventional means.
2. The two stations can use a satellite as a relay station for their communication.
3. One Earth Station sends a transmission to the satellite. This is called a Uplink.
4. The satellite Transponder converts the signal and sends it down to the second earth station. This is called a Downlink.

- Satellites are specifically made for telecommunication purpose. They are used for mobile applications such as communication to ships, vehicles, planes, hand-held terminals and for TV and radio broadcasting.
- They are responsible for providing these services to an assigned region (area) on the earth. The power and bandwidth of these satellites depend upon the preferred size of the footprint, complexity of the traffic control protocol schemes and the cost of ground stations.
- A satellite works most efficiently when the transmissions are focused with a desired area. When the area is focused, then the emissions don‟t go outside that designated area and thus minimizing the interference to the other systems. This leads more efficient spectrum usage.
- Satellite‟s antenna patterns play an important role and must be designed to best cover the designated geographical area (which is generally irregular in shape). Satellites should be designed by keeping in mind its usability for short and long term effects throughout its life time.The earth station should be in a position to control the satellite if it drifts from its orbit it is subjected to any kind of drag from the external forces.

Applications of Satellites

- Weather Forecasting
- Radio and TV broadcasting
- Military Satellites
- Navigation Satellites
- Global
- Connecting Remote
- Global Mobile Communication

ICT Initiatives in Animal Husbandry and Dairying

Some of the successful ICT initiatives taken up under different projects in India are

1. **The Warna Wired Village Project** providing Internet access to cooperative societies spread in 70 villages of Maharashtra. The aim is to provide information to the villagers by establishing networked booths in the villages.

2. **The Information Villages Project** of M.S Swaminathan Research Foundation has established a hub of the information network, in Villianur village (Pondicherry) to cater to the information needs of the rural people. It is aimed at bringing the benefits of modern ICTs to rural families in Pondicherry.

3. **TheDepartment of Animal Husbandry & Dairying, Government of India** has already established a **Local Area Network (LAN)** with 230 nodes at Krishi Bhawan, New Delhi with Internet access through NICNET gateway. An ICT Learning (e-Learning) Centre has also been established to provide on line internet access.

4. **4.The Dairy Information and Services Kiosk(DISK)** is one of the successful initiatives taken up by Gujarat Cooperative Milk Marketing Federation Ltd (GCMFL) with the help of Indian Institute of Ahmedabad. 'DISK' model includes a complete history of milk cattle owned by the member farmers. The details such as the breed and a history of diseases, inoculation, and artificial insemination are maintained in the system. It is being used at milk collection centers and in cooperatives to measure butter fat content of milk, test the quality of the milk and promptly make the payment to the farmers. It has resulted in the removal of incentives to those who adulterate milk, reduced the time for payments from 10 days to less than 5minutes and instilled the confidence in farmers on cooperative set up.

5. **The National Dairy Development Board** has established **" AKASHGANGA"** which provides total integrated solution for automatic milk collection.

6. The **Central Institute for Research on Goats** (CIRG) has developed E-mail Conference System for Goat Outreach on its **goat-nic.in** server using free software called **'majordoma'** which is available onwww.greatcircle.com on a free Linux operating system. Three e-mail conferencing systems, viz., goat-net@cirg.nic.in.,livestock-net@cirg.nic.in and fishnet@cirg.nic.in, have been launched by the institute to help information inflow among technologists, farmers, development officers and planners.

7. **Tamil Nadu Veterinary and Animal Sciences University** has developed multi mediaself learning modules on various aspects of livestock, poultry and fish production and installed the same in the **information kiosks** available in all the extension centres and constituent colleges spread through out the length and breadth of Tamil Nadu.

8. Under Animal Health Project funded by Department for International Development(DFID), **Rajiv Gandhi college of Veterinary and Animal Sciences, (RAGACOVAS)** Pondicherry in collaboration with University of Reading, UK, has designed an **interactive touch screen information Kiosk**. It has information on important cattle diseases in addition to management of cattle and methods of acquiring information. Illiterate livestock keepers can access the needed information on cattle management with the touch of the screen which had text and pictures with sound back-up. RAGACOVAS also developed an Information

kiosk on management of goats for the benefit of the goat keepers under Rural Innovation Fund project in collaboration with MSSRF.

ICT Efforts of ICAR And Government of India

1. IP-Telephony and Video Conferencing at ICAR Institutes/ HQs
2. VSAT Connectivity to 200KVKs including eight Zonal Coordinating units to ERNET-KVK, ICAR Network
3. Upgrading ICAR-ERNET network involving all ICAR Institutes and SAUs under on-going NAIP Project Component
4. Toll free number 1800-180-1551created by Ministry of Agriculture, Govt. of India, can be used by farmers anywhere in the country to access the information on agriculture and allied subjects.

❖ **Computer-Aided Teaching/Learning:**
- Computer aided teaching/learning also called Computer-based teaching /learning, sometimes abbreviated to CAT/L,refers to the use of computers as a key component of the educational environment. The term more broadly refers to a structured environment in which computers are used for teaching purposes.
- Computer aided teaching/learning are self-paced learning activities accessible via a computer or hand held device. It typically presents content in a linear fashion, much like reading an online book or manual. The term Computer aided teaching/learning is often used interchangeably with Web-based teaching / learning (WBT/L) with the primary difference being the delivery method. Where Computer aided teaching/learning are typically delivered via CD-ROM, WBT/Ls are delivered via the Internet using a web browser.
- Assessing learning in a Computer aided teaching/learning usually comes in the form of multiple choice questions, or other assessments that can be easily scored by a computer such as drag-and-drop, radial button, simulation or other interactive means. Assessments are easily scored and recorded via online software, providing immediate end-user feedback and completion status. Users are often able to print completion records in the form of certificates.
- Computer aided teaching/learning provide learning stimulus beyond traditional learning methodology from text book, manual, or classroom-based instruction. For example, Computer aided teaching/learning offer user-friendly solutions for satisfying continuing education requirements. Instead of limiting students to attending courses or reading printed manuals, students are able to acquire knowledge and skills through methods that are much more conducive to individual learning preferences. For example, Computer aided teaching/learning offer visual learning benefits through animation or video, not typically offered by any other means.

Computer-Aided Teaching/Learning

Advantages
1. Computer aided teaching/learning can be a good alternative to printed learning materials since rich media, including videos or animations,can easily be embedded to enhance the learning.
2. Computer aided teaching/learning can be easily distributed to a wide audience at a relatively low cost once the initial development is completed.

Limitations
1. Computer aided teaching/learning pose some learning challenges and typically the creation of effective Computer aided teaching/learning requires enormous resources.

2. The software for developing Computer aided teaching/learning(such as Flash or Adobe Director) is often more complex than a subject matter expert or teacher is able to use.
3. The lack of human interaction can limit both the type of content that can be presented as well as the type of assessment that can be performed.

Web-Sites Dedicated to Veterinary and Animal Sciences Education

A website is a collection of related web pages containing images, videos or other digital assets. A website is hosted on at least one web server, accessible via a network such as the Internet or a private local area network through an Internet address also called URL. The Internet is a global system of interconnected computer networks that use the standard Internet Protocol Suite (TCP/IP) to serve billions of users worldwide. It is a *network of networks* that consists of millions of private, public, academic, business, and government networks, of local to global scope, that are linked by a broad array of electronic, wireless and optical networking technologies. The Internet carries a vast range of information resources and services, such as the inter-linked hypertext documents of the World Wide Web (WWW) and the infrastructure to support electronic mail. A lot of websites dedicated veterinary and animal sciences are available in the Internet and a comprehensive list is furnished under various categories viz.,

- Indian organizations/institutes
- Veterinary universities/colleges
- Websites of professional bodies

Indian organizations/institutes

1. Central Avian Research Institute (CARI): www.icar.org.in/cari/index.html
2. Central Institute for Research on Buffaloes (CIRB): www.cirb.gov.in/
3. Central Institute for Research on Goats (CIRG): www.cirg.res.in/
4. Central Sheep and Wool Research Institute (CSWRI): www.cswri.ernet.in/
5. Dept. of Agricultural Research and Education (DARE): www.dare.gov.in/
6. Dept. of Agriculture and Cooperation: www.agricoop.nic.in/
7. Dept. of Animal Husbandry, Dairying and Fisheries: www.dahd.nic.in/
8. Government of India: india.gov.in/
9. Indian Council of Agricultural Research (ICAR): www.icar.org.in/
10. Indian Grassland and Fodder Research Institute (IGFRI): www.igfri.ernet.in/
11. Indian Veterinary Research Institute (IVRI):www.ivri.nic.in/
12. National Bureau of Animal Genetic Resources (NBAGR): www.nbagr.ernet.in/
13. National Centre for Agricultural Economics and Policy Research: www.ncap.res.in/
14. National Dairy Research Institute (NDRI): www.ndri.res.in/
15. National Institute of Animal Nutrition and Physiology (NIANP):www.nianp.res.in/
16. National Research Centre on Camel (NRCC): www.nrccamel.com/
17. National Research Centre on Equines (NRCE): www.nrce.nic.in/index1.htm
18. National Research Centre on Mithun (NRCM):www.nrcmithun.org/
19. National Research Centre on Yak (NRCY): www.nrcy.org.in/
20. Project Directorate on Cattle (PDC): www.pdcattle.ernet.in/
21. Project Directorate on Poultry (PDP): www.pdonpoultry.org/
22. State Agricultural Universities (SAUs): www.icar.org.in/sau.htm

Veterinary Universities/Colleges

1. Apollo College of Veterinary Medicine, Jaipur: acvmjaipur.org/
2. Bihar Veterinary College, Patna: www.bvcpatna.org.in/

3. Bombay Veterinary College: www.mafsu.in/bvc/bvccollege/bvc_main_page.html
4. College of Veterinary and Animal Sciences, Bikaner: www.bikanervetcol.org/
5. College of Veterinary and Animal Sciences, Mannuthy: www.kau.edu/covasmannuthy.htm
6. College of Veterinary and Animal Sciences, Pantnagar: www.gbpuat.ac.in/acads/cvsc/index.htm
7. College of Veterinary and Animal Sciences, Parbhani: www.mafsu.in/parbhani1/parbhani_main.html
8. College of Veterinary and Animal Sciences, Pookot: www.kau.edu/covaswayanad.htm:
9. College of Veterinary and Animal Sciences, Udgir:www.mafsu.in/udgir/udgri_main.html:
10. College of Veterinary Science and Animal Husbandry, Bhubaneshwar: ouat.ac.in/Colleges/Veterinary.htm
11. College of Veterinary Science and Animal Husbandry, Dantiwada: www.sdau.edu.in/prod03.htm
12. College of Veterinary Science and Animal Husbandry, Mathura: www.upvetuniv.edu.in/academic.htm
13. College of Veterinary Science , Guwahati:www.aau.ac.in/fvsc/cvsc/index.htm
14. College of Veterinary Science, Ludhiana: www.gadvasu.in/about-college.asp
15. College of Veterinary Sciences, Hissar: www. hau.ernet.in/covs.htm
16. Dr. G.C. Negi College of Veterinary and Animal Sciences, Palampur: www.hillagric.ernet.in/education/covas/college/index.html
17. Faculty of Veterinary and Animal Science, Kolkata: www.wbuafscl.com/departments/index.html
18. Guru AngadDev Veterinary and Animal Sciences University (GADVASU), Ludhiana: www.gadvasu.in/
19. Institute of Animal Health and Veterinary Biologicals (IAHVB), Bangalore: www.iahvb.co.in/
20. Kamdhenu University Gandhinagar, Gujarat
21. Karnataka Veterinary, Animal and Fisheries Sciences University (KVAFSU): www.kvafsu.edu.in/
22. Krantisinh Nana Patil College of Veterinary Science, Shirwal: www.mafsu.in/shirwal/shirwal_main.html
23. Lakhimpur College of Veterinary Science, Lakhimpur: aau.ac.in/fvsc/lcvs/index.htm
24. Madras Veterinary College , Chennai: www.tanuvas.ac.in/MVC.htm
25. Maharashtra Animal and Fishery Sciences University(MAFSU), Nagpur:www.mafsu.in/
26. Nagpur Veterinary College : www.mafsu.in/nagpur/nagpur_main.html
27. Post Graduate Institute of Veterinary and Animal Sciences, Akola: www.mafsu.in/akola/akola.html
28. Rajiv Gandhi College of Veterinary and Animal Sciences,Puducherry: www.ragacovas.com
29. Tamil Nadu Veterinary and Animal Sciences University(TANUVAS), Chennai: www.tanuvas.ac.in
30. U. P. Pt. DeendayalUpadhyayaPashuchikitsaVigyanVishwavidyalaya, Mathura: www.upvetuniv.edu.in

31. Veterinary College and Research Institute, Namakkal: www.tanuvas.ac.in/VCRI_namakkal.htm Veterinary College Bangalore www.kvafsu.edu.in/Colleges/VeterinaryCollegeHebbal/index.htm
32. Veterinary College Bidarwww.kvafsu.edu.in/Colleges/BidarVeterinaryCollege/index.htm
33. Veterinary College Shimogawww.kvafsu.edu.in/Colleges/VeterinaryCollegeShimoga/index.htm
34. **West** Bengal University of Animal and Fishery Sciences, Kolkata: www.wbuafscl.com/index.html

Websites of professional bodies

1. American Animal Hospital Association: www.healthmet.com
2. American Association of Feline Practitioners: www.avma.org/aafp
3. American Canine Sports Medicine Association: www.acsma.com
4. American College of Veterinary Internal Medicine: www.vmth.ucdavis.edu/acvim/
5. American Kennel Club (AKC):www.akc.org/
6. Australian Small Animal Veterinary Association: www.farmwide.com.au/nff/vetasscn/asava/asava.htm
7. British Small Animal Veterinary Association: www.bsava.ac.uk
8. Cat Fancier's Association: www.cfainc.org
9. Centre for Disease Control : www.cdc.gov/healthypets/
10. Commonwealth Agricultural Bureau (CAB): www.cabi.org
11. Consultative Group on International AgriculturalResearch (CGIAR): www.cgiar.org/
12. European College of Veterinary Internal Medicinecompanion animal: www.agrl.huji.ac.il/~hylton/ecvim/ecvim.htm
13. European Society of Feline Medicine: web.ukonline.co.uk/fab/esfm.html
14. Food and Agricultural Organization (FAO): www.fao.org/
15. Institute for Laboratory Animal Research (ILAR):
16. dels.nas.edu/ilar_n/ilarhome/index.shtml
17. International Livestock Research Institute (ILRI): www.ilri.org/
18. Pet Industry Joint Advisory Council: www.petsfomm.com/PIJAC/
19. World Association for the History of VeterinaryMedicine (WAHVM): wahvm.vet.uu.nl/
20. World Organization for Animal Health (OIE): www.oie.int/eng/en_index.htm
21. World Wide Fund for Nature (WWF): www.panda.org/

Web Directories

A web directory or link directory is a directory on the World Wide Web. It specializes in linking to other web sites and categorizing those links. A web directory is not a search engine and does not display lists of web pages based on keywords; instead, it lists web sites by category and subcategory. The categorization is usually based on the whole web site rather than one page or a set of keywords, and sites are often limited to inclusion in only a few categories. Web directories often allow site owners to directly submit their site for inclusion, and have editors review submissions for fitness.

List of the most common web directories

1. Open Directory Project (http://dmoz.org)
2. World Site Index (http://www.worldsiteindex.com)
3. Web World (http://www.webworldindex.com)
4. Search Sight (http://www.searchsight.com)

5. Jayde (http://jayde.com)
6. Domaining.in (http://www.domaining.in).
7. Turnpike Directory (http://www.turnpike.net/directory.html)
8. Yahoo! Directory (http://dir.yahoo.com)
9. Business.com (http://www.business.com)
10. Best of the Web (http://botw.org)
11. Aviva (http://www.avivadirectory.com)
12. Ezilon (http://www.ezilon.com)

Virtual Learning Institutions Or E-Institutions

Virtual learning institutions or e-institutions are the one which offers structured learning environment through the internet. A number of universities, private educational institutions are offering online courses in different disciplines of science and technology in India.The Tamil Nadu Veterinary and Animal Sciences University is also offering an online certificate course on animal welfare. Some of the e-institutionsproviding online courses and training in virtual environment at global levelare

1. The Australian Correspondence School (http://www.asc.edu.au)
2. California Virtual University (http://www.california.edu/catalogs.html)
3. Belford University (http://www.Belforduniversity.org)
4. Online Study for UK (http://www.ebam.ac.uk)
5. E-Learning training (http://www.outstant.com)
6. United States Open University (http://www.open.edu)