CHAPTER II
THEORETICAL CONCEPTS

2.0 Introduction

According to Blurton (1999), Information Communication Technology (ICT) are a diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information. ICT has demonstrated its impact on the library resources, systems, services and operations. It is well acknowledged in the library literature that the application of ICT have provided one of the best innovations in the history of libraries and it is changing the shape of libraries and role of librarians at an unprecedented pace (Lewis, 2007).

In this chapter, an attempt has been made to present different concepts relating Information Communication Technology (ICT) and Human Resource Development (HRD) viz., evolution of ICT in libraries, evolution of ICT in libraries: Iran and India, changing environment of university libraries, advantages of ICT in libraries, ICT in libraries, library automation, necessity of library automation, library automation software, role of INFLIBNET Center in automation of university libraries of India, ICT application in libraries, necessity of training, use of ICT in training, theories of job satisfaction and measurement of job satisfaction.

2.1 Evolution of ICT in Libraries

Automation in libraries first began in the 1960s and in the 1970s, libraries started adopting software applications and machine readable cataloguing. In the 1980s, networking technologies, optical discs, CD-ROMs and communications technologies were introduced. The primary objective of the early technology applications was to automate circulation, acquisitions and the catalogue to bring efficiency and effectiveness in library operations and services. The 1990s
witnessed revolutionary changes in the application of ICT in libraries such as the internet, world wide web protocols, information retrieval standards, integrated library systems and online databases. The 2000s are an era of digital libraries, virtual collections, paperless environment and round the clock instant remote access to unlimited resources (Ramzan & Singh, 2009). In addition, they opine that the rapid advancements in computers and telecommunications, exponential growth of information and media, availability of online databases, reduction in hardware and software costs, passion of using the internet, provision of cost effective communication mechanism and growing user demands are the major factors responsible for the increasing use of IT in libraries around the world (Ramzan & Singh, 2009).

2.1.1 Evolution of IT in Libraries: India and Iran

According to Moorthy (2000) many of the libraries and information centers in India started using computers for their works after the introduction of mini computers during late 1970s, since these were costly, only elite institutions in the public, academic, R&D and private sectors could afford them and so on, the libraries in these institutions were able to utilize them to some extent. Library automation, as a result did not progress satisfactorily. However, the arrival of microcomputers and personal computers (PCs) in Indian market in the 1980s gave the necessary impetus, the environment began to change and library automation picked up momentum.

Studies on information technologies in Iran indicate that computerization of library systems and services in Iran started in the late 1970s and resumed after an apparent gap in 1980s. However, this trend has accelerated in the last decade especially in institutions of higher education as a result of an increased number of users, greater demand for the use of library materials within and outside the libraries, increase in the amount of materials being published, changes in the
nature of reading material, and the development of new and cheaper computers (Farajpahlou, 1994).

2.2 Changing Environment of University Libraries

The information revolution has had a tremendous impact on our traditional libraries. The right of access to information is the basic right of a democratic society. This right is provided by the all kinds of the libraries in a society. Within an academic institution/university, providing and supporting information and technology usually falls to a variety of groups. The libraries are able to afford most effectively and efficiently for the academic, curricular, research and business support to the entire campus requires. There was a shift from the ‘libraries’ to ‘information centers’, from ‘readers’ to ‘users’, from ‘books’ to ‘e-books/e-journals’, from ‘librarian’ to ‘information manager’/‘cybrarian’ etc. All the basic functions of the libraries have taken a new turn with the help of the modern ICTs (Saha, Ghosh & Mondal, 2007).

Allen (2003) (as cited in Zhang, 2004) offered a comprehensive list of changes that would continue to have a major impact on services provided by libraries:

• development in technology – network capacity and the convergence of information and media technologies; increased access to computers and computer networks;

• development in publishing – increase in the volume of information; increased importance of digital technologies for the distribution and delivery of materials;

• increase in range of services through the development of services involving new technologies and new learning services;

• changes in the uses of buildings, e.g., moves from physical to virtual libraries;
• changes in the types of users, e.g., a more diverse range of users with increasing demands;

• changes in staffing libraries, e.g., moves toward multitask-skilled staff on a variety of permanent and temporary contracts;

• increased need for different libraries to collaborate with each other, both within sectors (e.g., higher education) and across sectors (e.g., higher education and public libraries).

2.3 Advantages of ICT in Libraries

Sharma, Singh & Kumar (2009) mention the following advantages of ICT in libraries:

• Opportunities to deploy innovative methodologies and to deploy more interesting material that creates an interest in the librarians;

• Enables better management of library a librarian thereby improving the productivity of the tutor as well as the taught;

• Enables the librarian to concentrate on other tasks such as research and consultancy;

• Enables optimum utilization and sharing of resources among institutions thereby reducing the costs of implementing ICT solutions.

2.4 ICT in Libraries

According to Sharma et al. (2009) ICT enables one:

• To capture, store, manipulate, and distribute information;
• To introduce and provide new services, revitalize the existing services by providing faster access to the resources, by overcoming the space and time barriers;

• To provide need-based, (tailor made), browsing and retrospective search services to the users;

• To have large number of databases in CDs;

• To utilize the staff for providing better information services;

• To develop/upgrade the abilities of professionals

• To encourage networking and resource sharing at local level;

• To have access to a number of national and international journals which are being published only in machine readable form;

• To digitize the documents for preservation and for space saving;

• To support library functions such as circulation, serials control, acquisition control, stock maintenance and other routine office works and developing in-house database;

• To retrieve and disseminate the information in user-defined format.

2.5 Library Automation

The first and foremost ICT component, which can be adopted in the libraries, is the computer for library automation. The automation is defined as the technique, a process or a system operates automatically. Library automation may be defined in simple sense as “A process of mechanization of library operations which are of a routine and repetitive nature. This covers usually housekeeping operations such as acquisition, serial control, cataloguing, circulation, references and administration work”. We may also say that computerization of all library
operation is known as Library Automation (Sinha, Chakarborty, & Bhattacharjee, 2007).

### 2.6 Necessity of Library Automation

Sinha et al. (2007) believe that today library automation is the need of the hour. Use of information technology in libraries has become inevitable in an era of information explosion and the emerging of a wide range of new technologies in order to satisfy changing complex information needs of users. The factors necessitating automation of university libraries are the following:

- Capacity to handle any amount of data and information;
- Speedy processing of information and its retrieval;
- Flexibility in information search;
- Standardization of library procedures;
- Participation in network programming and resource sharing;
- Provide better bibliographic control at local, regional, national and international level;
- High rate and better quality in performance;
- Avoid/eliminates duplication of works;
- Facilitate interdisciplinary nature of research and information;
- Economic implications of latest information technology;
- Overcome geographical and other barriers to communication; and
- Improve the quality of existing services and to reduce routine and time consuming clerical works (Sinha, et al. 2007).

### 2.7 Library Automation Software

In India, there are more than a dozen of library automation application software packages. The developers of these software packages include both
government and private organizations. Some prominent software packages successfully installed in many universities such as: NewGenLib, LIBSYS, SOUL, LIBMAN, BASIS PLUS & TECHLIB, CDS/ISIS (Sharma, et al, 2009).

In Iran, due to language barriers, an overwhelming number of these libraries have utilized commercial library-oriented packages developed in the country. The most widely used Iranian-made library software packages were, Pars Azarakhsh, Nosa, Kavosh and Ganjineh, respectively (Davarpanah, 2003).

2.8 Role of INFLIBNET Center in Automation of University Libraries of India

INFLIBNET centre is an autonomous Inter-University Centre of UGC (University Grants Commission) under the ministry of Human Resource Development, Government of India. The automation of University Libraries is a major activity of INFLIBNET. It is also a prerequisite for networking of libraries and resource sharing under the INFLIBNET Program. Realizing the importance of this basic necessity, INFLIBNET Centre through University Grants Commission has been providing grants (initial and recurring) to the universities identified under the program. Every year 15-20 libraries are identified and initial grant to the tune of Rs.6.5 lakhs is provided. This enables the university libraries to purchase computers, modem, telephone, printer, air-conditioner, software (OS) etc. These selected universities are also provided with recurring grant for the first five years after the installation of systems. This helps them to take care of expenditures relating to salary of Information Scientist (a position created specifically to assist Librarians in implementation of the program), data entry, consumable, computer maintenance and telephone charges etc.

Till now, 142 universities have been given grants to purchase computers, modem, telephone, printer, air-conditioner, software etc. The above support has
given tremendous boost to the automation activities at the participating universities (INFLIBNET Center, 2011).

2.9 ICT Application in Libraries

According to Rajput and Gautam (2010), the automation can be applied profitably in various processes of institutes or libraries. The following are the aspects of library working which can be computerized or automated:

2.9.1 Library Operations/Services

2.9.1.1 Acquisition

Acquisition is the process of selecting, ordering, and receiving materials for library or archival collections by purchase, exchange, or gift, which may include budgeting and negotiating with outside agencies, such as publishers, dealers, and vendors, to obtain resources to meet the needs of the institution's clientele in the most economical and expeditious manner (Reitz, 2011).

The impact of Information technology in collection development is very prominent in university library. With the help of web, acquisition work has become very much simplified. Order placing, duplication checking, price checking etc are done very effectively using ICT technique. Online bookshops and publisher's websites save the time of the librarians. For the procurement of journals, order is placed in the prescribed format to the publishers through Internet. Invoices can be downloaded from the Websites that makes service faster and avoids postal delay. E-mail helps in sending reminders to the publishers, vendors and even to the borrowers of the books (Antherjanam & Sheeja, 2008).

2.9.1.2 Cataloguing

The process of creating entries for a catalog. In libraries, this usually includes bibliographic description, subject analysis, assignment of classification
notation, and activities involved in physically preparing the item for the shelf, tasks usually performed under the supervision of a librarian trained as a cataloger (Reitz, 2011).

ICT has revolutionized the practice of cataloguing in the library. With the help of OPAC users access the holdings of the library catalogue at their desktop across the campus. It reduces the cost of maintaining a catalogue. Elimination of many paper files and decentralization is possible (Antherjanam & Sheeja, 2008).

2.9.1.3 Circulation

Circulation refers to the activity of a library in lending books to borrowers and keeping records of the loans (Parmar & Bhuta, 1989).

The use of technological devices such as computers, barcode scanners and its software in circulation helps in performing the routine operations easily and quickly. Transaction process of the collections in the library has become faster than before. Now, university library heavily depends upon telephone, Internet and E-mail for checking availability, reservation and renewal of books (Antherjanam & Sheeja, 2008). Further, an automated circulation system is capable of generating circulation statistics for planning and reporting purposes (Reitz, 2011).

2.9.1.4. Periodical Control

Serial Control is a general term encompassing all the activities involved in managing a serials collection, including but not limited to receiving, claiming, invoice processing, binding, circulation, and record maintenance (bibliographic, check-in, bindery, etc.), usually accomplished by the serials department of a library, manually or with the aid of an automated serials control system (Reitz, 2011).
ICT also helps in the process of the serial control in the university library. It helps in preparing union list of serials and helps in circulating via e-mail to the branch libraries (Antherjanam & Sheeja, 2008).

2.9.1.5. Reference Services

‘Reference services’ refer to that branch of the library’s services which includes the assistance given to users in their search for information on various subjects (Parmar & Bhuta, 1989). In the reference section, queries are answered through telephone. For ready reference services library staff uses Internet and e-mail facility (Antherjanam & Sheeja, 2008).

2.9.1.6. Interlibrary Loan (ILL)

When a book or other item needed by a registered borrower is checked out, unavailable for some other reason, or not owned by the library, a patron may request that it be borrowed from another library by filling out a printed interlibrary loan request form at a service desk, or electronically via the library's Web site. Some libraries also accept ILL requests via e-mail or by telephone, usually under exceptional circumstances. Materials borrowed on interlibrary loan may usually be renewed on or before the due date. Interlibrary loan is a form of resource sharing that depends on the maintenance of union catalogs (Reitz, 2011).

2.9.1.7 Management System

A computer-based information system developed and maintained by a commercial enterprise to integrate data from all its departments (product development, production and inventory, marketing and sales, personnel administration, etc.) to support managerial and supervisory decision-making with real time analysis (Reitz, 2011).
2.9.1.8 Documentation System

The process of systematically collecting, organizing, storing, retrieving, and disseminating specialized documents, especially of a scientific, technical, or legal nature, usually to facilitate research or preserve institutional memory. Also refers to a collection of documents pertaining to a specific subject, especially when used to substantiate a point of fact (Reitz, 2011).

2.9.1.9 OPAC (Online Public Access Catalogue)

Online Public Access Catalogue (OPAC) is a database composed of bibliographic records describing the books and other materials owned by a library or library system, accessible via public terminals or workstations usually concentrated near the reference desk to make it easy for users to request the assistance of a trained reference librarian (ODIS, 2011). Chauhan (2004) states that OPAC provides access to the catalogue through a computer terminal. OPAC allows searching the entire catalogue online, conveniently and quickly, using one or more search criteria. One can, for example, search by author, title, keywords, class number or one or more of these combined together. OPAC even shows the current status of a book, whether it is loaned out, available on the shelf or lying elsewhere. With modern library systems offering interface to OPAC, it is also possible to provide access from anywhere in the world via Internet.

2.9.1.10 Internet Services

Internet is the high-speed fiber-optic network of networks that uses TCP/IP protocols to interconnect computer networks around the world, enabling users to communicate via e-mail, transfer data and program files via FTP, find information on the World Wide Web, and access remote computer systems such as online catalogs and electronic databases easily and effortlessly, using an innovative technique called packet switching (Reitz, 2011).
Internet has enormous quantity of information with millions of web pages and thousands of newsgroups. We can get wide variety of information from the Internet ranging from simple web pages to interactive discussion groups. The Internet has become an indispensable resource for university libraries worldwide to enhance the collection, improve services and operations. Internet has made easy access to information sources/documents like books, journals, electronic publications, etc. The Internet can be successfully utilized for providing reference service because various primary and secondary sources of information are available online. It is possible to access the resources of other libraries through the Internet. It is also possible to browse the entire collection of a library through Web OPAC and can make a request for a document through e-mail (Haneefa, 2006).

E-mail is an abbreviation of electronic mail, an Internet protocol that allows computer users to exchange messages and data files in real time with other users, locally and across networks. E-mail requires a messaging system to allow users to store and forward messages and a mail program with an interface for sending and receiving. Users can send messages to a single recipient at a specific e-mail address or multicast to a distribution list or mailing list without creating a paper copy until hard copy is desired. Faster and more reliable than the postal service, e-mail can also be more convenient than telephone communication, but it has raised issues of security and privacy (Reitz, 2011).

2.9.1.11 Local Area Network (LAN)

Local area networks are comprised of computers connected to network servers. They may be used within the library to improve the operational efficiency of the organization. A local area network (LAN) provides connectivity between staff in all physical areas of the library building. It is particularly useful for connecting staff in branches with other staff at the main library. It provides for resource sharing of equipment especially printers and file servers. In addition,
LANs can provide a telecommunications system for patron access to library services from the patron's home or office computer (Mitchell & Saunders, 1991).

### 2.9.2 Other ICT Application in Libraries

#### 2.9.2.1 Bibliographic Database

A computer file consisting of electronic entries called records, each containing a uniform description of a specific document or bibliographic item, usually retrievable by author, title, subject heading (descriptor), or keyword(s). Some bibliographic databases are general in scope and coverage; others provide access to the literature of a specific discipline or group of disciplines. An increasing number provide the full-text of at least a portion of the sources indexed. Most bibliographic databases are proprietary, available by licensing agreement from vendors, or directly from the abstracting and indexing services that create them (Reitz, 2011).

#### 2.9.2.2 In-house/National Database

In-house database comes from within an organization and developed by library staff and/or others by using infrastructures available with library or parent body. An in-house database contains references to information sources available with that library/institution or available with other libraries of that locality. In-house database is a very important means of information organization. It can provide important services to its specific users by providing information generated and/or organized locally (Kumar & Kumar, 1993).

#### 2.9.2.3 Personal Computer (PC)

Personal Computer (PC) is any microcomputer designed for individual use, usually in a personal workspace or in travel, consisting of a CPU and associated peripheral devices. The term is often restricted to IBM-compatible microcomputers in which the hardware is controlled by Intel and the operating
system by Microsoft. A PC may function as a stand-alone workstation or be connected to a network. In a LAN, PCs may function as client workstations or as file servers (Reitz, 2011).

### 2.9.2.4 Laptop

A small, portable battery-operated personal computer, usually equipped with a built-in keyboard and mouse and a flat panel monitor that folds over the keyboard to form a cover. Modern research libraries are retrofitting study areas to provide network connectivity for patrons who use laptops, and some academic libraries are installing them in classrooms equipped for bibliographic instruction (Reitz, 2011).

### 2.9.2.5 Network Server

A network server is a computer that provides various shared resources to workstations and other servers on a computer network. The shared resources can include disk space, hardware access, and email services. Any computer can be a “network server.” What separates a server from a workstation is not the hardware, but rather the function performed by the computer. In general, a workstation is any computer used by an individual person to perform his or her job duties, while a network server is any computer that provides users with access to shared software or hardware resources (wisegeek, 2011).

### 2.9.2.6 Compact Disc-Read Only Memory (CD-ROM)

Compact Disc-Read Only Memory (pronounced "see dee rahm"), a small plastic optical disk similar to an audio compact disc, measuring 4.72 inches (12 centimeters) in diameter, used as a publishing medium and for storing information in digital format. Stamped by the producer on the metallic surface, the data encoded on a CD-ROM can be searched and displayed on a computer screen but
not changed or erased. The disc is read by a small laser beam inside a device called a CD-ROM drive (Reitz, 2011).

**2.9.2.7 Digital Videodisc (DVD)**

DVD is a type of optical disk of the same size as a compact disc but with significantly greater recording capacity, partly because it is double-sided. Although DVD requires special equipment for playback, most DVD players can also read CD media (Reitz, 2011).

**2.9.2.8 CD Tower**

A computer hardware device designed to store a large number of CD-ROM discs, usually connected to a server programmed to handle network access (Reitz, 2011).

**2.9.2.9 CD Writer**

A CD drive that supports write once (CD-R) or rewritable media (CD-RW) (The Free Dictionary, 2011)

**2.9.2.10 Film/Slide Projector**

Film/Slide Projector is a mechanical device that displays films or slides on a screen (Narang, 1995).

**2.9.2.11 Scanner**

In data processing, a peripheral device that reads and converts handwritten or printed text, graphics, or barcodes into digital format (a bitmap) for processing or display on a computer screen, without actually recognizing the content. In libraries, optical scanners are used to create digital images of materials for interlibrary loan, document delivery, and electronic reserves and in circulation to
read the barcode on the patron’s library card and on items in the collection. Some barcode scanners require an external decoder (Reitz, 2011).

2.9.2.12 Printer

Printer is the earliest and the still most popular output device. It helps in bringing output on paper in printed form. There are many types of printer, of which four namely, Line Printer, Dot-Matrix Printer, Daisy wheel Printer and Laser Printer are more popular (Sharma, 1991).

2.9.2.13 Barcode

Barcode is a printed label containing machine-readable data encoded in vertical lines of equal length but variable thickness, which can be read into an attached computer by an optical scanner. In libraries barcodes are used to identify books and other materials for circulation and inventory and to link the borrower's library card to the appropriate patron record in automated circulation systems (Reitz, 2011).

2.9.2.14 Barcode Scanner

Barcode Scanner is an optical character reader which automatically reads data from documents encoded as a series of Bar marks (printer produced or handwritten). The data read are translated into a Binary series which is encoded on magnetic tape or is entered directly into a Central Processor (Narang, 1995).

2.9.2.15 Barcode Printer

Barcode Printer is an output device used for printing barcodes (Narang, 1995).
2.9.2.16 Audiocassette

An audiotape permanently enclosed in a hard plastic case containing two take-up reels to which the ends of the tape are attached for playback and rewinding (see this example). Libraries that allow audiocassettes to circulate usually place them in a section reserved for sound recordings, arranged by composer, performer, genre, or some other means of classification (Reitz, 2011).

2.9.2.17 Videocassette

A blank or prerecorded videotape permanently enclosed in a hard plastic case containing two take-up reels to which the ends of the tape are permanently attached for playback and rewinding in a device called a videocassette recorder (VCR) (Reitz, 2011).

2.9.2.18 Microfilm

The use of 16mm or 35mm photographic film to store miniaturized text and/or micro images in a linear array consisting of a single row (cine format) or double row of frames that can be magnified and reproduced only with the aid of specially designed equipment. Microfilm is available in color or black and white (negative or positive) and is used (1) in continuous rolls mounted on open spools or in enclosed cartridges and (2) in unitized format in jackets or aperture cards. Stored under suitable environmental conditions, its longevity can be measured in centuries. For this reason, it is used for the preservation of paper documents at risk of deterioration (Reitz, 2011).

2.9.2.19 Microfiche

A small card-shaped sheet of photographic film designed for storing miniaturized text and/or micro images arranged sequentially in a two-dimensional grid (see this example). Microfiche is available in color or black and white (negative or positive). Various formats exist, but ISO recommends 75 x 125 mm
(48 frames in four rows of 12) or 105 x 148 mm (60 frames in five rows of 12). Although each sheet usually includes a title and/or index number in a heading across the top that can be read without magnification, the text itself can be read and copied only with the aid of a microform reader-printer machine. User resistance can be mitigated by keeping equipment in good repair and providing point-of-use assistance (Reitz, 2011).

2.9.2.20 Facsimile Machine (Fax)

Facsimile machine is a device that can send or receive pictures and text over a telephone line. Fax machines work by digitizing an image -- dividing it into a grid of dots. Each dot is either on or off, depending on whether it is black or white. Electronically, each dot is represented by a bit that has a value of either 0 (off) or 1 (on). In this way, the fax machine translates a picture into a series of zeros and ones (called a bit map) that can be transmitted like normal computer data. On the receiving side, a fax machine reads the incoming data, translates the zeros and ones back into dots, and reprints the picture (Webopedia, 2011).

2.9.2.21 Security Gate

A device installed near the entrance and/or exit of a library, usually in the form of a swing-arm or pair of uprights positioned in such a way that persons entering or leaving the premises must pass through a magnetic detection system designed to trigger an alarm if an attempt is made to remove library materials without checking them out (Reitz, 2011).

2.9.2.22 Uninterruptible Power Supply (UPS)

UPS is a battery powered power supply unit that is guaranteed to provide power to a computer in the event of interruptions in the incoming mains electrical power. Different rating UPSs will provide power for different lengths of time (The Free Dictionary, 2011).
2.10 Necessity of Training

The rapid growth and demand of information and frequent changes of IT sector the library profession or academic institutions are not exception in implementation of information technology in a consistent manner. In reality it is seen that a portion of the senior/aged library personnel has no knowledge/capabilities to work equally with the modern technological environment in compare with the traditional environment. Therefore, the human resource at library has to be developed as real knowledge resources. With the help of knowledge human resource, libraries must grasp the pertinent aspects of both user and technology issues to create an effective library services. Thus, training is the most essential instrument of Library Human Resource Development (LHRD) (Saha, et al., 2007).

Craig (1976) lists nine reasons for training. They are:

- Increase in productivity;
- Improvement in the quality of work and morale;
- Development of new skills, knowledge, understanding, and attitude;
- Correct use of new tools, machines, process methods, or modification thereof;
- Reduction of waste, accident, turnover, and other overhead costs;
- Fighting of obsolescence in skills, technologies, methods, products, markets, and capital management;
- Bringing incumbents to a level of performance for the job;
- Development of replacements, preparing people for advancement, improving manpower development, and ensuring continuity of leadership;
- The survival and growth of organization.

Training includes more than formal classes, workshops, or programs. Training can be carried out in many ways. Beardwell and Holden (1997) (as cited in doh-Ilomechine, 2009) group training into two primary areas: On-the-job
training and off-job training. The former is the training in which the supervisor or another co-worker teaches the individual to do a job, while the latter is the case in which the individual is sent to a vocational school or institute where training is provided. The success of any organization depends on its workforce, and to get the best from the workforce, it must be continuously trained and developed.

2.11 Use of ICT in Training (ICT-based Training)

Information technologies offer new opportunities for educators to enhance the quality and accessibility of their instructional material. Tools such as electronic mail, computer conferencing and the World Wide Web are assumed to strengthen communication between students and faculty members. Trainers in such industries as finance, insurance, and travel have made strategic use of ICT systems for product development, marketing, and distribution, and are using ICTs for professional development and training (Akir, 2006, p. 21).

Feitcher (as cited in Gantt, 1998) states that "in broad terms, computer-based instruction works. It offers a 10 to 20% improvement in performance over conventional training methods and a one-third reduction in time on task. Trainers can reduce the amount of time that a trainee spends learning by one-third".

Many reasons have been suggested as to why ICT-based instruction is an ideal complement to established methods of education and training. ICT makes access to education more flexible and reduces barriers of time and place. Asynchronous web-based technologies, for example, can advance the effectiveness of learning by bringing learners into contact with learning peers from around the world. Communication technologies can also enhance the quality of university teaching and research as well as corporate training systems (Akir, 2006, p. 12).

Multimedia technologies are being referred to as the technological wave of ICT developments and are defined as “a host of computer-delivered services
made-up of textual and no-textual information that integrate several sources of media and data such as video, graphics, animation, audio, text” (Cleary, 1998, as cited in Sigala et al., 2001). According to this, multimedia is an all-embracing term that cuts across a wide variety of ICT vehicles and tools (i.e., interactive/digital television, Internet and its applications (E-mail, WWW, etc.), other Web-based networks such as intranets and extranets, interactive CD-ROMs and DVDs (digital versatile disc), videoconferencing systems, multimedia PCs or palmtops, virtual reality, etc.) (Sigala et al., 2001).

2.11.1 Benefits of Multimedia Use in Training

Aside from its being an effective form of training, there are other benefits to learning through multimedia. For example, learning is self-paced, information is easier to access, learning becomes more interesting, and independent discovery-oriented learning is fostered. Jensen and Sandlin (1991) (as cited in Gantt, 1998) outlined further benefits of multimedia, which include:

- Multimedia mirrors the way in which the human mind thinks, learns, and remembers by moving easily from words to images to sound, stopping along the way for interpretation, analysis, and in-depth exploration.

- The combination of media elements in a multimedia lesson enables trainees to learn more spontaneously and naturally, using whatever sensory modes they prefer. For example, some people learn best by seeing, others learn best by seeing and hearing, still others learn best through manipulation or kinesthetic (tactile) exercises.

- Combining media elements with well-designed, interactive exercises enables learners to extend their experience to discover on their own, so that they are no longer passive while information is "fed" to them. Additionally, programs may be designed to include immediate feedback in order to clarify misconceptions before
trainees become confused and to provide direct reinforcement for correct responses.

• While students may only raise their hands to ask a question so many times, many multimedia programs (expert systems) are designed to allow learners to pause, branch, or stop for further remediation, exploration, or enhancement opportunities; these interactive qualities encourage non-linear thinking.

• By combining words with pictures, graphics, and audio, multimedia programs enable people with varying levels of literacy and math skills to learn by using sight, hearing, and touch. Evidence suggests that using multimedia segments as context for trainees significantly aids in reading comprehension.

• Instructional technologies help people learn to problem-solve and work in teams, which supports the development of interpersonal skills.

• With a multimedia program as assistant, trainers can provide more individualized attention to trainees as they need it most.

Instructors have time to focus on activities that demand participation while students are able to learn on their own (Gantt, 1998).

2.11.2 E-Learning

E-Learning comprises all forms of electronically supported learning and teaching. The Information and communication systems, whether networked or not, serve as specific media to implement the learning process. The term will still most likely be utilized to reference out-of-classroom and in-classroom educational experiences via technology, even as advances continue in regard to devices and curriculum. Abbreviations like CBT (Computer-Based Training), IBT (Internet-Based Training) or WBT (Web-Based Training) have been used as synonyms to e-learning (Wikipedia, 2010).
**Computer-based training** (CBT) is any course of instruction whose primary means of delivery is a computer. A CBT course (sometimes called courseware) may be delivered via a software product installed on a single computer, through a corporate or educational intranet, or over the Internet as Web-based training. CBT can be used to teach almost any conceivable subject, but it is especially popular for computer-related studies.

With the many types of CBT training tutorials available, employees receive step-by-step instruction, instant and positive feedback in a non-threatening environment, and above all, learn at their own pace. Multimedia is a key factor in blurring the line between education and training (Akuna, 2010).

**Web-based Training**: The World Wide Web is the epitome of a true multimedia environment. It displays animation, uses sound and video, and incorporates text and graphics, and nowhere has multimedia made such an impact as in this area. In fact, with the convergence of the Web and multimedia, there has been an explosion of web-based training and education courses. It was the visual impact that multimedia brought to the Web that made the Internet a truly universal happening. The Web brought user-friendliness, and a visual presence that had not existed before (Akuna, 2010).

Communication technologies are generally categorized as **asynchronous** or **synchronous**.

**Asynchronous activities** use technologies such as blogs, wikis, and discussion boards. The idea here is that participants may engage in the exchange of ideas or information without the dependency of other participants involvement at the same time. Electronic mail (Email) is also asynchronous in that mail can be sent or received without having both the participants’ involvement at the same time. Asynchronous learning also gives students the ability to work at their own pace. This is particularly beneficial for students who have health problems. They
have the opportunity to complete their work in a low stress environment (Wikipedia, 2010).

Synchronous activities involve the exchange of ideas and information with one or more participants during the same period of time. A face to face discussion is an example of synchronous communications. Synchronous activities occur with all participants joining in at once, as with an online chat session or a virtual classroom or meeting (Wikipedia, 2010).

2.12 Theories of Job Satisfaction

There are numerous theories attempting to explain job satisfaction, here an attempt to highlight the main theories including Maslow’s hierarchy of needs theory, Herzberg’s two-factor theory, Vroom's theory, and Adams' theory.

2.12.1 Maslow’s Hierarchy of Needs Theory

According to Maslow’s hierarchy of needs theory (1943), employees have five levels of needs, from the lowest to the highest, which include:

1. physiological needs (basic needs such as food and water)
2. safety needs (safe and secure physical and emotional environment)
3. belongingness needs (acceptance and friendship)
4. esteem needs (a positive self-image and attention and appreciation for one's contributions)
5. self-actualization needs (developing one's potential to the fullest degree)

Maslow stated that lower level needs had to be satisfied before the next higher level need would motivate employees.

2.12.2 Herzberg’s Two-Factor Theory

Herzberg’s two-factor theory (Herzberg's motivation-hygiene theory) stresses that motivation is composed of two largely unrelated dimensions:
1. job-related factors which can prevent dissatisfaction, but do not promote employees' growth and development (hygiene or extrinsic factors); and
2. job-related factors that encourage growth (motivators or intrinsic factors)

The hygiene factors include company policy and administration, technical supervision, salary, working conditions, interpersonal relations with the supervisor, peers and subordinates, job security, and personal life. These factors are associated with an individual’s negative feelings about the job and are related to the context or environment in which the job is performed. In contrast, motivators are directly related to the job and include work itself, recognition, advancement, achievement, growth and responsibility. These factors are associated with an individual’s positive feelings about the job and are related to the content of the job itself. These positive feelings, in turn, are associated with the individual’s experiences of achievement, recognition, and responsibility, and they are predicated on lasting rather than temporary achievement in the work setting. (Herzberg, Mausner, & Snyderman, 1959)

2.12.3 Vroom's Theory

Vroom's theory (Expectancy theory) is based on the belief that employees are motivated to make choices among behaviors. If employees believe that effort will be rewarded, there will be motivated effort, that is, they will decide to work harder to receive a reward. Variables in expectancy theory are choice, expectancy, and preference. Choice is the freedom to select from a number of behaviors. Expectancy is the belief that certain behaviors will or will not be successful. Preferences are the values a person attaches to different outcomes (Vroom, 1964).

2.12.4 Adams' Theory

Adams’ theory (Equity theory) posits that perceived inequity is a motivational force. Workers evaluate equity using a ratio of inputs to outputs. Inputs include qualification, experience, effort, and ability. Outcomes include
benefits. Inequities occur when workers feel that outcomes are not comparable to inputs (Adams, 1965).

These work motivation theories are derived from the broad field of human motivation study and are directly implicated for individual workplace behavior. Moreover, they may be applied to a variety of management practices aimed at motivating employees.

2.13 Measurement of Job Satisfaction

To measure job satisfaction, one must have a conceptual understanding of the construct in order to decide what indirect factors to measure. Since there is no single agreed upon definition of job satisfaction, and no widely accepted theory to explain it, it is no surprise that there is also no general consensus on the best way to measure job satisfaction (Wanous & Lawler, 1972 as cited in Worrell, 2004).

The most widely cited survey instruments found in the literature include The Job Satisfaction Survey (JSS), the Job Descriptive Index (JDI) and the Minnesota Satisfaction Questionnaire (MSQ).

2.13.1 Job Satisfaction Survey

The Job Satisfaction Survey was developed by Paul E. Spector to assess employee attitudes about the job and aspects of the job. The JSS is a 36 item questionnaire that targets nine separate facets of job satisfaction. Those facets include pay, promotion, benefits, supervision, contingent rewards, operating procedures, coworkers, nature of work, and communication. Each of these facets is assessed with four items, and a total score is computed from all 36 items. Responses to each question range from "strongly disagree" to "strongly agree", and questions are written in both directions (Worrell, 2004).
2.13.2 Job Descriptive Index

This 90-item scale is designed to measure employees' satisfaction with their jobs by looking at five important aspects or facets of job satisfaction which are present job, present pay, opportunities for promotion, supervision, and coworkers. It has been widely used and researched for over 40 years, and it has become one of the most popular job satisfaction survey instruments (Zedeck, 1987 as cited in Worrell, 2004).

2.13.3 Minnesota Satisfaction Questionnaire

The *Minnesota Satisfaction Questionnaire* (MSQ) has become a widely used instrument to evaluate job satisfaction. Three forms of the MSQ have been developed, two 100-item long forms (1977 version and 1967 version) and a 20-item short form. The MSQ is designed to measure specific aspects of an employee's satisfaction with his or her job, and it provides more information on the rewarding aspects of a job than do more general measures of job satisfaction. The MSQ has been widely used in studies exploring client vocational needs, in counseling follow-up studies, and in generating information about the reinforcers in jobs (Worrell, 2004).