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CHAPTER I

INTRODUCTION

1.0 INTRODUCTION

Education is one of the most influencing sub-systems of society for development and growth of Nation. Education system reflects the society's image. Supporting evidences are no more needed to prove the statement that science and technology is the core element for future development and growth of any society. Even Kothari Commission (1964) recommended that "The development of research and technology is essential for growing of our country at faster rate."

At this point of time, to talk about uses of computers is neither irrelevant nor pre-mature as the term computer is no-more mystic for common man. Today, application of computers in educational sector is wide and it is helpful to sharpen quality of the product of education. Computer is a versatile tool, helps to solve many problems relating with teaching and it assists to accelerate the functioning ability of employees.

Now we are in the midst of the Information Technology revolution. We are in a new progressive era with a promise of far reaching benefits for all sections of society. Computers and computer related technology is the main tool for present revolution of society. One of the most known products of the research and technology is "the computer". At the same time it is not only a product of research and technology it is also a tool for development of research and technology. No part of the society is untouched by computer today. It is found every where in each and every sphere of life. In medical for diagnosis and remedy, in administration, communication, film, defense, astrology, games education and where not. The use of computers in all walks of life has unleashed new business opportunities covering system integration, internet working, internet services, software development, manufacturing, marketing, education, consultancy and training in this field. Hence more and more organizations are inspired to this field. The entry of many IT multinationals in India is the evidence for this statement to prove. They view India as one of the largest markets for IT and communication services, training and education.

Computer Education is one of the significant components of this system that provides skilled manpower according to the changing need of the market. Indian Computer Education is capable of attracting the attention of the globe and hence it has become one of the largest exporters of skilled software personnel to developed and developing countries. There is huge scope of research in this area for the national development. The development in the area of computer and computer education is the byproduct of our education system. To assess the development in the computer education, it is also essential to assess the development of our educational system, policies and programmes of central and state government. In the succeeding paragraphs an attempt has been made to analyze our education system, policies and programmes those have a direct influence on the development of our technology and computer education.

1.1 BEGINNING OF AN ERA: COMPUTER EDUCATION

India entered in the field of computers in the year 1954 when decision was taken to design first general purpose computer which was completed in the year 1956 by Tata Institute of Fundamental Research (TIFR), Bombay. Another attempt was made by the joint collaboration of Indian Statistical Institute (ISI), Kolkata, and Jadavpur University (JU), Kolkata in the year 1963 to develop a computer which was named as ISIJU. The first indigenous mini computer was developed by Government owned ECIL (Electronic Corporation of India Ltd.), Hyderabad that was designed at Bhaba Atomic Research Centre (BARC). Following the Government decision, IBM Corporation withdrew from India in 1978. But by that time, there were few private sector companies like, Wipro and Methodex which started assembling mini and personal computers.

The 80s saw the emergence of the higher level structured languages and faster adaptation to computerization by Indian Industries. This is perhaps the most significant trend seen in recent times and the most crucial to the development of the software industry in India. In pursuit of it, in November 1984, Government of India released new Computer Policy. It was an open and liberal invitation for collaboration, technology transfer and setting up of manufacturing facilities by the foreign firms. Many important foreign manufacturers except IBM had some tie-up with a local vendor. The greatest impact of this open door policy was on the PC manufactures.

With the easy availability of advanced technology systems due to liberal Government policy, software developers have also begun developing increasingly sophisticated packages both for the national and international markets. The 90s are the era of the Internet, Object Oriented Programming and Relational Database Management System i.e. the programming for stand alone machines to global networks across multiple network platforms.

Developing countries like, USA, Canada, Australia, Japan etc. had a great concern for Indian humanware for software development. Even today there is a great national and international demand for versatile and dynamic software experts in silicon valley.

These developments in the field of computer are the credit of our education system. The major contribution in this area is of our Computer Education imparted by IITs, universities and private bodies. The contribution of IITs and universities is huge in terms of the supply of experts in the area of hardware and networking. Some private managed institutions like, Jetking, and Aptech, are also doing well in hardware training. Department of Electronics Accredited Computer Courses (DOEACC) Society a the joint venture of All India Council for Technical Education (AICTE) and Department of Electronics (DOE), Government of India is doing wellin this field to maintain and manage the standard of Computer Education for national and international needs. In the area of software, the contribution of private managed institutions like NIIT, Aptech, Tata-Unisis, LCC, Infosis, Asset, Datapro, Informatics, PIIT, Unique Hi-tech, CMC, Vijay computers, CDAC, etc. is quite huge. Now different national and foreign universities are also offering Computer Education courses in both hardware and software through distance learning programmes with the help of local affiliated institutions. Some of the Indian Universities are IGNOU, Ambedkar Open University, M.G University, Sikkim Manipal University, Algappa University, Makhanlal Chaturvedi R.P. University, Annamalai University, Punjab Technical University etc.. Those universities are offering Computer Education in both distance and face to face mode. But nearly more than half of the courses are offered by private managed institutions. The universities offering Computer Education in Gujarat in regular mode are many like, the M.S. University of Baroda, Gujarat University, S.P. University, South Gujarat University, North Gujarat

University, Saurastra University, and Bhavnagar University. They are imparting Computer Education in its University campus and/or through affiliated collages elsewhere. There are many local institutions which are also imparting Computer Education in Gujarat e.g., Roshani computers, Itech Computer Education, Next Soft, Bysoft, Millannium Computers, Dataquest, etc.

The teaching learning process in the computer institutions offering hardware and software training differs from institute to institute. It is assumed that the teaching learning process in university departments and IITs are best of all but at the same time, some private institutions also offer Computer Education at a satisfactory level, where as, the teaching learning process of many private institutions are not up to the mark. The institutions offering Computer Education also differ in terms of affiliation, norms, rules, regulations; course offered, fee structure, certification etc. There is a felt need to study these organizations offering Computer Education in terms of different criterion and parameters.

The development in the field of computer is due to the development of computer hardware and software and policies related to the development of both hardware and software. In the proceeding few paragraphs an attempt has been made describing the development of computers, development of computer languages and policies in India relate to the development of both.

1.2 DEVELOPMENT OF COMPUTERS

After the second world war computer was developed very quickly. But this development took place in different stages. These stages are identified as generations of computers. The time period of the development of computer can be described in following generations.

Table1.1: Technology and Period wise Generations of Computer Development.

Generations of Computers	Technology Used	Period of Time
First Generation	Vacuum Tube	1940-52
Second Generation	Transistor	1952-64
Third Generation	Integrated Circuit (IC)	1964-71
Fourth Generation	Large Scale IT	1971-80
Fifth Generation	Artificial Intelligence	1980 and later

Although the time span of any developmental stage can not be mentioned so accurately, as it was observed that the ending years of one stage and the commencing years of the succeeding stage could be common and next stage would have started when the preceding one is near to completion. Still, the general agreement was found regarding the development stages of computer. Now let's have a brief introduction of all these five stages of computer development.

1.2.1 First Generation Computers: Vacuum Tube Technology (1940-52)

The computers of the first generation were based on Vacuum Tube Technology. Nearly, 15 to 18 thousand vacuum tubes were taken into the use in this machine and to run this machine 150 KW power was needed. The speed of this computer was very slow, and the size of this computer was very large so it was too heavy. The cost of this computer was very high and too much heat was generated from it. Therefore, air-conditioning atmosphere was essential. In general, the first generation computers were not affordable from economic point of view. Even with these constrains Electronic Numeric Integrator And Calculator (ENIAC) hold remarkable importance and place because it was the first electronic computer. It was followed by advanced machines with similar technology like, Electronic Discrete Variable Automatic Computer (EDVAC) and Electronic Delayed Storage Automatic Computer (EDSAC). The first commercial computer Universal Automatic Computer (UNIVAC-I) using this technology was prepared by Remington Rand Corporation in 1951.

1.2.2 Second Generation Computers: Transistor Technology (1952-64)

In 1948, three American scientists namely William Shockly, John Bardin and Wallder Brighten invented the transistor. First of all it was used in the radio and thereafter, transistor was used in the second generation computer instead of vacuum tubes. Additionally, the use of discreet circuit was started in them. As a result of this, the size of the computer and heat generated was reduced and the speed was increased. In short, the machines using transistor and discreet circuit were known to be the second generation computers.

1.2.2 Third Generation Computers: IC Technology (1965-1971)

Thereafter, integrated circuits were used in computers instead of vacuum tubes and transistors. The computer using integrated circuits were considered as the computers of third generation. The speed of this type of computer was very high and its cost was also very low in comparison to second generation computer. During 1965 to 1971 the size of computers was reduced and the computer became cheap in price.

1.2.3 Fourth Generation Computers : LSIC Technology (1971-1980)

After 1970 computers having LSIC (Large Scale Integrated Circuits) and VLSIC (Very Large Scale Integrated Circuits) Chips came into existence which were called as the computers of fourth generation. LSIC developed a new field of electronics. In LSIC chip more than 10,000 working parts such as transistors, resistors could be included within only two square centimeters of space. One of these chips could work as the whole CPU (Central Processing Unit) of the computer. The machines with such one LSIC chip were known as microprocessors. Such microprocessors were known as the computers of fourth generation. The computers became speedier and less costly due to these microprocessors. The size of the computers reduced to such a level that it could be arranged on a table. Today, even the fourth generation computers and its technology are being used.

1.2.4 Fifth Generation Computer: Artificial Intelligence (1980 and later)

The development of computer was continued. After 1980, super computers were invented through which marvelous progress had been achieved in the speed and

accuracy of calculation. Super computers are the computers of the fifth generation. The computers of fifth generation are called the computers having artificial intelligence. Because of having artificial intelligence computers started to take logical decisions. These computers can perform different kind of complicated activities such as, to get the information about the atmosphere of the whole world and to forecast it, to process the signals received from the satellite etc. But these computers are very costly so the use of computer of this type was very limited to research organization, meteorological institution and heavy industries

1.3 TYPE OF COMPUTERS

Mainly, the computers can be categorized into two different types. One type of categorization is in terms of the type of computers according to its action and another type is in terms of the type of computers according to its size. An attempt has been made to discuss these two major categories of computers.

1.3.1 Type of Computers According to its Action

Computer can be categorized into digital computers, analog computers and hybrid computers according to the type of work/function done by it. A Brief description about these computers is given as follows.

1.3.1.1 Digital Computers

The computers which can make calculations with the help of specific numbers are known as digital computers. Today the word computer is become synonymous of digital computers. 0, 1, 2, 3....9 are the digits and the computers which can perform all activities with the help of these digits are known as digital computers. The language of digital computers is binary and the binary system is shaped with the help of two digits i.e., 0 and 1. Thus, the alphabet of this language is in digital form. In short, addition, subtraction, multiplication division and related activities of these functions can be done by these computer with the help of digits.

1.3.1.2 Analog Computers

By using the physical quantities in analogous calculations we can get the results. For Example, three plus five is equal to eight. The same principle is being

used in the analog computer. The analog computer which is based on such a principle is one kind of electronic mechanical instrument. In analog computer, one kind of measurement is being transferred into the voltage for making calculations i.e. 1 can be presented by 1 volt. Thus, the main characteristic of this computer is that electric voltage is being used as the basic value in it. Moreover, mainly it is being used for the calculations related to some specific experiments undertaken in the field of science and technology. Thus, the fields of its utility are very limited. The use of analog computer is restricted sequentially due to the increasing importance of digital computer.

1.3.1.3 Hybrid Computers

When the principle of both the digital and analog computers are used in the development of computer it is called as the Hybrid computers. For example, the electronic instrument for measuring the blood pressure of patient is such kind of instrument. This instrument transfers the breath of blood in number after making its calculations. Thus, both measure and number are used in this computer. Particularly this kind of computers are used in hospitals and factories.

1.3.2 Type of Computers According to its Size

Computers can be categorized into super computer, mainframe computer, mini computer, and micro computers according to its size. A brief description about these types of computers are given as follows.

1.3.2.1 Super Computer

The super computer is having very high working capacity as indicated by its name. Such computers can perform one thousand million fractions of work within one second. Super computers are at the apex of the computer range. They are the fastest and the most expensive machines and are considered to be a national resource. Although initially they were used for weapons designing, today they are used for commercial purpose. The cost of these computers is very high so they are affordable only by big organizations. Some of the areas in which super computers are being used are weather forecasting, biomedical research and aircraft design etc.

1.3.2.2 Mainframes

Computers smaller than super computer are known as mainframes. They are less powerful than super computers. They operate at very high speed, have very large storage capacities and can support hundreds of users. They are used for data processing in large organizations where the record of thousands of employees have to be processed. They are also used to manage large centralized database. Such data bases are normally queried by hundreds of users who need to access information from different locations. They are used as controlling nodes in Wide Area Networks like railway reservation, airways reservation etc..

1.3.2.3 Mini Computers

Mini Computers can perform better than micro computers. They are larger in size than micros. Their cost is more than micros. Normally, they are designed to support more than one user at a time. They possess larger storage capacity and operate at higher speed. They can also communicate with mainframes. They are used to control and monitor production processes, to analyse results of experiments in laboratories, to meet instructional needs. etc. They are also used as servers in Local Area Networks (LAN).

1.3.2.4 Microcomputers

Micro computers are at the lowest end of the computer range. As their name indicates, they are smaller in size. Comparatively their cost is low and easily movable. The main parts of these computers are microprocessors, so they are known as microcomputers. Most of the micros are used for personal needs, so they are also known as Personal Computers (PC). The most common applications of the PC are word processing, spread sheet calculation and database management. They are also used for desktop publishing, accounting, graphics, statistical analysis, investment analysis etc. In the field of education microcomputers are widely used.

1.4 COMPUTER LANGUAGES

The functioning of a computer is controlled by a set of instructions. These instructions are written to communicate with computers. The language used in the

communication of computer instructions is known as the computer language or technically called as programming language. Computer language can be divided into three levels like, Machine languages (Low level language), Assembly (symbolic) languages and Procedure oriented languages (high level languages). Like, different types of computers, a brief description is given here about different levels of computer languages.

1.4.1 Machine Language

Computers are made of two-state electronic components which can understand only pulse and no-pulse or 1 and 0 conditions. Therefore, all instructions and data should be written using binary codes i.e. 1 and 0. The binary code is called the machine code or machine language. The machine language is also known as the first generation computer language. As computers are not identical in design, each computer has its own machine language. This language is very difficult to understand and master.

1.4.2 Assembly Language

An assembly language uses mnemonic (or memory aid) codes rather than numeric code as used in machine language. One of the first steps in improving the programme preparation process was to substitute letter symbols-mnemonic for the numeric operation codes of machine language. Mnemonics come in various shapes and sizes like, SUB, HLT, CLA, ADD, STA etc. all of them used for specific functions. It is easier than machine code in learning and writing programmes as it uses English like language. As the computer understands only machine language, a programme written in assembly language must be translated into machine language before the programme is executed. This translation is done by a computer programme referred to as an Assembler. Assembly language is also known as the second generation computer language.

1.4.3 High Level Language (HLL) or Procedure Oriented Language (POL)

These languages consist of a set of words and symbols and one can write programmes using these in conjunction with certain rules like English language. These languages are oriented towards the problems to be solved or procedures for

solution rather than mere computer instructions. These are more user centered than the machine centered languages. They are known as high level languages or third generation languages. The most important characteristic of this language is that it is machine independent and a programme written in this language can be run on computers of different makes with little or no modification. However, programmes written in this language need to be transalated into equivalent machine code before execution through a programme called as translator. Most high level languages are developed during the last three decades. The most common high level languages are FORTRAN, BASIC, COBOL, C, PL/1, ALGOL, PASCAL, ADA etc.

Due to the development of computer hardware (computers) and software (languages) and the ability of computers to be programmed, it is used in every sphere of life including teaching learning process. The use of computers in the teaching learning and other related fields are discussed as follow.

1.5 COMPUTERS IN TEACHING

Computer has both vocational and pedagogical role in Education. When it is taught as a discipline, vocational utility is created in it's product and similarly, it is useful as a tool to teach other subjects like Mathematics, Physics, Chemistry, Geography, Biology, etc. This role of computer is pedagogical in nature.

Vocational utility has dominated in the market of computer uses. Investment is even substantial in this field. But the use of computer as a tool to teach other subjects has given relatively less attention. Hence, there is ample need for the people of other fields to learn computers. So that computer can be used for teaching other subjects and interdisciplinary approach can be applied for further applications.

1.5.1 Use of Computer as a Discipline or Vocational Use of Computer

When we think of vocational uses of computers, immediately number of courses offered in this field come in our mind, e.g. BCA, MCA, PGDCA etc. It is also linked with computer languages like, Java, C, C++, etc. with back hand support database like Oracle, Foxpro, etc., Here, when computer itself is taught as a subject, it's output can be presented for developing computer professionals and producing

computer users. Both the output have specific functions in the field of education which can be discussed as follow.

1.5.1.1 Developing Computer Professionals

Computer professionals are the experts in particular field of Computer Education. There are many different types of institutes, which are offering different computer courses to produce them. Some of them are subsidized and others private. They are offering some of the courses such as B.C.A., CIC, D.C.A., PGDCA, M.C.A., B.Sc., and M.Sc. in Computer Science., B.E., B.Tech., M.E. and M.Tech. in Computer Engineering and Technology. There are some other certificate, degree and diploma courses offered by different institutes. This is not exclusive list of Computer Education courses. Private institutes have also designed their own courses. Open universities, affiliated colleges, DOEACC certified course running institutes, private institutes, MHRD, I.T.I., IIT, polytechnics, etc. are offering different courses. These institution and many others are producing a number of computer professionals.

1.5.1.2 Producing Computer Users

It basically using computers in other areas as helping hands and increasing efficiency. When we talk of the use of computers in other spheres of life, computer literacy is essential to certain degree. This use of computer helps to create computer users. There are very few courses available in market for preparing computer users for different other areas. Only a few courses are available in medicine, telecommunication and business. Hencel more systematic efforts are needed to focus on this area.

1.5.2 Use of Computers as a Tool

Learning about computers and learning with computers are different. Co-learning with computers is not given much attention. To develop software of different subjects to help learners to learn those subjects with the help of computers, computer professionals are needed. They can develop softwares in consultation with subject experts. It is also called as instructional computing. Many researches have also been done in this area. Researcher conducted by Khirdawkar (1998), Das (1998), Zyoud(1999), are the examples of the use of computer in different subject areas.

Instructional computing is used in the field of computer with applications, like, Computer Aided Instructions (CAI), Computer Aided Learning (CAL), Computer Aided Assessment (CAA), Computer Managed Learning (CML) etc. In CAI programmed study plan is prepared according to the need of content and psychological factors like reinforcement, exercise, repetition etc and according to the plan an automated software is prepared for the learners. With the help of this package, a student can learn a particular topic of a subject without the help of a teacher with his own pace and time. Intelligent Tutoring Systems (ITS) is a more sophisticated form of conventional CAI. It tries to construct system with human like tutoring capability. In CAL, computer is used as a teaching learning aid where computer is used to help both tutors and learners in imparting instruction. The whole curriculum is not taught through computer software rather assistance is taken where needed. It can help in learning at individual pace, at free will, and self corrective to shortcoming and weaknesses, stimulated and interactive feedback systems. Here computers can be used for presentation, simulation, animation and drill and practice. Computer can assist teachers to teach subjects properly. Through CAA, a test can be conducted with the help of computer. A question bank is made available with the computer and a sequence of random setting in programmed to generate different sets of question papers with different difficult levels. When a student wants to get assessed, the computer provides a question and the candidate's evaluation is done automatically with the help of this computer package. In CML the use of computer is taken to monitor and report on students learning.

1.6 COMPUTERS IN ADULT EDUCATION

Expert packages in computer can help illustrate people to learn alphabets and mastering 3Rs in a quicker and easier manner. No computer background is needed to use this package. In few cases it is being observed that the period for adult learning can be reduced from 40 days to 4 days as a result of the use of such packages. S.P. University has designed such a package for Hindi, Gujarati and Punjabi languages. Like wise, computers can be used to help handicapped persons in learning process.

1.7 COMPUTERS IN DISTANCE EDUCATION

Those who are deprived from formal education can get the advantages of distance learning. computers can be used effectively in distance education. Computers can be a great help in distance education using self instruction and individualized instruction packages. Universities providing distance education are using computers for these purposes. Such universities are IGNOU, Ambedkar Open University, M.G. University, Sikkim Manipal University, R.P University and Annamalai Universities.

1.8 PROBLEMS IN COMPUTER EDUCATION

Adopting a new technology is a great challenge. There are few constraints in the area of Computer Education. Major problems in Computer Education are relating to resource allocation, training of teachers, attitudes of decision makers, stiff competition, indifferent attitude of government, shortage of teaching staff etc. Few problems in the area of computer education are discussed here as under.

Quality of computer education suffered due to the mushrooming development of computer education institutes without proper rules and regulations. The demand for computer expertise is decreasing in global as well as national market due to which many institutions are closing down their institutions. There is a lack of manpower to serve in the computer education institution. Even many of computer instructions lack in pedagogic training. Due to first development and change in the field of computers, it is always difficult to equip institutions with latest hardware and software. Financial and infrastructural problem are also common among Computer Education institution. The increased cost of living, electricity, telephone etc, also affecting adversely in the development of Computer Education institutes. In the present study the investigator is trying to get the details about the problems faced by Computer Education institutes in the Borada district of Gujarat.

1.9 CURRENT STATUS OF COMPUTER EDUCATION

Out of over 700 engineering colleges in the country, about 500 colleges are offering B.Tech. Programs in electronics, computer science, engineering, and IT. While the MCA program was concepted in 1996 offered by nearly 300 universities/ colleges, BCA and BIT, three to four year programs have been introduced late in

various universities, including IGNOU. It must be noted that the formal sector is capable of producing 75,0000 graduates every year with B. Tech./B.E./BCA degrees. However, hardly this sector is able to fulfill the demand of IT education at different levels. The non-formal sector, particularly, agencies like NIIT, Aptech and the DOEACC certified institutions are attempting to fulfill this demand not only by providing short-term, skill-oriented programmes, but also enrolling university students for masters/ degree/ diploma/ diploma/ certificate equivalent courses those who could not get admitted to these programmes at formal institutions. It is estimated that there are 0.5 million students who are getting IT training every year from these informal sector and the rate is growing at the rate of around 20 percent per annum.

1.10 POLICIES AND PROGRAMMES IN COMPUTER EDUCATION IN INDIA

Computer Education in both hardware and software started in India during seventies. Few universities and IITs started offering different courses in software and hardware. Due to the increased demands of skilled computer manpower and the insufficient capability of the government sector to supply skilled manpower, private institutions came forward to offer Computer Education courses. Towards the end of eighties and early years of nineties there was a mushrooming growth of Computer Education institutions. It was due to huge demand of computer education manpower in national as well as international market. The contributions of central government and state government were quite encouraging in this direction to spread and develop Computer Education in the country. Different policies and programmes of central and state government helped this sector a lot for their progress. Some of the policies and programmes of center and state are presented here as follow.

The report of the National Workshop on Computer Literacy Curriculum held at the National Council of Educational Research and Training in 1984 gave the following recommendations to manifest the importance of Computer Education.

1. Computer Education should be introduced at senior secondary level and may gradually be introduced at middle and primary levels.

2. Computer Education program should be a part of the curriculum for every student, irrespective of the area selected for specialization.

3. Computer literacy program should familiarize students with the computer as a versatile tool with immense application potential in all aspects of human development.

Planning Commission had also given emphasis on the expansion of Computer Education. The 7th Five Year Plan (1985-90) emphasized for the reorientation of the education system so as to prepare the country to meet the challenges of 21st century. An amount of Rs. 700 crores were allotted in 7th Five Year Plan for computer literacy and expansion of computer programme at all the levels of education. Following measure were put on priority during 7th Five Year Plan related to Computer Education.

1. To expand existing/ initiate new programmes for computer manpower development during the 7th plan to desired levels by 1995.

2. Integration of Computer Education in professional and general education courses at first degree level and provision of computer facilities in these institutions in the 7th plan to be completed by 1995.

3. Introduction of elective computer science courses at higher secondary level during the 7th plan.

4. Extension of computer literacy programme to cover all higher secondary schools by 1991, secondary schools by 1995 and elementary schools in the long term.

National Policy on Education (1986) also put emphases on Computer Education. Apart from different innovative measures like, Operation Blackboard, Navodaya Vidyalaya, much emphasis was given on the vocational aspect of education referring to the Computer Education.

The 8th Five Year Plan (1992-1997) has also mentioned about the importance of information technology, Computer Education and the participation of community in Computer Education. It had stressed that all steps would be taken to move to the age of communication and technology. It had stressed on making education relevant in the context of changing socio-economic scenario.

The 9th Five Year Plan (1997-2002) also emphasized on Computer Education and its recommendations made the task force on Computer Education for every stage to be implemented in a time bound manner.

The 10th Five Year Plan recommended strategically for the development of computer and Computer Education in the country in terms of the following strategies for hardware, software, marketing and human resource development.

1.10.1 Hardware Development Strategy

The hardware development strategy recommended by 10th Five Year Plan is presented as follow.

The major reasons for the stagnant growth in IT hardware production are distorted tariff structure, poor infrastructure, high cost of finance and stiff competition from multinational corporations (MNCs). This sector is likely to face even harder competition after 2005 when the zero duty regime comes into place in line with the Information Technology Agreement of the World Trade Organisation (ITA-WTO). Although under this regime, import duty on finished products would come down to zero, it is unlikely that duties on various inputs such as chemicals and metals used in hardware production would also be brought down to zero. In such a scenario, the viability of domestic manufacturing will be adversely affected. A comprehensive package of measures, both short term as well as long term, needs to be put in place to ensure accelerated development of the sector. The most important long-term measure is to evolve a well thought-out hardware policy suited to our requirements. The highlights of any strategy to promote the hardware sector should be as to the following lines.

- Formulate a national hardware development policy by December, 2002 in line with the relevant recommendations of the second and third reports of the National Task Force on IT and Software Development.

- Undertake a comprehensive rationalization of the tariff structure, especially for raw materials, to cope with the zero duty regime from 2005.

- Identify global hardware majors through trade delegations and encourage them to set up manufacturing units in India.

- Workout a specific action plan to ensure the development of world class products at competitive prices. This should include promoting international specific alliances, dedicated R&D, targeting new overseas markets, continuous product improvement etc. Existing Indian companies have to play a major role in this regard.

- Strengthen quality certification programmes and encourage the establishment of test laboratories for international certification in order to generate greater confidence in suppliers from India.

- Promote HRD and skills development in key technologies like embedded systems, VLSI (Very Large-Scale Integrated Circuit) design, blue tooth technologies etc. The industry needs to set up contract design centres and spend 5 per cent of revenues on R&D.

1.10.2 Software Development and Marketing Strategy

The software development and marketing strategy recommended by 10th Five Year Plan is presented as follow.

The total global software and IT services market is estimated to be about $ 1.2 trillion of which India's share is 2 per cent. The Indian software industry is under threat from emerging competitors like China, the Philippines, countries of the Commonwealth of Independent States (CIS), South Korea etc. Strategies would, therefore, have to be re-oriented for sustained growth. The domestic market also needs to be developed. The experience of countries like, China which have a very

strong and vibrant domestic market, needs to be studied when developing our long term strategy. Major initiatives that require immediate action in the software sector are as follows.

- The software industry needs to move up the value chain by developing high value products through R&D Software firms need to tie up with the extensive R&D network that exist in the country.

- To ensure long-term sustained domestic growth and exports, the software industry needs to move from being software solutions providers to manufacturers of packaged products.

- Continuous improvement in productivity will hold the key to maintaining our competitive edge in the global market. Three vital inputs are needed for this: sustained improvement in the quality of products and services, availability of high quality manpower and strong R&D support.

- For building brand equity and positioning the Indian brands abroad, large investments in marketing and brand building would be required. The United States would continue to receive priority attention for software exports. Other elements of the marketing strategy should be strengthening marketing channels globally, expanding the focus to emerging markets in Europe, the United Kingdom, Asia- Pacific, Japan etc., and entering into agreements with end-user countries for executing large projects.

- Industry associations like, the National Association of Software and Service Companies (NASSCOM), Manufacturers Association of Information Technology (MAIT), Electronics and Computer Software Exports Promotion Council (ESC) etc., need to assist the small and medium enterprises (SMEs) in their export efforts through effective networking and one-on-one meetings with potential customers in developed countries.

- Priority attention needs to be given to the development and promotion of software in Indian languages and meeting local requirements in order to expand the domestic market.

On the basis of the following future IT manpower requirement, strategy for human resource development was developed by 10th Five Year Plan.

It can be said that the approach to IT education in India, to a large extent, will now be influenced by the anticipated growth of software exports in this sector. The report estimates that by 2008 the total software market in the country can be $87 billion out of which software exports are expected to be around $69 billion, and that $ 17 billion of the exports will be contributed by IT-enabled services market. These figures are consistent with the estimates contained in the paper published by Soni, Mehta and .Khurana (SMK) Wherein software exports in 2008 are expected to touch $57 billion and the domestic software industry is expected to contribute another $25 billion. The SMK figures have been arrived at by assuming growth to be around 50 percent till 2003 and then slowly tapering off to 20 percent in the later years.

The SMK report states that, in 1998, productivity per capita figures were $40,000 for exports and $10,000 for domestic market. Assuming 10 percent increase in productivity of software engineers every year, the man power requirement in 2008 has been estimated to be around 5.4 lakh and 3.2 lakh respectively. It should be noted that productivity per capita in 2008, by their calculations, will be around $106,000 for software exports. The productivity per capita of $80,000 in 2008 for the domestic software industry given in the report is not consistent with the 10 percent annual increase assumption. Even assuming a higher rate of increase in productivity, it is unlikely that per capita productivity in the domestic market. Considering that the average software engineer's productivity in the software exports market has been estimated to be over $ 100,000 in the year 2008, it is clear that the SMK study has not taken into account the emerging IT-enabled services market in their projections.

The report does not indicate as to how the manpower requirement numbers in the report have been arrived at. The estimate of 1.1 million as the requirement for international and domestic software is about one lakh or more if the SMK estimates of productivity per capita figures are used in the calculations. For the exports market, The requirement can be estimated to be five lakh ($52 billions software exports in 2008), and for the domestic market the figure is five lakh ($24 billion domestic market in 2008) for a total of ten lakh.

The report's estimates of 1.1 million in the IT-enabled services sector seem to be reasonable in view of the implied estimates of per capita productivity figures. According to the report, the export, and that the domestic market with the same infrastructure is likely to serve both markets. Productivity per capita in 2008 is, therefore, expected to be $172,000 in this sector. Keeping in mind that the current per capita productivity in this sector is around $6000, and that this is a manpower-centric, low-tech activity, the expectation that productivity will increase at the most three times by 2008 is realistic.

1.10.3 Strategy for Human Resources Development

In order to achieve sustained growth in the IT sector and maintain India's competitive edge in the field, high quality professionals in adequate numbers are required. According to a McKinsey- NASSCOM study, India would require 2.2 million IT professionals by 2008 – 1.1 million in the hardcore IT sector and an equal number for IT-enabled services. The country needs to ensure the right mix of technical, business and functional skills in the workforce to meet the needs of individual business segments and customer markets. Educational and training institutions need to match the demands of the industry. The major initiatives required in this regard are given as follow.

- Continuous up gradation of standards at the school level with emphasis on Physics, Mathematics and English.
- Make microelectronics and biology the new focus areas in tertiary education.
- Updating the syllabus of computer engineering, electronics and IT in various technical institutions in line with the demands of the industry. The curriculum in other branches of engineering should also be reoriented and broad based to include IT subjects.
- Postgraduate engineering education and innovative research in IT are imperative in order to maintain quality and facing new challenges in this dynamic sector.

- Ensuring a continuous upgrading of teaching faculties and introduction of teaching aids like computers, access to Internet, videos etc.
- Augmenting and upgrading facilities in existing RECs and engineering colleges under deemed universities to Indian Institute of Technology (IIT) level so that the country has at least 100 such institutions by the end of the Tenth Plan to meet the requirements of quality manpower.
- Recognizing, without further delay, the 'C' level course of the Department of Electronics Accredited Computer Courses (DOEACC) as equivalent to M.Tech in computer engineering for all purposes.

To realise the aims and objectives of strategy of Central Government for Human Resource Development, Task Force has given following recommendations on HRD in IT (2001).

- Creating information on IT manpower.
- Promoting initiatives in HRD in IT with focus on bridging the digital divide, innovation in pedagogy etc.
- Monitoring the intake and out-turn of IT professionals by institutes with the objective to double intake by 2001-02 and triple it by 2003.
- Setting up of exclusive IT institutes, improving their quality, infrastructure and promoting networking.
- Launching an IT faculty development initiative.
- Evolving curriculum and courseware of IT institutes.
- Promoting technology-mediated IT education using a web-based and multimedia approach.
- Improving connectivity.
- Promoting postgraduate education and research.

- Facilitating interface with the IT industry.
- Sharing investments between the central/ state governments and industry.

According to the priorities given in 7th five year plan, the Government of India launched a project called CLASS (Computer Literacy and Studies in Schools) project with joint collaboration of NCERT, Department of Electronics of IIT, Delhi, Ministry of Education and Culture and CMC (Computer Maintenance Corporation of India) in the year 1984-85 with following objectives.

- To provide students with a broad understanding of computer and their use.
- To familiarise students with the range of computer application in all walks of human activity and the potentiality of the computer as an information processing tool.
- To demystify computers and develop a degree of ease and familiarity with computers which would be conductive to develop individual creativity in identifying and developing applications relevant to the immediate environment of the child.

This project covered 250 secondary and higher secondary schools throughout India. Schools were representing all geographical areas of the country. Forty two resource centres were also selected to train school teachers as well as to provide logistic support to selected schools. Three teachers from each school were trained through intensive 3-week training course. The scheme was extended to another 1000 schools in 1985 and 1986. By 1987 resource centres were increased to fifty, where as, experimental schools were increased up to 1250. The project implemented by the NCERT covered nearly 14,000 higher secondary schools by 1990. This project played an important role in the progress and extension of the Computer Education in India. In the National Policy on Education (1986) in was noted that, "As computer have become important and universal tools, a maximum exposure to computers and a training in their use will form part of professional education." Therefore, a joint committee was formulated by the Department of Electronics (DOE), the National Council for Educational Research and Training (NCERT), the Indian Institute of Technology (IIT), and the Technical Teachers' Training Institute (TTTI). This

committee played a vital role in introducing computers in the schools as a logical follow up work of the CLASS Programme.

Recently Government of India has started a improved CLASS project called 'CLASS 2000' covering secondary, and higher secondary education. It is planned to impart computer based education in 100 smart schools, computer aided education in 1000 schools and general computer literacy in 10,000 schools. Thus in Indian schools computers entered as an individual and new subject. Today in manly Indian schools Computer Education is being given and many schools have introduced Computer Education in their syllabus.

Recently the State Government of Gujarat has also taken remarkable initiative steps to bring computer awareness at the secondary school level. Gujarat Secondary Education Board (1998) Circular no. 1197/ C.M/ 6T6 sited that GSEB has recognized Computer Education as a subject for VIII to X standard in 1998-99 and prescribed a course outline. A detailed syllabus for VIII standard has been prescribed and implemented on experimental basis. But it had recognized computer course as a SUPW subject and not as a compulsory course.

From the Government's policies and programmes it was found that the urgent necessity to bring computer awareness to education set up has been accepted. May be due to these policies and programmes, the distinct development of Computer Education is possible at different levels. In spite of these initiatives and developments, it is felt that the status of Computer Education both at school and higher levels is not up to the mark as Goel, Das and Joshi (2000) also observed that, "Computer Education itself has not yet been standardised with respect to infrastructure, syllabus and qualification of manpower." It means that matter does not end with the installation of the computers in the schools and starting the process of computer education. There are many unanswered questions relating to the progress and development of Computer Education at different levels. The present study is a humble attempt in this direction.

1.11 COMPUTER EDUCATION IN INDIA

Computer Education had started in India during seventies. Different factors contributed to the magnitude and direction of the growth of Computer Education. Beginning with microprocessor equipped laboratories, leading to personal computers, subsequently mainframes, then workstations and now-a-day things like, distributed processing architecture computers, is indicative of the qualitative updation and upgradation of Computer Education in India. Growth in the number of students, availability of qualified faculties, vast software industries and large establishment of academic and training institutions reveals the quantitative expansion of Computer Education in India.

The software industry is one of the major industries which contributes substantially towards Indian economic growth. As per the World Bank survey in 1996, Indian software export was Rs. 16,000 million. The number of software export companies has gone up to 2000 in the year 1997, which was around 10 in the year 1984. These companies are major potential places for accommodating computer graduates. These companies are dynamic and their markets are global. The skill requirements for this sector has created an immense need for modernization of existing Computer Education system as Ahiture, (1982) quoted that on the same line of development of our software sector, our educational system should be modernised and adaptive. Now India is one of the biggest computer professional providers in global software and hardware market. A large number of students are getting this education and many institutions are there in the market to provide Computer Education to produce computer professionals and users.

Computer Education is not as structured as other disciplines of education (Goel, Das and Joshi), (2000). Private Computer Education institutions is enormous due to increasing market demand and increase in business opportunities on one side and lack of government computer training institutions on the other side. During last few decades, private computer education institutions formed as the backbone of the Computer Education.

Computer Education is one of the disciplines of education where output is absorbed on the basis of performance and less weightage is given to the certificates.

Due to the specific changing nature of this discipline, private institutions offer courses according to the need of the market under their own banner. In this competitive market, these private institutions try to attract students with the help of different new courses and their marketing skills. But they keep on changing their course as the demand of the market. So there is no many fixed courses offered by different private institutions. The universities offer courses like, BCA, DCA, MCA, PGDCA, B.Sc. & M.Sc. in Information Technology and B.Tech and M.Tech in computer science and engineering etc. But the courses offered by a large number of private institutions are not fixed as they designed and revise their own courses and course contents according to the need of market . These courses vary from institution to institution. These courses are like, ADSE, MCSD, BASIC, e-COMMERCE, Information Technology, Web designing, Internet Access, Visual Basic, C, C++, ORACLE, Java, Graphics and Multimedia, etc. These are the courses which cover specific languages, operating systems and application packages. There are even hardware courses offered by private institutions like, ADCNE, CNE, MCSE and MCSD. The numbers of courses offered in hardware are relatively less in comparison to the courses offered in software.

Some institutions like, Aptech and NIIT have their own research and development units to develop advanced courses and teaching technologies. Some institutions have adopted very high standard courses and teaching methodologies of some foreign and national universities like, Computer Station Inc. adopted the American Modular system and many use semester system. In some institutions the teaching learning is not up to the mark and hardly trained and experienced teachers are available in those institutions.

In terms of admission criteria, universities and affiliated colleges used to admit students on more scientific way using eligibility criteria and entrance tests. Even the admission criteria is quite rigid in the self financing programmes of universities, where as, the admission criteria of private institutions are quite liberal. Private institutions are more concerned about the number of students they can enroll. They use to attract a number of students by their advertisements. They do not have strict criteria for admitting students. The cost of courses also differ from institutions to institutions. The university departments and affiliated institutions offering subsidized

programmes excluding self financing programmes charge nominal fees for their different Computer Education programmes. The private managed institutions charges more fees even in comparison to self financing courses in universities and affiliated institutions in certain cases. In term of placement also there is a great difference among different institutions offering Computer Education. Table 1.2. and table 1.3. depict the development of computer courses and use of computer software over years.

Table 1.2: Year wise Conception of Computer Degrees with their Importance and Hardware Need.

Years	Subjects of Importance	Degrees Available	Hardware Used
1980-85	Discrete Maths, Data Structures, Numerical Analysis, Data Processing, Digital Electronics	B.E.	Microprocessor 8085, BBC micro, IBM-PC
1986-90	Compiler Construction, Data Structure & File, System Programming, DBMS, operating system	B.E. M.C.A. M.Tech.	IBM-PC 286, Mainframes, MC 68000 Trainers, Microprocessor 8086
1991-95	DBMS, Computer Graphics Parallel Computing, Software Engineering, Artificial Intelligence Office Automation	B.E. M.C.A. M.Tech. M.Sc.	Sun workstation 3/50, IBM-PC 386, Microprocessor 68000 trainers
1996 Onward	Computer Networks, DBMS, Software Engineering, Computer Graphics, Artificial Intelligence	B.E. M.C.A. M.Tech. M.Sc.	Sun Spark 4/50, IBM-PC 486, Pentium

Table 1.2 depicted the growth of computer profession during years. Though computer profession was started in 1980 with only one course of B.E. with very lower version of hardware and subjects, gradually it started increasing its potential. After 1996 many professional courses were emerged those using highly powerful hardware and software. Similarly, the development of languages, packages and operating systems over different periods are shown in table 1.3.

Table1.3: Year wise Development of the Teaching of Computer Languages and Packages with their Operating Systems.

Years	Operating Systems	Languages/Packages taught
1980-85	DOS 1.0, Earlier version of UNIX	FORTRAN-77, Assembly 8085, BASIC, ALGOL, ADA, COBOL
1986-90	DOS 2.0, DOS 3.0, UNIX 1.0, XENIX	PASCAL, FORTRAN 77, Dbase-III, C (beginning), ASSEMLY 8086, ASSEMBLY 6800
1991-95	DOS 3.0-6.0, SCO UNIX, WIN 3.0	C (advanced), Clipper, PASCAL, FOXPRO 2.X, PROLOG, FOXBASE, Word-Star, Word Perfect, Lotus 123, Quattaro Pro 5.0
1996 & onwards	DOS 6.0 and above, WIN 3.1, WIN 95 SCO UNIX	C, FOXPEO 2.6, PROLOG, LISP, MS-OFFICE, ORACLE (introductory)

Global markets need better communicational skills, marketing potentials and total quality management concepts from professionals, apart from their computer knowledge. Again, it is imperative to make our curricula interdisciplinary, enough to adopt subjects like, marketing management, psychology, values, ethics, etc. Modernization of educational laboratories which, recently required hardware and software platforms and products.Based on a survey conducted in engineering colleges and university teaching departments (Computer science), the following data shows the development of software over years.

1.12 COMPUTER EDUCATION IN GUJARAT

The scenario of the Computer Education in Baroda district and Gujarat state is very similar with the scenario of the country. The Computer Education in Gujarat, managed by universities and affiliated institutions are very similar to that of national level as it comes under either the same umbrella of UGC or AICTE. Similarly the privately managed institutions are also very much similar throughout the country because a large portion of these institutions are managed by the same organizations, for example, NIIT, Aptech, LCC, Tata-Unisis have study centers/ franchise throughout the country. In Gujarat there were nearly 3000 computer institutions and

their branches offering Computer Education both in private and government sectors prior to 1999. Till date it has been reduced to nearly 1050 due to many causes like, recession, stiff competition, natural calamities etc. A large proportion of the institutions are found in big cities like, Ahmedabad, Baroda, Surat, Bhavnagar, Jamnagar, Ankleswar, Vapi etc but in taluka head quarters rarely any institution is found. Considering the different institutions working in the field of Computer Education in Gujarat, these institutions can be divided into following six major categories.

1. **University Departments Imparting Computer Education Courses:** Universities like, the M. S. University of Baroda, South Gujarat Universities, Gujarat University, Saurastra University, S.P.University and Bhavnagar University etc. offered Computer Education Courses through university department. They are offering the courses such as MCA, BCA, PGDCA, B.Sc and M.Sc in Information Technology etc.

2. **Affiliated Colleges of Universities offering Computer Education Courses:** Universities, such as, M.G. University, Kerala, South Gujarat University, Gujarat University etc. are having affiliated colleges which are offering computer courses.

3. **Study Institutions of Universities:** Universities, such as, Sikkim Manipal University, C.V. Raman University, Makhanlal Chaturvedi R.P. University etc. are imparting Computer Education through their Study Institutions.

4. **DOEACC Certified Institutions:** DOEACC (Department of Electronic Accredited Computer Courses) society is offering computer courses through it's certified Computer Education Institutions, such as, Vijay Computer Centre and Pramukh Swamy IIT. (PIIT). The are offering O, A, B level courses.

5. **Franchise Institutions of Renowned Computer Training Agencies:** Many renowned private computer training agencies are offering Computer Education courses through their study centres. Most of them design and keep on revising their own courses according to the needs of the market. These agencies are NIIT, Jetking, Aptech, LCC, Tata Unisis, etc.

6. **Self Governed Institutions Offering Self Designed Courses:** Local Institutions like, Bitcom Computers, PCC computer institutions, Micro track Computers etc. established without fulfilling any criteria and norms of any recognised body. They design their own courses and offer according the need of the market.

7. **Self Governed Institutions Offering Courses of Other Bodies:** These institutions were established without fulfilling the norms and criteria of any recognised body but they are offering the courses designed by certain bodies. This type of institutions are Roshani Computer, ITCT etc.

8. ITI offered computer course: Industrial Training Institute is offering COPA (Computer Operating and Programming Assistant) course.

The contribution of these institutions is remarkable in the development of Computer Education and information technology in the country. There is a need for proper guidelines and regulations for these institutions mainly privately managed institutions to check and improve the quality. In the absence of a proper regulatory act, the quality of education is also going down day by day. In the present day of change and competition there is a dare need to streamline the Computer Education to provide competitive manpower in the field of both hardware and software. Like the competition in other sectors, India is also expecting a threat from China in the area of Computer Education in all forms, supply of manpower, supply of software etc. There is a dare need to reorient and streamline our Computer Education at higher level which need detailed study of the system. The present study is an attempt in this direction to study the status of Computer Education in Baroda district of Gujarat.

1.13 COMPUTER EDUCATION IN BARODA DISTRICT

Baroda district is one of the advanced district of Gujarat in term of education. It is also found to be quite advanced in development of Computer Education. In 2004, there were around 200 Computer institutions in the Baroda district of Gujarat. According to the available data around 700 Computer institutions were there in around June 2000. It includes universities, affiliated colleges, study centres of universities, franchise study centres of some computer training agencies, and self

governed computer institutions. Now there are nearly 100 computer education institutions offering courses in both hardware and software. This scenario conveys the message that the number of Computer Education institutions are going down during last five years and only around 15 percent of total institutions could survive in last 4 to 5 years.

The institutions which are closed down are mainly private institutions, and the foremost cause behind it was their financial crises. But at the same time it is to be noted that demand of computer manpower in both i.e. public as well as private sector has reduced significantly.

As far as admissions are concerned, it is not only private institutions have suffered even colleges and universities have even gone through a very bad period. Few years ago, it was dream of the students to get admission in B.C.A. and M.C.A. and they have to pass through long procedures like, entrance test, interview etc. under tough competition and rate of success in getting admissions were varying from1 percent to 10 percent. But today the scenario is quite different. Getting admissions are relatively easier today but market value of the product has gone down to remarkable extent although it is difficult to say that there is any change in the quality of the products.

1.14 RESEARCH QUESTIONS

The researcher came across certain studies related to the status of Computer Education at school level and certain others. But no study was found to know the status of different types of computer institutes other than schools. It is the study in which institutes offering subsidised courses as well as self financed courses offered in face to face mode are incorporated. Following research questions inspired the researcher to taken up this piece of study. Some of which may be answered during the process of this proposed study.

- What is the contribution of government and non government institutes in Computer Education in Baroda district of Gujarat?

- Whether there are any rules, regulations, norms, ordinances, government policies etc. available which are application for the computer training centres in the region of Baroda district of Gujarat?
- Which courses are offered by the institutes of computer training centres in Baroda district of Gujarat ?
- What is the status of these offered courses from view point of fees, teaching duration, authority designing the course, affiliation, certification, weightage in time table and evaluation etc.?
- What is the status of the facilities and resources available related with infrastructure, hardware and software etc. in Computer Education institutes ?
- Whether teaching staff of Computer Education is qualified, experienced, well paid and trained in teaching pedagogy?
- Whether the methods, techniques, approaches, skills of teaching, used in teaching computer subject were effective?
- Whether the computer institutes were facing problems with regards to teachers, students, computer laboratory, courses, infrastructure, electricity, fees, and any other legal problems?
- Which courses are more in demand and which courses are less in demand?
- Are different Government recognized, Franchisee study centres of computer agencies and other private institutes comparable with regards to their contribution in the field, teaching faculties, Infrastructure, Hardware, Software and other facilities?

1.15 RATIONALE OF THE STUDY

India is one of the biggest computer professional providers in global software and hardware market. A large number of students are getting this education and many institutions are there in the market to provide Computer Education to produce computer professionals and users. These computer users and professionals are

produced through universities, IITs, polytechnics, ITI's affiliated colleges and private computer institutions. It is understood that the government institutions are able to provide relatively better quality education due to proper infrastructure facilities and qualified manpower. Moreover there are certain criteria for selection of teachers, admission of students etc. But all the students do not get admissions in these government institutions as their intake capacity is shorter than requirement. So to cater the need of the students, innumerable private institutions have emerged and learners are rushing to them. They are attracting these students through their marketing skills. These institutions normally give them admission irrespective of their stream, and level of education, moreover whether that has taken place under certain norms, criteria and requirements is also yet to prove. It creates the doubt upon the quality of their product. Hence, to open up the realistic situation of Computer Education and stop further deterioration in this field, this study is required and can prove to be beneficial in future.

There are many research studies available in the area of Computer Education. Most of the research studies are related to teaching learning and researchers tried to see the effectiveness of some sort of CAI or CAL packages prepared to teach subjects at school and university levels. But there are few survey studies available related to Computer Education in school education. The researcher did not come across any such studies related to the status survey of the Computer Education at other than school level such as Computer Education imparted by universities and their centres, franchise study centres, ITI's, self governed private institutions etc.. This study can provide a status of Computer Education at all these levels.

The courseware and the teaching learning methodologies differ from institutions to institutions. Some courses of both government and private bodies are well designed by a continuous research and development efforts. Some institutions use very high quality methodologies of teaching and learning designed by themselves and some use imported teaching learning technologies and courseware designed by foreign institutions. The present study can provide details of different types of teaching learning techniques, methods and approaches which is being adopted today. This study can help to study these teaching learning methodologies and courseware so interested students can take its advantage.

The output of the present study would be able to provide a competitive view of Computer Education with reference the courses offered with their fees, duration, their designing authority, admission and eligibility criteria etc., contribution of different types of institutions in Computer Education field, picture of infrastructure and other facilities available such as computers, printers and allied facilities, books available, area occupied, classrooms, computer laboratories etc., teaching staff with their qualifications, experiences, average number of teaching staff members, salary etc. and other significant details. It will provide a competitive picture of the norms, guidelines, criteria etc. followed by different computer institutions in Baroda district of Gujarat.

As mentioned earlier Computer Education is relatively new concept in Indian perspective than developed counties. At this stage certain empirical evidences are needed for further progress of the discipline. It should be recorded that different kind of multidimensional studies on Computer Education have been conducted all over the world. But in India a very few researches have been undertaken in this area. Only a few researches have been noted in the fifth survey of educational researches conducted by the NCERT. This fact confirmed that in India till today this area of research has not been significantly noticed by the investigators. Present study has been ventured in this rapidly developing field of Computer Education to assess it scientifically. Moreover, no even single research has been undertaken to know the present situation of the Computer Education in India and particularly in Baroda district other than Computer Education at schools.

One must know whether the things are in the right direction in this endeavor and whether the goals in this context have been achieved or not. In this regard, it can be said that this timely effort of evaluating Computer Education will help the concerned people to plan and improve the Computer Education effectively. This study will focus on many significant aspects such as development of Computer Education institutions, courses taught, norms, criteria applicable for Computer Education institutions, infrastructure and other facilities, teaching learning process, various problems faced by the institutions, market value of the courses and comparative picture of various types of computer institutions and many other related facts.

At school level certain level of standardisation is observed as education boards have passed certain circulars and given the uniform syllabus for school Computer Education. So worries in relation to school Computer Education have shortened to certain extent. At the same time at university level even uniformity in syllabus is seen to certain extent although it varies a little from university to university. DOEACC, ITI etc. also have scientifically designed their courses for Computer Education but the contribution of even significant in the Computer Education field so it can't be ignored. In this state of scenario no study have been conducted which has taken them in consideration. So the investigator has taken this study to establish some strong evidence about the Computer Education.

Today Indian contribution in software market has opened the eyes of China and some other countries. So now these countries are willing to come to join this race and make race more competitive. In this situation when India is facing threat from China, South Korea and Common wealth countries, this attempt of investigator to study the computer and offer some suggestions to make Computer Education more effective may prove fruitful.

Today when Indian students are moving to overseer to satisfy the hunger of quality education, a lot of Indian currency is going out and Indian students have created a remarkable market for European countries, at this juncture of time to change the situation in Indian favour, there is felt need to improve the existing condition of computer market. In this circumstances, this study can play a vital role.

As it is known to every body that there is no formal teacher training courses available for computer faculties, the pedagogy adopted in teaching learning is doubtful when qualification for computer teachers is not recognized and decided by any responsible authority. In this condition this study can open many facts in this regard. So the present study is an attempt in this direction to study the status of computer in the district of Baroda other than schools which can be helpful to answer certain questions raised in the form of research questions.

1.16 STATEMENT OF THE PROBLEM

A STUDY OF THE COMPUTER EDUCATION IN BARODA DISTRICT OF GUJARAT.

1.17 OBJECTIVES OF THE STUDY

Objectives provide the direction in which work is to be done and focus on the area to realize. The present study was undertaken with the following objectives.

1. To study the development in establishment of Computer Education institutes in Baroda district of Gujarat.
2. To study the norms, rules, directives, ordinance, etc. applicable for the development of Computer Education in Baroda district of Gujarat.
3. To study the status of Computer Education coursed offered by different institutes in Baroda district of Gujarat.
4. To study the infrastructure, hardware and other facilities available for Computer Education coursed offered by different institutes in Baroda district of Gujarat.
5. To study the status of staff for teaching Computer Education at different institutes in Baroda district of Gujarat.
6. To study the Computer Education teaching learning processes at different institutions in Baroda district of Gujarat.
7. To study the problems faced by Computer Education institutes in Baroda district of Gujarat.
8. To study the market demand of different Computer Education coursed offered by different institutions in Baroda district of Gujarat.
9. To compare the status of Computer Education in Baroda district of Gujarat in terms of infrastructure, Hardware, Software and other facilities, Teaching faculties etc available in different institutes viz : Government recognized, Franchisee study centres of renowned computer agencies and self governed private institutions.

1.18 OPERATIONAL DEFINITION OF TERMS

The following terms used frequently in the present study has been operationally defined.

1. **Computer Education:** Computer Education is the specific education about computer and its applications including different capsules like, fundamentals of computers (about computers, its history, its system organization), software (application and programming), programming language, system design (application and expert systems), hardware and networking. It is the education offered with the combination of different capsules for different levels and duration. It includes all the courses offered with different nomenclatures like, Computer Science, Computer Education, Computer, Information & Communication Technology etc. Computer Education includes certificate, diploma, PG diploma, degree and master degree courses in software and hardware technology in science, arts, commerce and technology streams. For the present study, it includes all the courses offered by recognized as well as unrecognized institutions in face-to-face mode.
2. **Computer Training Institutes/ Centres**: The bodies imparting Computer Education in face to face mode are computer training institutes / centres.
3. **Government Recognised Institutes** : The institutes of which courses (either subsidised or self financed) are recognised by government bodies like, University, DOEACC, UGC, etc. are considered as Government recognised institutes.
4. **Franchise Centres**: Computer Education institutes which are given the right to run institutes under the brand name of renowned computer training agencies like, NIIT, Aptech, LCC, SSI, etc. Providing Computer Education, are Franchisee centres.
5. **Common Courses:** The courses which are taught commonly in more than one institute are common course.
6. **Individual Courses:** The courses which are not taught at more than one institute are individual courses.
7. **Market Value Index:** Each course has 5 as highest market value and 1 as lowest value. The summation of the value indicated by the heads for particular

course of computer institutes divided by the number of institutional heads is the market value index.

8 **Private Computer Education Institutions:** These are the institutions providing self-financed Computer Education courses for both pre-service and in-service need of different clienteles. Some of these institutions are recognized by some universities or similar bodies whereas, many are unrecognized.

9. **Public Computer Education Institutions:** These are the institutions providing mostly subsidized Computer Education courses financed by public funds. Most of these institutions are recognized by universities or similar bodies.

1.19 DELIMITATIONS

The following delimitation were considered in the context of the present study.

- The study is delimited to the certified courses (where certificate is provided after successful completion of the course)
- The study is delimited to the courses offered in face to face mode.
- The study is delimited to the Computer Education institutes other than schools.

1.20 CHAPTERISATION

The study is presented with five chapters. The chapterisation of the present study is as follow.

Chapter I: Introduction

Chapter II: Review of Related Literature

Chapter III: Methodology of the study

Chapter IV. Analysis and Interpretation of Data

Chapter V: Summary and Conclusion.