A STUDY ON THE COMPUTER EDUCATION IN THE HIGH SCHOOLS OF SELECTED STATES OF NORTH-EAST INDIA

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By

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To

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CERTIFICATE

I certify that the thesis entitled **"A Study on the Computer Education in the High Schools of Selected States of North-East India"** submitted by **Sri. Parijat Chakrabarty** for the **Degree of Doctor of Philosophy** of the North-Eastern Hill university, Shillong, embodies the record of original investigation carried out by him. He has been duly registered and the thesis presented is worthy of being considered for the award of the **Ph.D. Degree.** This work has not been submitted for any Degree of any other University.

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INTRODUCTION

INTRODUCTION

1.1.0. INTRODUCTION TO COMPUTER EDUCATION

Human progress, as understood in the modern world, is associated with the phenomenal development in science and technology. It is also well-known that since the days of unrecorded history of human existence, man has been engaged in technological development to fulfil his needs for food, shelter, safety, comfort and many other aspects of social and cultural life. Large scale exploration of nature and utilization of vast natural resources using technological tools have direct bearing on man and his life. Rockets and space vehicles are used for the exploration of space as also for collection of purposeful data by meterologists and other scientists. Extensive utilization of computers are being made not only for scientific investigation, information storage and retrieval, control and guidance, data transmission and processing and many more scientific applications, but also for almost all areas of our life, including management, banking, traffic control, language transmission, data cataloguing and recording in libraries, education and many other fields. Our technology[1] has moved us into an information society. Whether it be in securing or utilising knowledge, or in acquiring

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1 Implies whole collection of ways in which the members of a society provide themselves with the material tools and goods of their society. The collection of artifacts and concepts used to create an advanced socio politico-economic structure (Alcron, 1986).

skill, information of the right kind at the right time in the right dose is essential. The world of information is an intellectual wealth that mankind has accumulated troughout its existence in various forms like language, printing, mass-media computer, etc. Information serves its purpose only if it materializes in technology and cultural values, in human knowledge and experience, in the forms of their communication as a matter of fact, in the entire system[1] of social relations. It thus falls to the sphere of education to evaluate this useful information. Though the term education is as old as civilisation, its role, content and importance in society have undergone major changes. In the agricultural civilisation, education was an ornament, an enrichment and a leisure time pursuit. It became a tool for economic development in the industrial civilisation. In the high technology era of today, it has become a resource, perhaps the most precious of all resources.

With the advent of electronics, computers, micro-processors, etc., the traditional concept of education is changing rapidly. Rapid development of technology is turning all traditional disciplines into inter-disciplinary divisions. Each new technology introduced in the society brings in change

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1 A system is an aggregate of two or more physical components and a set of disciplines or procedures by means of which they interact (Alcron, 1986).

in attitude and interest towards education among the individuals. Also, new technology brigs with it new methods and new opportunities in the field of education. Computer is one such recent technology which has entered in every walk of human activity including education sector.

Entire educational system is experiencing transformation with the introduction of this modern technology, that is, computer. "We are having access to an unprecedented technology upon which to build educational systems that distinguish between the transmission of past heritage, and the eliciting of new understanding" (Dwyer, 1974). Parents, teachers, children and school managements are interested in introducing computer awareness in schools, but, clear cut guidelines are not available for the schools on suitable computer courses, infrastructure, hardware and software materials and the objectives. It is essential to grow awareness among the children about computer and its application at the school level so that they can cope up with the practical applications of computer and its further development effectively. The goal, is not to create a better world of computers, but to create a better world for man to live in (Hunt and Shelley, 1980).

The impact of computers is felt everywhere because of its speedy and effecient information processing ability. In this

socially conscious and highly developed technological society the role of computer is quite effective. Increasing amount of information in government, public and private establishments lead to development of adequate form of handling information. The problem of information handling system could be performed easily with the help of computers because of its ability to analyse information, to retain, update, reproduce and the ability of presenting the information in various forms. Computer saves labour, increases effeciency, minimises wastage and helps in bringing desired quality of output.

Hunt and Shelley (1980) stated that "Society is already more computerised than many people may imagine and because of the implications of this, hence, it is clearly important that people become aware of the potentialities so that they can seek to influence future use. Awareness hinges on education and this is growing and must continue to expand - hopefully at the same fast pace at which the youthful, vigorous computer industry is itself expanding".

The statement clearly suggests that education has a vital role to play in making full use of the potentialities and abilities of computers. People need to become aware, knowledgeable and specialised on this technology to make the society effective and productive. Education helps in bringing awareness, developing knowledge and becoming specialised in any field. Therefore, computer education is essential right from the school level.

At the first instance, let us know what is a computer.

1.1.1 DEFINITIONS OF COMPUTER

Computer is an electronic device which helps in solving complex problems.

Computer is "a data processor that can perform substantial computation, including numerous arithmetic or logic operations, without intervention by a human operator during the run" , (American National Standard Vocabulary for Information Processing, X 3.12-1970).

According to Encyclopaedia of Micro Computers Terminology (Christie and Christie, 1985), computer is "a mechanism capable of manipulating data".

"Computer is a device capable of solving problems or manipulating data by accepting data, performing prescribed operations (mathematical or logical) on the data, and supplying the ressults of these operations" (Malik and Kotwal, 1985).

According to Lav Gupta (1987), a computer is "an information processing system".

Thus, a computer may be defined as an electronic device that manipulates symbols self-directedly but algorithmically for executing programs and process data with an amazing speed and accuracy. Defining, computer in technical way, a computer is a high speed, automatic, electronic, digital data processing machine.

1.2.0. MAN-COMPUTER INTERACTION

Today, human beings are increasingly dependent on families of machines, irrespective of size, shape and capabilities. Computer is one of the finest examples of such families. Inter-relationship between man and computer has been nicely illustrated by Licklider (1970), as shown in Table 1.

Table 1. Man-Computer Interrelationship

Man	Computer
Sets goals, supplies motivation	Converts hypotheses into models, tests models against data
Formulates hypotheses, asks questions	Answers questions
Conceives models, mechanisms, procedures	Simulates mechanisms and models carries out procedures
Defines criteria, evaluates performance	Displays results
Handles low-probability events	Interpolates, extrapolates, transforms, plots data in various alternatives. Converts static equations into dynamic models

Contd...

Table 1. Contd.....

Man	Computer
	Makes elementary probabilistic evaluations Performs some diagnosis, pattern matching, relevance recognizing.

In the man-computer interaction situation one needs to consider the following aspects, the nature of a man, the nature of a computer, the interface from a man to a computer, the interface from a computer to a man, and the interaction between man and the computer through these interfaces. Here, man refers to children and adults of both the sexes. In the children-computer interaction, the most important factors associated are the environment and motivation of the children. The environment comprises people, objects, and events. A child is mainly characterised with respect to age, sex and potentiality. Parents, siblings and teachers are considered as people ; computers and educational materials are referred to as objects ; the cultural and social systems surrounding are referred to as events. All combined together influence the learning of the children. Learning and motivation get influenced by child's age, sex, ability and interests. Children-computer interaction aims at familiarisation of the basic things of computer technology to children. There is a need to study the extent of interrelationship generated between the children and the computer.

1.3.0 IMPACT OF COMPUTERS ON THE SOCIETY

Technology is a major stimulus for change and has become synonymous with economic progress. Technology has been responsible for bringing about major changes in agriculture, health, transportation, communication, education and general industrial development in varying degrees. Sheingold, Kane and Endreweitz (1983) state that "The computer does not have a simple impact on an organisation or the people in it. Its implementation and use are embedded in a compiled matrix of social and political relationships. At all levels of implementation and use, it is essential to consider the interaction of the computer with the social system that surrounds it, for, this interaction should be viewed over time, as computing activities influence the social system and the social system shapes the influence of the technology". Computers, which originated in the most advanced countries of the world, have today made themselves felt in almost all nations of the world. They have pervaded in various walks of life like business, administration, documentation, recreation, etc. In fact, computers are bringing about revolution in aiding man's thinking process and decision-making ability (Simon, 1960). If one looks back at the human history, it may be noted that three major developments have altered man's living conditions, his concept of society and his understanding of human existence.

These developments are : (i) the scientific revolution in the 16th and 17th centuries ; (ii) the late 18th century industrial revolution ; and (iii) the scientific-technological-industrial revolution after the Second World War. Computer, as put forth by Simon (1960), is the fourth revolution in this direction.

1.4.0. EVOLUTION OF COMPUTERS

Computers have been evolved over a peeriod of time, the genesis of its basic principles getting traced to the Circa B.C.. The progress of this evolution is presented briefly in Table 2.

Table 2. Evolution of Computers

Period	Device	Generation
1	2	3
Circa B.C.	The first mathematical device	Abacus
16th Century	John Napier produced Logarithms for calculation	Logarithmic tables
1620	William Oughtred formulated the analog device	Slide Rule
1642	Blaise Pascal invented the first mechanical calculator	Pascal's machine
1671	Gottfried Leibnitz devised a calculating machine	Modified Calculator
1801	Joseph Marie Jacquard devised first automated machine	Punching Cards

Table 2. Contd....

1	2	3
1822	Charles Babbage designed the first mechanical Computer	Difference Engine
1833	Charles Babbage designed a machine based on five units - Store, Mill, Control, Input and Output	Analytical Engine
1872	George Boole developed two state algebra came to be known as Boolean Algebra based on which the theory of modern Computer was formulated	Electro - Mechanical Computer
1890	Herman Hollerith devised electrically activated computer cards or Punch Card Machines. He established the largest manufacturing multinational company known as International Business Machines (IBM)	Hollerith Cards
1920	Leonardo Torres devised a digital calculating machine	Digital Calculator
1936-50	Konard Zuse developed four computers	Z - 1, Z-2 Z-3, Z-4
1944	Howard Aiken designed the first electro mechanical computer	Automatic Sequence Controlled Calculator or Mark 1

Contd....

Table 2. Contd....

1	2	3
1946	J.Prosper Eckert and John Mauchly devised first electronic computer using Vacuum tubes known as ENIAC (Electronic Numerator Integrator and Calculator)	Electronic Computer
1946	John Von Neumann gave the concept of stored program computer	
1949	EDSAC (Electronic Delayed Storage Automatic Computer) is the first stored program electronic computer	First Generation of Computers
1952	EDVAC (Electronic Discrete Variable Automatic Computer) Computer was developed using stored programs concept	Examples - IBM 650, IBM 702, UNIVAC - 1 and E 101
1959	Computers are devised using transistors	Second Generation Computers
1959	Random access devices	Discs
1964	Integrated Circuits (ICs)	
1965	Computers using ICs	Third Generation Computers
1969	Large Scale Integrated (LSI) circuits	

Contd...

Table 2. Contd...

1	2	3
1971	*Computers using LSI circuits*	*Fourth Generation* Computers
1972	Microprocessors - computer on a single silicon chip	
1976	First Microcomputer	Apple Computer
Since 1985	Concept of "Artificial Intelligence" knowledge Information Processing Systems evolved - Very Large Integrated Circuits (VLSI) are in use.	Fifth Generation Computers

Note : Based on - (i) Jaggi and Jain (1988)
(ii) Rajaraman and Rajaraman (1988),
(iii) Bhatnagar and Ramani (1990).

Computers were originally designed to calculate easily and speedily. Then, they were used to perform repetitive clerical calculations. This was followed by information processing to generate management information systems. At present the computers help in a wide variety of activities of our civilisation.

1.5.0. SOME HIGHLIGHTS ABOUT COMPUTERS

Below are highlighted some fundamental ideas about computers.

Components of a Computer -

The basic configuration of a computer is given in Figure 1.

A computer has an Input, an Output and a Central Processing Unit.

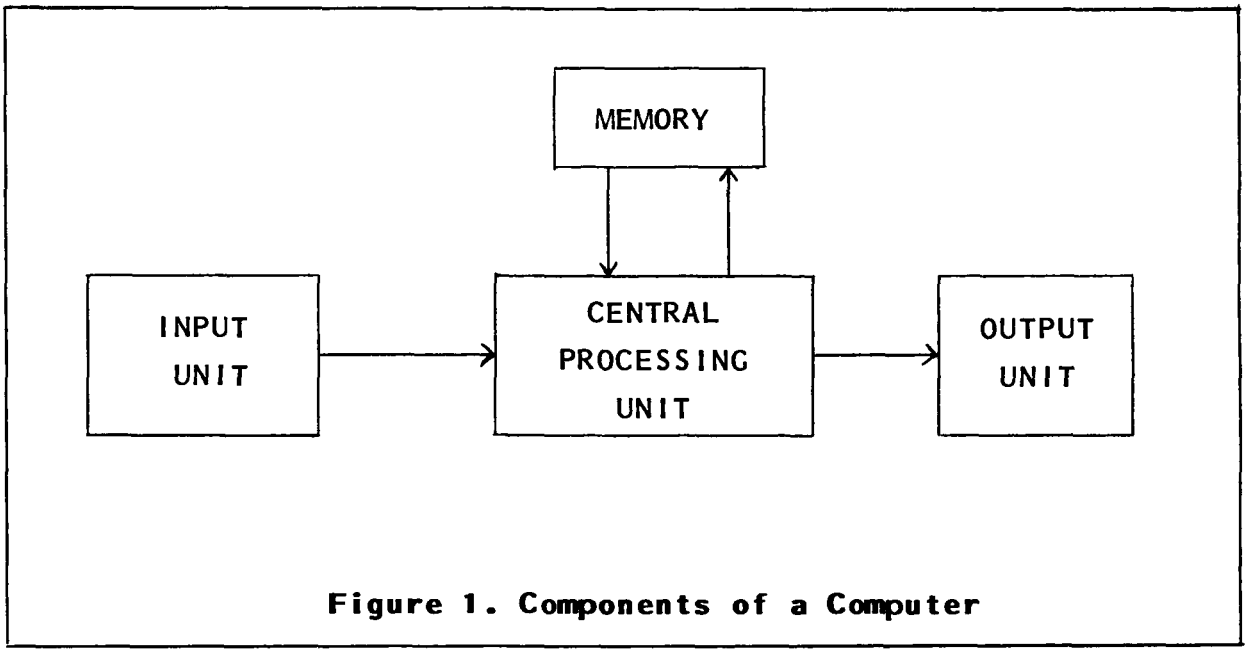

Figure 1. Components of a Computer

a) The input unit -

The input unit reads instructions and data into a computer's memory. There are two devices which assist in feeding data in this unit, namely ;

i) Keyboard

ii) Video Display Unit

b) Central Processing Unit -

Instructions and data fed into the input unit needs to be executed and this function is done by the Central Processing Unit (CPU). The CPU consists of the following sub units:

i) Memory - Main memory or Primary Storage and Secondary Storage

ii) Control Unit

iii) Arithmetic Logic Unit

c) The Output Unit -

The output unit provides results or required information to the user. Output unit is a communication or link between the computer and the user. A number of output devices are available nowadays :

i) Character Printer

ii) Line Printer

iii) Dot Matrix Printer

iv) Visual Display Unit

v) Laser Printer

Types of Computers -

There are three types of computers, namely, digital, analog and hybrid.

a) Digital Computers -

Digital computers are based on the binary system (0 and 1). A digital computer can perform only one operation, namely, addition.

b) Analog computers -

An analog computer works on supply of continuous electrical signals and displays output continuously, for example, speedometer of an automobile.

c) Hybrid Computers -

A hybrid computer combines the features of analog and digital computers.

Classification of Computers -

Computers belonging to third and fourth generation can be classified as :

i) Main Frame computers
ii) Mini computers
iii) Micro computers (e.g., Personal Computers)
iv) Super computers

Characteristics of a Computer -

The main characteristics of a computer are :

i) High Speed
ii) Reliability and Accuracy
iii) Large and Perfect memory
iv) Capability of Logical Decisions
v) Versatility
vi) Automation
vii) Diligence

Computer Languages--

A computer can understand the binary language, the

language of 0 and 1, also called Machine Language. Computer, being an electronic machine, only understands the language of electric pulses, the presence of an electric pulse being denoted by 1 and its absence by 0. Languages used for computer purpose are categorised into three forms namely :

a) Machine Language

b) Assembly Language

c) High Level Language

Machine Language -

Binary language (the language of 0's and 1's) is the machine language. Machine language was in use in the past for making programs but today its use is very much restricted.

Assembly Language -

Assembly language (or Symbolic Programming Languages) was developed in 1950. This language is written in mnemonic (alphabetic, symbolic) codes and not in numeric codes.

High Level Languages -

High level languages are quite easy to learn and use. This language is also known as Procedure Oriented Language. Some of the commonly used high level languages are provided in Table 3.

Table 3. Commonly used High Level Languages

Language	Full Name	Development and Use
FORTRAN	Formula - Translation	Developed by IBM in 1957. Used for scientific purpose.
ALGOL	Algorithmic - Language	Developed in 1960. Used for scientific and numerical work.
COBOL	Common - Business - Oriented - Language	Designed by CODASYL (Conference of Data System Languages) in the year 1960. Used for commercial and business purposes.
BASIC	Beginner's All Purpose Symbolic Instruction Code	Designed by John Kemeny and Thomas Kurtz in around mid 1960's. Widely used in business, science, education, and in other areas.
PASCAL	Named after the famous French Scientist, Blasie Pascal	Developed by Niklaus Wirth. Used for general purpose and for computer scientists.

(Note :- Adopted from Jaggi and Jain (1988)).

Special Purpose Languages -

There are some high level languages which are developed for use in solving particular class of problems. They are known as Special Purpose Languages. These are

i) LOGO

ii) LOTUS

iii) dBASE III

1.6.0. DEVELOPMENT OF COMPUTERS AND THEIR APPLICATIONS IN INDIA

Because of the immense utility and efficiency, computers have made great impact on the development of mankind all over the world, India being no exception. India is under the process of major social, economic and educational revolution with the introduction and adaptation of computers. The Indian computer industry is still in its developmental stage as compared to the developed countries, but progressing very fast. In this section a brief picture is presented, of the technical growth and applications of computers in India, and also of the demands in the society of persons having a working knowledge of computers.

History of computer in India dates back to 1954 when a decision to design a general purpose computer was started at Tata Institute of Fundamental Research (TIFR), Bombay and the project was completed in 1956. The computer developed was

named TIFRAC.

Development of a second generation computer was started with a joint effort of Indian Statistical Institute, Calcutta and Jadavpur University, Calcutta in 1963. The computer, named ISIJU - 1 came into operation in 1966. Inspite of these bold attempts, productive output was not much. In the fifties and mid-sixties, activities concerning computers were very much limited with the help of a few imported computers namely, IBM[1](1401) and ICL[2](1901). In 1969, the Government based Electronic Corporation of India Ltd. (ECIL), Hyderabad, in collaboration with Bhaba Atomic Research Centre (BARC), Trombay built the computer TDC 12 (Trombay Digital Computer 12) followed by upgraded versions - TDC 316 and TDC 32. The number of computer installations rose to 120 by the early seventies. The process of computerisation of libraries in India started in 1964. Planning Commission of India are using computers since 1968.

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1 International Business Machines, USA

2 International Computers Ltd., UK

During the early part of the seventies the CDC 3600 at the TIFR and the IBM 7044 at Indian Institute of Technology (ITT), Kanpur were the two most powerful computers. In the early seventies computers were used in the fields such as structural engineering, power systems analysis, ballastics, nuclear physics, cryptography, demographic research, agricultural statistics and in other areas. The use of computers in the Universities and technological institutions was only ten per cent. In 1971, Numerical Weather Prediction forecasts were carried out with the help of computers. For the first time, 1971 Census data were processed through computer. During 1970's, Regional Computer Centres were set up at Calcutta, Pune, Chandigarh and Kanpur for catalysing the development of various computer applications. As the technical advancement of computers got progressed, the computers paved their way for use in various sectors in the country. Balasubramaniam (1985) has given an analysis of the same as shown in Table 4.

Table 4 Sector-wise Growth of Computers in India during 1960's and 1970's

Sector	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	Total
Utilities	-	-	-	-	-	-	2	-	-	-	2	-	-	-	-	-	-	-	4
Engineering/ Manufacturing	1	-	-	-	2	5	6	10	9	6	13	16	6	10	12	4	7	-	107
Insurance and Banking	-	-	-	-	2	1	-	1	-	-	-	-	-	-	-	2	1	-	7
Transport	-	-	-	-	1	3	4	4	2	1	2	4	-	-	-	1	-	-	22
Petroleum & process industries/ steel	-	-	-	-	2	-	2	2	2	2	2	1	2	2	3	2	2	--	24
Educational Institutions	-	-	2	3	2	1	2	2	1	2	8	1	5	2	11	10	12	5	69
Consulting and Service Bureau's	-	-	-	-	-	1	3	2	-	2	2	2	1	3	5	5	6	4	36
Government	-	-	-	-	1	-	2	1	1	-	1	1	2	3	5	6	7	4	34
Defence	-	-	1	-	-	-	-	1	1	1	-	3	-	3	5	4	5	3	27
Research and Scientific Organisations	-	-	-	6	2	3	-	2	-	-	3	4	2	6	23	14	15	9	89
Total	1	-	3	9	12	14	21	25	16	14	33	32	18	29	64	45	57	26	419

Source :- Balasubramaniam (1985)

Further is provided the estimated demand projection for computers during the Eighth Five Year Plan (Table 5).

Table 5 Estimated demand for Computers during the Eighth Five Year Plan

Sector	Super	Large	Mini	Micro
Government	2	270	2,100	1,60,000
Defence	4	50	500	12,000
Space and Atomic Energy	2	6	100	3,000
Railways	-	20	180	21,000
Communications	-	20	86	16,000
Banking and Finance	-	85	850	52,000
Education	5	50	1,000	50,000
Research and Development	10	40	500	20,000
Total (Rounded off)	23	541	5,316	2,74,000
Total Cost (in Rs. Crores)	184	1,082	1,329	13,700

Note :- The average cost of computer systems for different categories are taken to be as follows :

Supercomputers - Rs.8 Crores ; Large Computer - Rs.2 Crores ; Minis - Rs.25 Lakhs ; Micros - Rs.50,000.

Source : Ghosh (1989).

Thus, it may be seen that computers are entering into our society in a large way. Though the figures indicated are large, yet there is tremendous potential for further increase in this field. This becomes evident when a comparative picture of the number of computers in relation to the population of different countries are seen. Table 6 gives a brief picture of the same.

Table 6 The Computer Scape

Country	Computers per 1,000 people
U.S.A.	184.0
U.K.	104.0
Canada	96.0
Norway	87.0
Japan	87.0
Ireland	84.0
Singapore	79.0
Switzerland	77.0
Denmark	74.0
Sweden	73.0
India	0.6

Source :- "The World View", Masterfile, Computers Today, Vol.8, No.89, July 1992.

Alongwith the demand for computers there is a heavy requirement of people to work with computers in various capacities. As reported by Aparna Aachar (1991), the DoE

(Department of Electronics) study team stated that the manpower requirement in the country for the next five years - over 255 at the doctorate level, 14,500 at M.Tech. level, 24,000 at B.Tech. level, 40,000 at Graduate level, 99,000 Diploma holders and additional 18,500 at the diploma in the computer engineering category. It is further reported that the formal institutes can produce hardly 1,85,000 skilled manpower vis-a-vis, the above requirements. Let us look into the manpower demand versus supply scenario for the Seventh and Eighth Five Year Plans as estimated by DoE (Table 7).

Table 7 Manpower : Demand Versus Supply in the field of Computer Technology

Particulars	Manpower : Demand Vs. Supply (DoE Estimates)				
	Seventh Plan		Eighth Plan		
	Requirement	Supply	Requirement	Supply	Gap
Ph.D.	105	65	255	240	15
M.Tech.	1,650	1,850	14,355	2,500	11,845
B.Tech.	1,762	11,500	23,945	7,000	16,945
M.C.A.	2,892	2,000	40,040	18,000	22,000
D.C.A.	13,632	12,100	98,880	80,000	18,880
Others	17,476	-	18,340	7,000	11,000
Total	37,517	27,515	1,95,815	1,14,740	80,685

Source :- Aiyer (1992)

Thus, it is quite evident that there is a great demand for computer manpower. An effective programme of computer education is needed for partial fulfillment of this demand.

1.7.0. COMPUTER EDUCATION

Walker (1984) states that the term "Computer Education" may be used in two connotations ; one to refer it as a means of instruction, and the other as an object of instruction. Carnoy, Daley and Loop (1987) explain as "Computer education (as a means of instruction and object of instruction) is part and parcel of the new technology, and, at the same time it represents access to understanding computers and participating in different kinds of work involving computers".

Thus, it may be stated that computer education refers to the acquisition of knowledge about computers and participating in different kinds of work involving computers. Knowledge about computers refers to computer literacy. Participation in different kinds of work involving computers refers to the effective use of computer as a tool, for example, in Computer Assisted Instruction. Referring to Carnoy, Daley and Loop (1987) again, they have explained and distinguished the two connotations in the following way "Computer as a means of instruction includes drill and practice sessions that exercise a student's skills usually in a subject other than computing ; intelligent tutorial and diagnosis systems that teach new subject matter and/or

identify gaps in student knowledge ; simulations and games that provide activities to supplement traditional classroom instruction in a subject ; and finally, problem solving or logical thinking skills development wherein the computer and software serve as a laboratory for exercising a student's reasoning power. Computer as an object of instruction includes word processing and data base management as well as computer programming in a variety of computer languages and computer literacy".

In the present study, the term 'Computer Education' has been used as an object of instruction[1].

1

(i) According to Lorin W. Anderson and Robert B.Burns in **Research in Classrooms** (Pergamon Press, 1989) the concept of instruction as defined by various educators, is provided as follows :- Gump (1967) includes five components of instruction : concern (e.g., academic, social and recreational), teacher leadership pattern, group quality (defined in terms of the group configuration in the classroom), pupil activity (that is, the behavioural and/or academic demands of the activity) and action sequencing (that is pacing). Weil and Murphy (1982) defined instruction ("instruction processes") as "duration, source, group size, nature of the instructional activities, and specific teacher or studentbehaviours". Barr and Dreeben (1983) suggest, instruction consists of "patterns of interaction,

On a close look into the programme of computer education in the schools in the North-Eastern Region of India, computer education is considered as an object of instruction covering computer programming (which to some extent covers word processing[1]) and computer literacy. These two terms are explained further.

Computer Programming -

Computer Programming has been defined by Bork (1985) and Bozeman (1985) as the "communication activity by which tl

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aspects of class organisation, curriculum content, and the intellectual and social demands made by the nature of the school-work itself". Stodolsky (1988) used eleven dimensions to conceptualise instruction : instructional format, teacher leadership role, cognitive level, task options, options when done, expected student interaction, feedback, pacing, student location, student behaviour, and student involvement.

(ii) "Instruction may be considered as a process of providing a controlled environment consisting of various components with which an individual interact and gain experience, leading to their attaining certain prespecified learning outcomes" (Instruction in Higher Education, ES-302, Block 1, IGNOU, New Delhi, 1991).

1 Word Processing refers to computer facility that allows users to create, edit, store, reformat, and print letters, reports and other documents (DCO-01, Block 3, IGNOU, New Delhi, 1991).

person specifies what the computer is to do in a manner which enables the computer system to perform the specified task".

"Computer Program is a set of sequenced instructions to cause a computer to perform a particular operation" and "a programming language consists of the vocabulary and the set of rules, designed for precise description of computer programs" (Office Environment and Data Processing, DCO-01, Block 3, IGNOU, New Delhi, 1991).

Making it explicit, it may be said that the steps involved in feeding data into a computer and based on which the computer will perform the required task to get desired result is computer programming. The steps essential for feeding data inside a computer includes flowcharting and writing sequential steps from the flowchart for a particular computer language.

Computer Literacy -

Computer literacy is considered as a talking-level-of-knowledge. This includes knowing some computer history ; knowing definitions of computer-related words ; knowing some applications of computers in business, government and industry knowing about social and ethical issues and so on. Many of these objectives are stated, "the student is aware of ....." (Carey and Carey, 1984 as quoted in Ricardo Nemirovsky, 1987).

According to Carnoy and Loop (1986), learning of skills with which to use the computer, is referred as, "computer literacy" and this term can be given a broad definition so as to include not just detailed use of the computer in various situations, but a general knowledge of the roles of computers in society and in the broader sense it is known as "informatics".

Wagner (1987) states, "the advent and increasing use of microcomputers has led many educators and policy makers to consider the need for individual comptencies in dealing with computer languages and manipulation of microcomputer software, commonly grouped under the term Computer Literacy".

While highlighting the importance of computer literacy, Mallick and Kotwal (1985) express as, "Computer Literacy is the non-technical study of the computer and its effect upon society. It is an important area in Computer Education as it provides the student with some of the knowledge, tools and understanding necessary to live in a society which is going to be dominated by Computers".

Thus, it may be concluded that computer literacy includes computer structure, programming and the impact of

computers in different fields in society. The main objective of the computer literacy is to meet a cultural objective which is generally a part of a broader base, that is, to prepare students for an "informatics future" by developing an awareness of computers and their working.

1.8.0. COMPUTER EDUCATION IN INDIA

The importance and growth of applications of computers are highlighted by Ershov (1990). To quote him "By the eve of the third millennium, the developed industrial countries will be close to completing the second industrial revolution connected with the automation of information processing. We may term this concluding stage the "full Computerization of society, which means the situation where all information needed by men will originate, be stored and circulated in society on machine carriers, and its entire processing, both internal and in interaction with man, will be performed by computers and computer software". In India, the application of computers in various fields are getting extended in a fast rate. This has resulted in an increasing demand for computer manpower. To meet this demand, attempts are made by both the Government and private organisations by imparting necessary computer education to people at different levels. The computer education imparted in the educational institutions may be considered at post school level and school level. Each of these levels are briefly discussed further.

1.8.1. COMPUTER EDUCATION AT POST-SCHOOL LEVEL

According to Khanna (1992), by 1991, there were about 108 Universities and 1,216 Colleges equipped with computer facilities assisted by University Grants Commission (UGC). An Educational Network (EDUNET) is being set up to connect IITs (Indian Institute of Technology) and the Tata Institute of Social Sciences, Bombay. In the Eighth Five Year Plan (1992-97) there is a proposal to link various libraries in India through Satellite Network known as INFLIBNET (Information Library Network), (Goel and Jaiswal, 1992).

There are a number of higher educational institutions imparting computer education courses in collaboration with the Department of Electronics (DoE) throughout India as illustrated in Table 8. Apart from it, the DoE, in cooperation with the UGC, MHRD (Ministry of Human Resource Development, Government of India), Directorate General of Employment and Training, and State Governments, has initiated a number of courses and other projects in various educational institutions and Universities to produce highly skilled and trained manpower required for the computer industry.

According to the Manufacturer's Association for Information Technology (MAIT) there were 700 private Computer Institutes during 1990-91. Computer Policy of 1986, states

that, private computer training institutes must have due recognition from the All India Council of Technical Education - Department of Electronics (AICTE-DoE).

Table 8 Number of Institutions offering Computer Education courses at the Higher Education level

Courses	No. of Institutions
Bachelor of Technology (B.Tech.)	23
Master of Computer Applications (M.C.A.)	60
Post Graduate Diploma in Computer Applications (P.G.D.C.A.)	63
Diploma in Computer Engineering	18
Post Polytechnic Diploma in Computer Applications	47
Diploma in Computer Applications (Teachers' Training Programme)	11
Master of Computer Applications (Teachers' Training Programme)	8
Post Graduate Diploma in Computer Applications in Hindi	9

Source : Which Course ? ; Special Report, Computers Today, 7 (76), june 1991.

By June 1991, about 47 institutes have been provided provisional recognition out of 270 institutions applied for ("Shifting the Chaff", 1991).

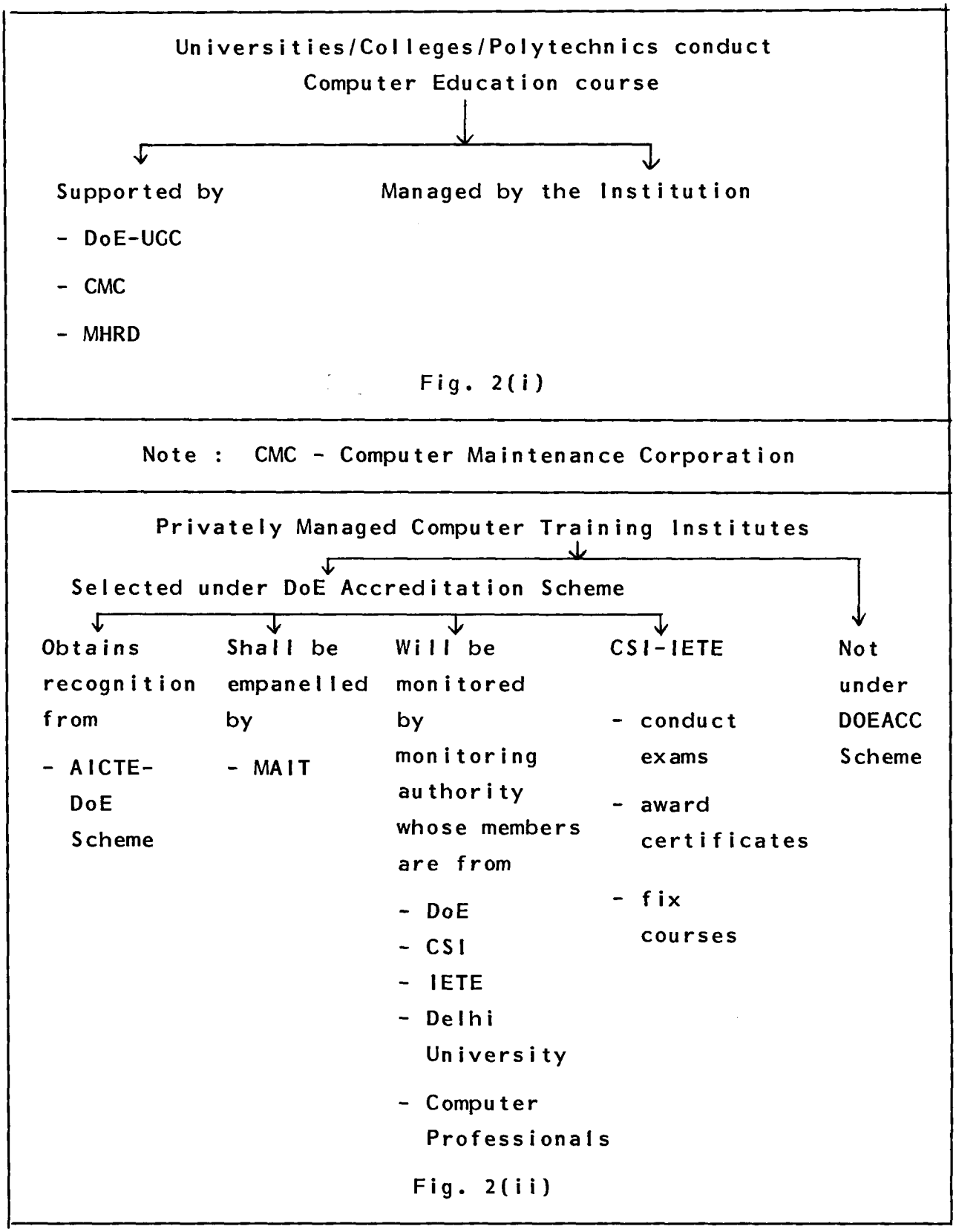
In 1991, National Working Group under the Chairmanship of Prof. S.Sampath was set up to look into the problems associated with computer training and education for producing the required computer manpower. In consequence to its observations and recommendations, the DoE has launched a scheme known as DOEACC (Department of Electronics Accreditation) scheme. The objective with which the scheme is formulated is for "building a meaningful, organised and responsible computer training industry". According to Vittal (1991), Secretary, DoE, "DoE is implementing this scheme to generate qualified manpower in information technology by utilising the facilities and expertise available in the private sector". Under the DOEACC scheme there are four levels of examinations The DOEACC scheme is depicted in Table 9.

Table 9 DOEACC Scheme

Level	Description	Minimum Eligibility	Duration
O	Foundation course (Program Assistant Level)	10 + 2	1 year
A	Advanced Diploma course (Programme Level)	Level O and one year professional experience/ polytechnic diploma/ graduate	11/2 years
B	Graduate Level course (Systems Analyst/ Software Engineer Level)	Level A or three years relevant professional experience or DCA (post graduate polytechnic) with three years experience	3 years
C	Master's Level course (Systems Manager Level)	Level 'B' or B.Tech. (Computer Science) or MCA, M.Sc. (Computer Science or equivalent) with one and a half years professional experience	11/2 years

Further is provided the present system of structural functioning of various computer educational institutions as shown in Figures 2(i) and 2(ii). From the figures it may be seen that there are several agencies managing the computer training facilities in the country.

Figure 2 Organisational Structure of Computer Educational Institutions



Note : IETE - Institution of Electronics and Telecommunication Engineers

CSI - - Computer Society of India

1.8.2.0. COMPUTER EDUCATION AT SCHOOL LEVEL

At the school level two major schemes, namely, the CLASS (Computer Literacy and Studies in Schools) Project and the Navodaya Vidyalaya Commputer Education Scheme (NVCES) were taken up to promote Computer Education in schools in India. They are discussed in brief further.

1.8.2.1. THE CLASS PROJECT

The year 1983-84 ushered in a new era when the Government of India launched a project known as CLASS. The CLASS project was implemented as a pilot project with the joint effort of the Ministry of Human Resource Development (then the Ministry of Education) and DoE. The details of the CLASS project are provided further.

a) Objectives of the CLASS project -

The objectives of the CLASS project are :

(i) To provide a broad understanding of computers and their use ;

(ii) To provide a hands on experience ;

(iii) To familiarise students with the range of computer applications ; and

(iv) To demystify computers and develop a degree of ease

and familiarity with the computers.

b) Target groups -

School students studying in classes IX, X, XI and XII.

c) Management of CLASS Project -

The CLASS project comprises of a Steering Committee headed by the Secretary, Department of Education, MHRD and the Secretary, DoE. They are responsible for formulating plans and policies related to the project. There are a number of organisations involved in managing the CLASS project. CMC (Computer Maintenance Corporation) is entrusted for procurement, installation and maintenance of hardware. NCERT (National Council of Educational Research and Training) looks after the academic matters like academic planning, software development, teacher training and monitoring the project. Institutes such as technological institutions or Universities are the resource centres whose functions are to provide guidance and supervise the schools, provide teacher training, monitor and report, and take care of installation and maintenance of hardware in coordination with CMC.

d) Coverage of Schools -

CLASS project became operational in selected schools in 1984/85. The schools selected were either government schools or government funded schools located in urban areas.

Most of the schools selected were Central schools (Kendriya Vidyalayas). The number of schools covered under the project were increased over the years. Table 10 shows the number of schools covered under the CLASS project. The number of schools included under the CLASS project from 1984-85 to 1989-90 were 2,598.

Table 10 Number of Schools covered under the CLASS project

Years	Number of Schools in the first Year	Additional Schools over the previous Year					Total number of schools
1984-85	248						
1985-86		501					749
1986-87			500				1,249
1987-88				700			1,949
1988-89					378		2,327
1989-90						271	2,598

Source : Vittal, (1992)

During the first year of operation of the CLASS project, 42 resource centres were established in various technological institutions and Universities distributed all over India. The number of resource centres rose to 60 during 1991-92. In the first year of its implementation following

facilities were provided to the selected schools.

(i) Two eight-bit BBC microcomputers per school. Capacity of the microcomputer is of 32 Kilobyte RAM[1] and 32 Kilobyte ROM[2] and has resolution graphics

(ii) Two 5 1/4 inch floppy disk drives

(iii) One 80-column dot-matrix printer

(iv) One cassette recorder

(v) Two 12 inch monochrome/colour VDUs (Visual Display Unit)

(vi) Investment made on hardware is Rs 60,000 per school

(vii) Twentyfive software packages per school

e) Teacher Training -

Schools selected for the CLASS project are required to send three teachers for training to the nearest resource centre for a period of three weeks. Teachers having received the training are expected to devote five and a half hours per week with computers mostly after school hours and

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1 RAM (Random Access Memory) is the main memory of the computer that is fabricated on a semiconductor chip. Information can be read from and written to by the user and therefore it is also called read/write memory.

2 ROM (Read Only Memory) is the main memory of the computer that is fabricated as the random access memory but the contents of this memory are fixed during manufacture and cannot be modified.

during vacation. A total of 3,180 teachers received training from 1984 to 1987. Following aspects are dealt upon in the teacher training programme

(i) computer awareness and literacy ;

(ii) interaction with computers ;

(iii) programming ;

(iv) computer arithmetic and logic ; and

(v) social objectives.

The training programme consisted of lectures on computers, writing basic programming and operating computers.

f) Effectiveness of CLASS Project -

CLASS project has now been in operation for several years. Vittal (1992) refers to a review, made by a Working Group set up the Government of India in 1986-87, of the CLASS project. As stated, the review indicates that,

(i) Such a project is the first major initiative for computer education at school level

(ii) Awareness is generated and demand for computer education among the school students is increasing

(iii) Objectives of demystification and familiarisation are partially achieved

The Working Group's recommendations for the improvement of the CLASS project after the review are

(i) Originally stated objectives are to be retained

(ii) CLASS may be at + 2 stage covering all senior secondary schools by 1990

(iii) Periodical evaluation of hardware must be carried out

(iv) Depending on the strength of the students number of computers are to be increased to 5-8 per school

(v) Maximum utilisation of Indian languages are to be made

(vi) Greater stress has to be laid on software development

(vii) Resource support to school is to be made available at district level

(viii) NCERT will be nodal agency for academic matters

National Policy on Education (NPE), 1986 and Programme of Action (POA), 1986 emphasised that computer literacy programme to be made available on a wide scale and that adequate coverage to be provided to all senior secondary schools by 1990.

The CLASS project will be continued in a modified form and is expected to cover 15,000 higher secondary schools by 1997. The project will be implemented in collaboration with private computer institutes. This modified form of CLASS project shall be introduced only in those selected schools which are equipped with requisite physical facilities and characteristics.

1.8.2.2. NAVODAYA VIDYALAYAS COMPUTER EDUCATION SCHEME (NVCES)

Navodaya Vidyalayas (NV) were set up throughout India to impart education specifically for the rural talented children managed by the Navodaya Vidayalaya Samiti (NVS). The NVS decided to go for computer education since January, 1991. A sum up of the NVCES is putforth.

a) Objectives of NVCES -

The objectives of NVCES are to

(i) strengthen creativity and discovery learning ability

(ii) develop problem solving skills

(iii) develop procedural thinking abilities

(iv) develop intuitive thinking and estimating skills

(v) develop computer programming concepts

b) Target Groups -

Computer education course in NVs is meant for students studying in Classes VI, VII, VIII, IX, X, XI, and XII.

c) Management of NVCES -

The NVS launched the Computer Education Scheme or Computer Literacy Programme with the assistance of Private Computer Agencies, namely ; Computel Systems and Services (CSS) and Informatics Computer Systems (ICS). An agreement is signed between NVS and CSS under which there are several terms and

conditions. Some of the terms and conditions of agreement are

(i) CSS will supply four IBM PC Compatible Computers (256 KB memory and 360 KB capacity single disk drive) ; one Printer (80 column), one Stabiliser, Floppies, Text books, etc. alongwith one computer teacher

(ii) The contract period lasts for four years starting from 1st July 1991 to 30th June 1995. After completion of the contract period NVS may extend the contract for another term

(iii) Educational Software must be provided by the Agency

(iv) At the end of the contract period (1991 to 1995), computers and other materials provided by the agency shall be the property of NV.

NVS is responsible for financing the Private Computer Agency. The Samiti is the approval authority for implementing the CLP in all the NVs of India. Regional offices located at various centres of India shall monitor the NVs of the respective regions and report to the NVs. NVs will implement the CLP and submit quarterly progress report to the Navodaya Vidyalaya Regional Offices and to the NVs. NVs has taken a step since 1992 to acquaint and make aware of the CLP to the Principals of the NVs during vacations. In the year 1992, about 30 Principals of NVs were provided training in relation to CLP. Only those NV Principals are eligible to receive training in the CLP where the CLP is being implemented.

d) Coverage of NVs -

The CLP was first started in 73 NVs throughout India in the year 1991. During the second year that is in 1992 the CLP was extended to 30 more NVs, thus making the total of implemented schools as 103. Implementation of the CLP in different States/Union Territories (UTs) of India is presented in Table 11. Out of a total of 275 NVs spread all over India the CLP is going on in 103 NVs. Maximum number of NVs where CLP is implemented is in the State of Uttar Pradesh.

Table 11 CLP undergoing in NVs in various States/UTs of India

State/UT	Number of NVs where theCLP is being implemented			Place where the NVs are located
	1991	1992	Total	
Andaman & Nicobar Islands	1	-	1	South Andaman
Andhra Pradesh	7	1	8	Visakhapatnam, Medak, Nalgonda, Rangareddy, Chittor, Nizamabad, Karimnagar, Anantapur
Arunachal Pradesh	-	1	1	Mahadevpur
Bihar	6	1	7	Nalanda, Gumla, West Champaran, Ranchi, Samastipur, Bhojpur, Nawada

Table 11 Contd.....

State/UT	Number of NVs where the CLP is being implemented			Place where the NVs are located
	1991	1992	Total	
Dadra & Nagar Haveli	1	-	1	Sili
Delhi	1	-	1	Katewara
Diu & Daman	-	1	1	Diu
Goa	1	-	1	South Goa
Gujarat	3	2	5	Jalna, Kheda, Junagarh Surat, Bharuch
Harayana	4	1	5	Jind, Hissar, Sonepat, Rohtak, Sirsa
Himachal Pradesh	3	1	4	Mandi, Sirmour, Shimla, Una
Jammu & Kashmir	2	1	3	Jammu, Kathua, Udhampur
Karnataka	5	2	7	Belgaum, Bangalore, Raichur Kolar, Mandya, Shimoga, Chikmangalur
Kerala	4	1	5	Eranakulam, Idukki, Cannore, Pathanamthitta, Kasargod
Madhya Pradesh	5	3	8	Bilaspur, Shahdol, Raipur, Narsingpur, Hoshangabad, Tikamgarh, Jabalpur, Panna

Table 11 Contd.....

State/UT	Number of NVs where the CLP is being implemented			Place where the NVs are located
	1991	1992	Total	
Maharastra	6	1	7	Buldana, Latur, Nagpur, Ahmednagar, Amravati, Nasik, Osamanabad
Manipur	1	-	1	Bishnupur
Meghalaya	-	2	2	Williamnagar, Baghmara
Orissa	3	1	4	Cuttack, Bolangir, Keonjhar, Dhenkanal
Pondicherry	1	1	2	Karaikal, Kalapet
Punjab	4	2	6	Kapurthala, Amritsar, Ropar, Sangrur, Ludhiana, Faridkot,
Rajasthan	5	3	8	Bhilwara, Chittorgarh, Sikar, Churu, Jaipur, Ajmer, Udaipur, Jaisalmer
Sikkim	-	1	1	Rothak
Uttar Pradesh	10	4	14	Merrut, Kanpur, Rai, Bareilly, Nainital, Jaunpur, Jhansi, Sultanpur, Sitapur, Gorakpur, Mirzapur, Gonda, Bahraich, Bulandshahr
Total	73	30	103	

Source : Navodaya Vidyalaya, Regional Office, NER, Shillong (Obtained during June 1993).

There is a proposal on the part of the NVs to introduce Computer Science as a Vocational course in the NVs for XIth and XIIth standards. The scheme that is NVVEC (Navodaya Vidyalaya Vocational Education Courses) is expected to be implemented from 1993.

e) Textbooks and Softwares -

Under the agreement between the NVS and the computer agencies, necessary textbooks and softwares shall be provided to the NVs by the agencies. The following are the text books which are recommended and supplied by ICS for the CLP in different classes.

Class	Name of the books for CLP
VI	Computers for Children
VII	Basics of BSIC
VIII	Basics of BASIC
IX	Basics of BASIC
X	Introductory Computer Science
XI	Textbook on Computer Science
XII	Textbook on Computer Science

The ICS has also supplied the Systems Software for CLP which is used for the programme alongwith the textbooks.

f) Expectations -

Following are the expectations of the NVS through the CLP

(i) By the end of the four year period, every child in the school (NV) be able to operate and programme on computers. The knowledge gained would help the child not only to find employability in the fast growing computer industry, but, would even help to improve his employment prospects in any organisation that use computers.

(ii) By involving an expert agency, NVS can look forward to the introduction of a sophisticated hi-tech subject in the schools through a simple and proven mechanism

(iii) In each school 4 teachers will be trained in the use of computers

(iv) Enabling more sophisticated classroom instruction

(v) Computer for school office use.

g) Effectiveness of the CLP -

Since, the contract period between the NVS and computer agencies is from 1991 to 1995, no evaluation is carried out, so far, to know the effectiveness of the ongoing CLP, according to the available information.

1.8.2.3. COMPUTER EDUCATION SCENARIO IN SCHOOLS : AN OVERVIEW

The CLASS project and the NVCES are the two major steps taken so far in introducing computer education in the schools. Alongwith the students, a number of teachers are trained and made aware of the modern technology. Apart from the CLASS project and the NVCES, many schools have taken up on their own to provide computer education to their students.

The computer revolution which is taking place in our schools is changing the outlook of both urban and rural students markedly. Demand for computer education at the school level is increasing day by day all over India. "It is estimated that there are more than 3,500 educational institutions in India with computer facilities. This number is likely to increase to about 15,000 in another few years with the implementation of policy directives passed by the Parliament in March, 1988" (Mukhopadhyay, 1988). Emphasising the role of computers in the educational process, the Programme of Action formulated by the Ministry of Human Resource Development to implement the National Policy on Education (NPE), maintains that "Computers can play an important role in enhancing the efficiency of the teaching learning process, to make children more creative and provide them with the individualised learning environment. Computer Literacy will be crucial in preparing children to cope with the microcomputer explosion, which has the same potential for social change as the industrial

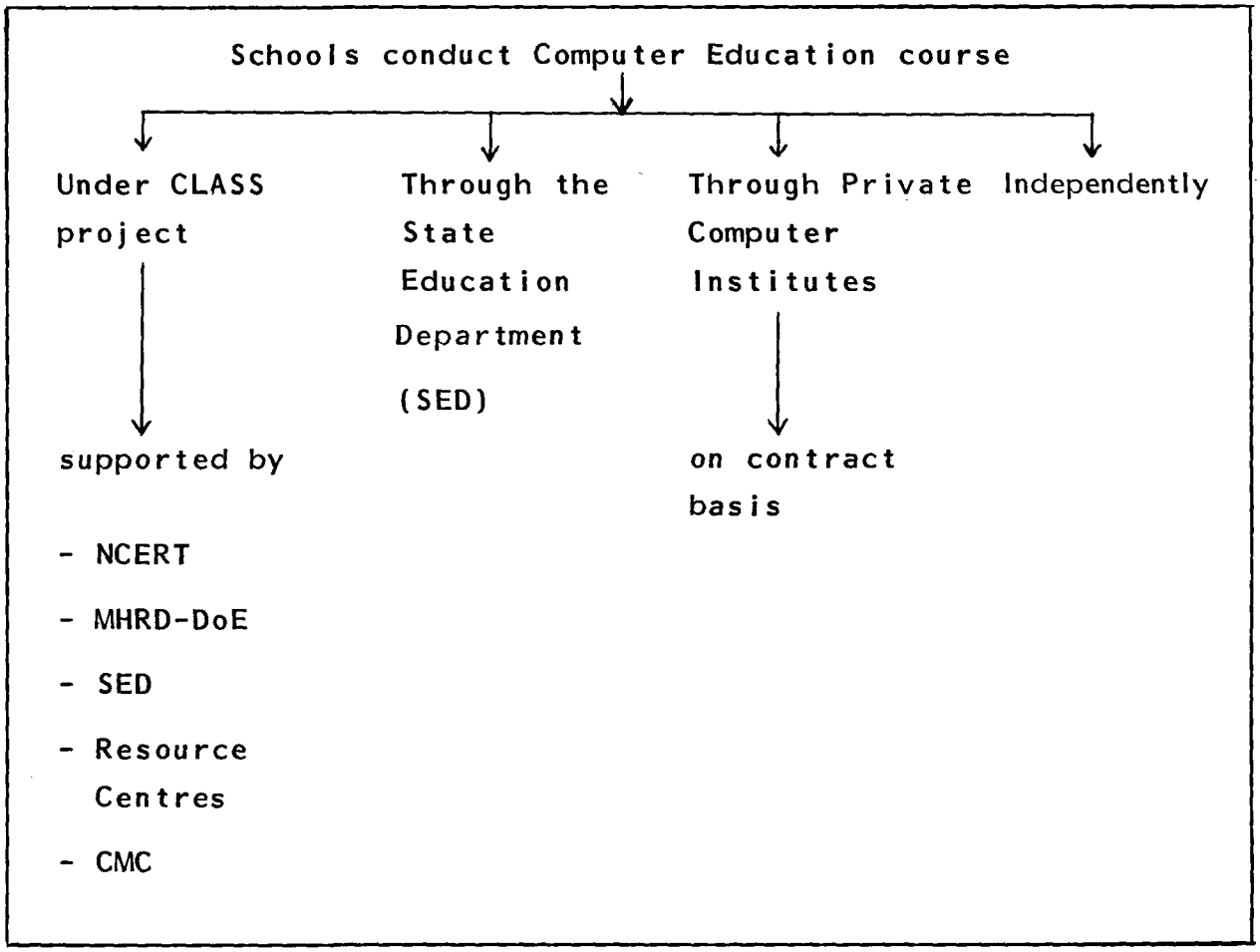
revolution. The demands for equity, therefore, require that Computer Literacy programmes be progressively integrated with the school curriculum at the lower secondary and elementary levels" (Ministry of Education, Government of India, 1986).

The action plan of the NPE, 1986 envisaged extension of the computer awareness programme to 10,000 higher secondary schools and their progressive integration with the school curriculum at the lower secondary level in the Seventh Five Year Plan (1985-90). According to the Fifth-All India Educational Survey (1986), Computer Science as a subject is introduced in 94 Higher Secondary Schools (3 in Haryana, 88 in Tamil Nadu and 3 in Delhi) out of a total of 15,498 Higher Secondary schools in India.

There are thousands of private computer education institutes which are helping in promotion of computer education in schools by providing trained computer teachers, and computer sets as necessary inputs. Probably, the massive spread of computer education in schools became possible within a very short period because of the private computer education institutes.

An attempt is made to represent the present system of structural functioning of computer education in schools as shown in Figure 3.

Figure 3 Management Structure of Computer Education in Schools of India



Thrimurthy (1993) has made valuable suggestion which needs mentioning -

"It is the need of the hour to workout different strands of computer orientation, their functions, tools that provide such functions and to assign such tools to different levels of school education, in the Indian context.

To start with, we need to work out and accomplish the following, while keeping open to the new thoughts.

1. Identifying various objectives and functions at each strand of computer orientation, which may include procedures, using programs, computer fundamentals, computer application, impact of computer usage, writing computer programs
2. Identifying the computer software tools to achieve these objectives
3. Identifying management methodologies to introduce computer orientation at different standards of school level
4. Identifying the Hardware Platforms and Software tools that can be adopted in Indian Schools, to meet the computational and training requirement at each standard
5. Identifying gray areas where software development is required indigenously to help the school education
6. To prescribe and recommend the specific software tools that can be used for Teaching by assigning them to each level from Kindergarten to 10th Class
7. List out the guidelines on infrastructure to introduce the courses for helping the management
8. Suggest the effective management methods of handling tools (for example, school library cannot be an ideal place to keep track of school software and catalog them)

It is also necessary to identify the suitable time slot to offer computer curriculum by adjusting it in the regular school schedule".

1.9.0. COMPUTER EDUCATION IN THE NORTH EASTERN REGION OF INDIA

The North Eastern Region (NER) of India extends between 22^0 19' N to 28^0 16' N Longitude and 89^0 42' E to 97^0 12' E Latitude, comprising of seven States, namely, Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, and Tripura whose capital towns are Itanagar, Guwahati, Imphal, Shillong, Aizawl, Kohima and Agartala, respectively.

Computer education is offered in the NER both by private computer institutes and by formal educational institutions. Most of the private computer institutions are established in the State capitals. Only one private computer institute, namely, Informatics Computer Institute which is located in Shillong, is accredited under the DOEACC scheme.

At the higher education level, beginning has been made by the different Universities to offer computer education in one way or the other. To quote some, North Eastern Hill University has provisions for a Diploma/Certificate course in computers; Regional Science Centre at Guwahati, Gauhati University, and Manipur University also offer diploma courses in computer applications. Certain selected Colleges (St. Edmund's College, St. Anthony's College and Lady Keane College

located in Shillong ; Cotton College, Arya Vidyapeeth College, Handique College situated in Guwahati) of the North Eastern States have introduced computer courses at the degree level.

At the Secondary education level, several schools have introduced computer education as a part of their curricular programme. Some Navodaya Vidyalayas in NER have already come under the Navodaya Vidyalaya Computer Education Scheme. The CLASS project also covers many secondary schools in various States of North East.

The CLASS project or Computer Literacy Programme (CLP) in short, is in operation since 1984-85 in the States of Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura. The number of schools which have opted for the CLP in the various States of NER are given in Table 12.

Table 12 Schools covered under the CLP in the NER as in 1992

State	Number of Schools
Assam	104
Manipur	4
Meghalaya	6
Mizoram	11
Nagaland	11
Tripura	11
Total	147

In Assam, the CLP is in operation in more than hundred high and higher secondary schools. The Resource Centre for Manipur, Meghalaya and Mizoram and a part of Assam is the Regional Engineering College, Silchar (situated in Assam). The Resource Centre for Nagaland and a part of Assam is Guwahati Engineering College, Guwahati. The State Institute of Education at Jorhat in Assam started functioning since 1991 as yet another Resource Centre in this region. The Tripura Engineering College serves as the Resource Centre for Tripura.

Teachers from these 147 schools covered under the CLP are sent in batches to get training on the computers for a period of three weeks. A casual discussion with the heads and teachers of some of these schools revealed the following as the reasons for not getting the benefit of the programme to the fullest extent - irregular electricity supply ; defective computer ssets ; insufficient training imparted to the teachers; lack of coordination between the National Council of Educational Research and Training, State Education Department, Resource Centre and School ; lack of motivation and interest among the trained teachers in CLP ; and improper communication facility. But, the picture gets brightened a little to notice that students from Central Schools of Guwahati took part and won prizes at the national level quiz competition on Computers.

Apart from the formal educational institutions, various private agencies in the form of private computer

institutes are serving the region quite effectively in promoting computer education particularly among the student population.

Students from certain schools of the NER participated in a Computer Fair held at Calcutta in the year 1991. At the first instance, Statewise district level competition was organised and the selected students from the district level participated in North East region competition held at Regional Science Centre situated at Guwahati. From the North East, the students of Don Bosco School and St. Mary's School both from Guwahati and Assam Rifles Public School and Auxilium School located at Shillong were selected to participate in the Inter-State Computer Fair, held at the Birla Industrial and Technological Museum, Calcutta. In the Fair, St. Mary's School of Guwahati bagged the Best-School team award and Special and token prizes for Quiz, Essay writing and software development competition.

1.10.0. NEED FOR THE STUDY

Walker (1983) proposes that computers enhance education by providing the following : more active learning, more varied sensory and conceptual modes, less mental drudgery, learning nearer the speed of thought, learning better tailored to individuals, more independent learning,

and better aid to abstraction. The proposed statement by Walker requires validation through research. Today, computers are playing a vital role in our life because of its multifarious utilities. The rapid rise in the number of organisations, industries and institutions possessing computers is a clear indication of the pivotal role played by them. Computer technology is undergoing a total change. The future computers pioneered by Japanese, known as Knowledge Information Processing Systems, will open a new era in computing.

The developed countries introduced computer education at the school level with the intention to improve students' performance to prepare young people for changing job demands in the workplace, and to bring in change in students' learning. Developed countries were able to succeed in achieving the set goals to a great extent as they were technologically and economically well advanced. Developing countries on the other hand, had to delay in introducing computer education at the school level due to varied economic, resource, technological, social and such other constraints.

Though computer technology in India is in use since mid-fifties, yet its entry at the school level was only in the early eighties. Computer education at the school level commenced with the launching of the CLASS project. After that, sudden introduction of computer education in the schools began

throughout India, either with the help of private computer institutes or through their own initiative. Rapid expansion of computer education specially through the private computer institutes in private schools and the ever increasing demand for computer manpower in various sectors forced the government to incorporate computer education as a subject of study in government funded schools, to prepare the individuals for the information society. The demand for computer education in the schools is spelt out by parents and elders and this is perhaps one of the significant demands expressed by the society in the history of Indian schools. The manner in which the schools introduced and the desirability shown by the parents in introducing computer education calls for attention in this direction.

Carnoy, Daley and Loop (1987) in "Education and Computers : Vision and Reality" reviewed the status of computer education in various countries of the world, and revealed that, in an increasingly computerised society introduction of computers in schools is essential in order to develop positive and efficacious attitudes toward the technology ; and research evidence suggested that motivational (positive and efficacious attitudes) outcomes can be produced by modelling influences available from parents and peers. They have further indicated that limited research work had been carried out regarding the motivational consequences of computer use. They have also highlighted the importance of research in this area reasoning out that the

computer technology is becoming an integral part of daily life in many societies.

Realising the importance of computers in our day to day activities, computer education gained due priority in schools, in India. Introduction of computer education ocurred in Indian schools a decade ago. Most decisions to introduce computer education have been made without having due research knowledge about the implications of this technology on the psychological and pedagogical aspects.

Policy-makers, curriculum developers, educators and parents are all faced with the following challenge : on the one hand, they want to provide computer experiences for children in the classroom but, on the other, so far they have no conclusive evidence of a general nature that the computer is a positive educational force (Carnoy, Daley and Loop, 1987).

As the case is there with the rest of India, computer education is there in the schools of NER of India also, since a decade. Though NER of India is not industrially advanced compared to the other parts, yet, the impact of computers can be seen in the region.

Introduction of computer education in schools in the NER of India in general and making it a compulsory aspect of

curriculum by some in particular is a bold step. Realising the demand of computer education in the schools of NER of India and the non-existence of any indepth research work in this area, it becomes worthwhile to study certain aspects like the attitude of students towards computer education, how the teachers and students view the programme, the performance of students in the course, and basic to all, the existing status of the operational aspects like the machines, teachers and curriculum. The present investigation is an attempt in this direction.

1.11.0. STATEMENT OF THE PROBLEM

The problem under investigation reads as **"A Study on the Computer Education in the High Schools of Selected States of North-East India".**

The study attempts to find out the facilities available for computer education course in High Schools, views of teachers towards certain aspects of computer education, views of students about certain aspects of the computer education course, performance of students in the computer education course, relationship between the performance of students in the computer education course and their performance in other school subjects, and attitude of students towards computer education course.

As has already put forth (refer caption 1.7.0.) the term **'computer education'** is considered as an object of instruction covering computer literacy and computer programming (which to some extent covers word processing).

The **'performance of students'** in this study refers to the marks obtained by the students in the **'Computer Studies'** paper in their Class X examinations.

The term **'attitude'** (for a discussion of the term refer caption 3.4.1.1.) indicates the degree of positive or negative affect associated with some psychological object (here it being computer education). Operationally, the term refers to the score obtained by an individual on the Attitude Scale developed by the investigator for the purpose of the present study.

1.12.0. OBJECTIVES

The following were the objectives of the present study :

i) To find out the facilities provided for the computer education course in high schools

ii) To study the computer education curriculum followed in the high schools

iii) To find out the views of teachers towards certain

aspects of computer education

iv) To find out the views of students about certain aspects of the computer education course

v) To find out the performance of students in the computer education course

vi) To find out the relationship between the performance of students in the computer education course and their performance in other school subjects

vii) To find out the attitude of students towards computer education course.

1.13.0. DELIMITATIONS OF THE STUDY

a) The present study is confined to four States, namely; Assam, Meghalaya, Mizoram and Nagaland

b) Since introduction of computers is of recent times in the region, the study was restricted to only the capital towns of the four States, Guwahati, Shillong, Aizawl and Kohima, respectively. (Figure 4 shows the four States and the capital towns which were considered for the study).

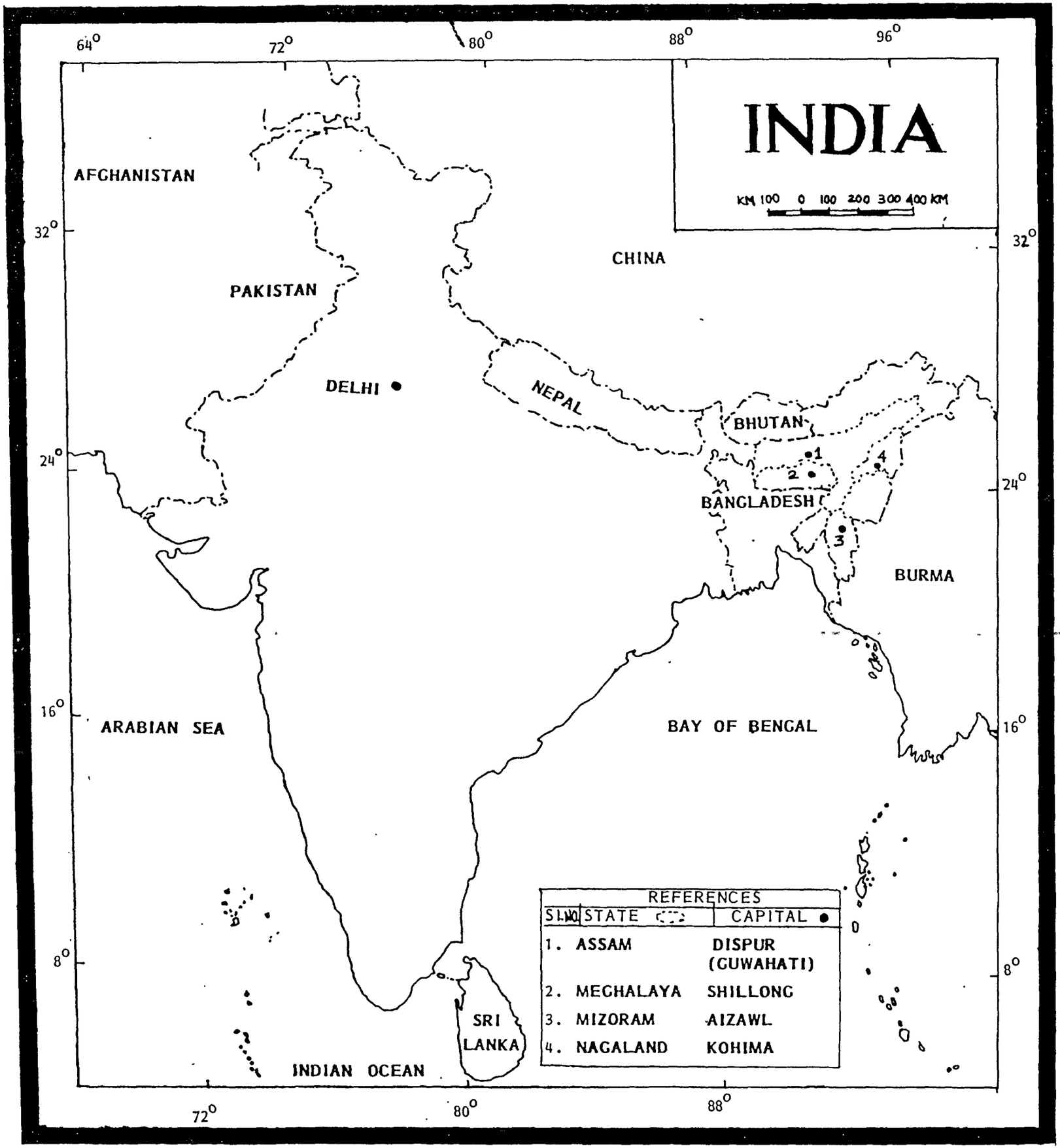


Figure 4 : LOCATION MAP

c) Since, at present, the Indian Certificate of School Education (ICSE) system alone conducts the final examination in 'Computer Studies' for Class X, only such schools offering ICSE syllabus were considered for collecting data on the performance of students (refer objectives v and vi under caption 1.12.0.)

d) As it was felt that to give any reaction or to develop any attitude, the school should have exposed the course to the students and teachers for a considerable time, the study included only those high schools which had introduced the course prior to 1991.

The next Chapter presents a review of related literature.

CHAPTER II

REVIEW OF RELATED LITERATURE

REVIEW OF RELATED LITERATURE

2.1. INTRODUCTION

In this Chapter, an attempt has been made to present a review of the related literature and studies in the area of computer education which are relevant to the present investigation.

A crucial argument for computer education is that using computers in schools is a necessary preparation for a new world of work. The assumptions under which computer education is based, follows that (a) the principal source of future economic and social development will be the production and consumption of information including its application to the production of other goods and services ; (b) this production and consumption will significantly increase the aggregate demand for higher levels of skills, that is, it will tend to reskill rather than deskill labour ; and (c) the use of computers in schools is directly related to the development of the types of skills needed to fill these future jobs (Carnoy, Daley and Loop, 1987). This is a world wide view about the implementation of computer education in educational

institutions.

Computer education took its roots in educational institutions outside our country since long. Hence one comes across some research in this area which is carried out outside India. In our country, microcomputers moved into schools by 1983-84. Since then, the introduction of computers in schoools of computers in schools started increasing rapidly. But, research activity in the field of computer education is of recent origin.

Review work carried out in the present study, thus, presents research studies carried out mainly outside India. All these studies are grouped into different clusters meaningfully and are presented hereunder.

2.2. STUDIES HIGHLIGHTING THE ROLE AND IMPORTANCE OF COMPUTER EDUCATION

Early studies reported that computer phobia existed among the people, but, as computers started spreading in social and educational spheres there is a sharp decline of computer phobia (Carnoy, Daleyy and Loop, 1987).

Looking into the cultural significance of computers in the classroom, Blumenfeld, Hirschbuhl and Al-Rubaiy (1979)

highlighted the general concepts of planned cultural change that could reduce education's resistance to technological change.

Atherton (1979) has made an attempt to study the developments in computer education in the 1970's in the U.K. with regard to Secondary Education and Teacher Training. In 1974 about 7,000 children took computer examination courses and the figure rose to 26,000 by 1978. According to Atherton, computer studies has a wide range of applications ; it can be treated in a practical way at all intellectual levels found in the secondary schools ; it encourages and rewards a disciplined approach to problems.

Vamos (1987), while discussing on the role of computers in education, expressed that some basic level of computer literacy will soon be required for every citizen, young or old, if he or she wishes to carry on everyday activities without help or hindrance. But he has warned that computers and all those techniques associated with their use should not be considered as a panacea for all human problems. Though computers have become revolutionary tools in all activities and media of communication, they should serve superior human values and not rule them. According to the UNESCO report (1985) it was found that in general, all

countries are currently showing great interest in the field of computer education.

It is held that computers in their broadest sense revolutionised the teaching and learning process since 80's. Although the use of computers was introduced into the educational system of advanced countries in the late 60's and early 70's, the major developments in the use of computers in schools took place in the 1980's since the advent of microcomputers throughout the world.

Sheingold, Kane and Endreweit (1983), conducted three case studies with regard to use of microcomputers. They investigated three geographically distinct school districts. The study considered four levels, or contents, within which an educational innovation takes place : community, school system, individual, school and classroom. Case study methodology was used in the selected three school systems, all of which had significant microcomputer use at both the elementary and secondary levels. Data were collected by a four member team of researchers skilled in interviewing, classroom observation, and assessment of instructional applications of computing during the fall and winter of the 1980-81 school year. The three case studies revealed that school systems assimilate microcomputers to their own goals, needs and ways of operating. The study has suggested that

the effects of microcomputers on education will depend, to a large extent, on the social and educational contexts. Six major issues evolved from this study which forms an agenda for future research and as a foundation for educators, namely ; access to microcomputers ; new roles in response to microcomputers; integration of microcomputers into elementary classrooms and curricula ; quantity and quality of software ; preparation of teachers for using microcomputers ; and effects and outcomes of the instructional use of microcomputers.

In India, the National Meet (1992) held at New Delhi emphasised that the importance of computers is in various fields because of its multipurpose utility. As such, there is a need of computer education in its totality starting from school education to higher education keeping pace with the changing technology. The Expert Meet recommended that computer education be introduced from 5th standard onwards ; conceptual framework be introduced from 1st to 8th standards ; about 80 percent time be devoted to learning with computers and 20 percent time to know about computers ; before 8th standard, instruction be non-verbal ; in the 9th and 10th standards 50 percent of time be devoted for learning about computers ; and between 10th and 12th standards computer education be offered as an elective subject. It also highlighted that hardware must be adequate to curriculum and be able to run all the software available for that level.

Emphasising the importance of computer education Atre and Barde (1987) stated that next to arithmetic, computer study is the most useful and practical of all the subjects. Computer knowledge gives completeness to the human personality and so it is imperative that the present school or college-going population should acquire this powerful knowledge. Computer educaation is an effective way for modernizing education.

While emphasising the need of computers in educational institutions in India, Gupta (1985) remarked that the spread of computers in educational institutions is slow mainly due to two factors - cost and inadequate or lack of proper planning plus non-availability of hardware and software services.

Khurana (1993) conducted a study on Computer Science - its Application and Usefulness in School Education in four schools of Ludhiana district with a sample of 120 students from 9th and 10th classes. The teachers incharge of the respective schools also formed the sample of the study. The study revealed the following :

1) the capacity of the computers was 32 KB in all the schools ;
2) in half of the schools, the computer education was offered as a compulsory subject ;

3) an extra fee for computer education was being charged and this was moderate ;

4) sixtyfive percent of the teachers reported that the students were allowed to use the computer independently ;

5) it was further stated by the teachers that about 98 per cent of the students used the computer for depth learning ;

6) it was also revealed that all the teachers could handle the computers very efficiently in the classes and the students reported that the teachers were able to discuss and relate the theory and practical part appropriately ;

7) majority of the students said that computer education was useful to develop the basic skills and the computer was used very frequently in teaching the subjects such as Mathematics, Biology, General Science, Physics, etc.

Further, according to Khurana (1993), computer education is useful for developing basic concepts, skills, vocabulary and retention of knowledge in students and computer education should be made a compulsory part or component of the academic curriculum in all the schools.

2.3. STUDIES ON COMPUTER LITERACY

As Computer Literacy comes under the purview of Computer Education, it was felt necessary to include the available literature in this area. Moreover, in India, Computer Literacy is still regarded as one of the goals to be attained at the school level, and therefore, it is quite important here to include the available information which will serve the purpose of the present study.

Noble (1984), accepted that "Computer Literacy" is an essential condition for everyday life, either in jobs, schools or homes and as a result computer literacy education has spread to train people of all ages. Further, Noble points out the importance of computer literacy in computerised market-place, learning revolution and technology work force through suitable examples. Computer-literacy phenomenon might best be viewed not as education, but rather as an ideological campaign, one that coincides with and reinforces a hegemonic vision of a computerised future.

"Project MICRO (Minority Computer Resource Opportunity) was designed to provide an effective, educational, computing model for African-American and poor middle-school students (13-15 years). The goals were to develop computer literacy and critical thinking skills and

to create interest in further classes in science and technology. Teachers were given extensive training and technical support. Students in the project gained significantly in computer literacy and problem solving compared with those students not in the project", (Edwards, 1989, 1990 ; as quoted in Sutton, 1991).

Imae, Hirata, Shimizu, Kitaoka and Tijika (1986), surveyed computer literacy of 3,452 sixth, eighth and eleventh grade students in Japan during 1984, at a time when few schools had installed computers for educational use. The study surveyed the levels of computer literacy of Japanese students before schools began to use computers in the classroom. The results were used to divide the students into four categories - (1) Program writers, (2) Non-program writers, (3) Future interest in computers, and (4) Indifferent/avoidant. Students in the first of these two groups could operate computers while those in the latter two could not. The percentages for the groups were 4, 13, 46 and 34 respectively. These ratios varied little between types of schools. Most of the students had positive attitudes towards computers but the indifferent/avoidant group was less familiar with them. Students who already knew how to use micro-computers were more

interested in mathematics, science and social studies. They were also better adapted to school life and activities. Their primary reasons for using computers were to play games and to learn programming. In these groups, the most frequently mentioned negative effect was that computers were hard on the eyes, while the most frequently mentioned positive effects were intellectual training and the making of friends.

Singh and Sokhey (1990) conducted a study on Computer Literacy in the schools of Ludhiana city, Punjab. The objective of the study was to investigate the status of computer literacy, its utility, constraints and prospects in schools. Sample of the study consisted of eight schools, out of whiich 2 were government schools having the facility under CLASS project of NCERT and 6 private schools with computer facility managed either from their own resources or under contract with computer agencies. A questionnaire was developed, and the same was administered by the investigators to the teacher-in-charge of the computer classes. Findings of the study were :

a) As compared to the government schools, the private schools had more computers, in better working conditions, installed in better furnished separate

dust proof/AC rooms and were handled by better trained teachers with a minimum of one year of training.

b) The computer literacy in private schools has been introduced right from the lower classes making it a regular subject rather than an optional as in government schools.

c) In all the schools, besides the use of the science and mathematics softwares for teaching, restricted office automation with the help of computer was found.

d) Contrary to the opinion of the computer in-charges, the potential of the computer facility was not found to be fully harnessed in government schools.

e) The common problems with regard to computer literacy faced by government schools were irregular grants, lack of funds for repairs, administrative procedural delays, lack of suitable space, shortage of computer stationery, electricity supply cuts or low voltage, insufficiency of time and training.

f) For the success of the CLASS project the government schools were looking for more help in terms of more computers, whole time trained teachers, advanced training at regular intervals to the teachers already deployed and sufficient contingency funds.

g) Suggestions received from the schools included formulation of specific computer syllabi for different

classes and evolving an appropriate mechanism for evaluation of students' performance and teachers training by some educational apex body and organisation of inter-school competitions, workshops and seminars on computer literacy at different levels.

2.4. STUDIES ON ATTITUDE TOWARDS COMPUTER EDUCATION

Studies have been conducted to find out the attitude of students towards computer education.

A study conducted in 1970 with poor, middle-school, predominantly Mexican-American students reported that the computer was perceived to be fairer, easier, clearer, more likeable and better than the teacher (Hess and Tenezakis, 1970).

Atherton (1979) has indicated that both pupils and teachers like computer education.

Lawton and Gerschener (1982) found that particularly children possess positive attitudes toward computers and computer activities.

Vasic' Dragan (1987) has discussed the experiment

which preceded the programme for introducing teaching computing and calculating in primary schools in the Socialist Republic of Siberia. The sample in this experiment consisted pupils from rural, sub-urban and urban areas. The aim of the experiment was to establish justification for introducing informatics in the final grade (Form VIII) of primary school, to formulate syllabus for informatics and to prepare the pupils for mastering this new computer literacy. As many as 31.78 percent of pupils covering all the areas together had a chance to work on a computer before experimental teaching began. The results of this experiment indicated that

- All the pupils had positive attitude towards informatics. One third of the pupils from the sub-urban areas considered that informatics is useful for their future vocation.
- With regard to attitude towards computers, it was found that there was significant difference between rural, sub-urban and urban pupils.
- There was a significant environmental influence on mastering the use of computers.

Some studies have attempted to find out the gender differences, if any, in the attitude towards computer education.

According to Sutton (1991), Eccles et. al., 1985; Fennema and Sherman, 1978 ; Sherman and Fennema, 1977 ; and a number of investigators explored students' attitudes about the computer as a male domain. No study reported more positive attitude for girls.

Collis and Williams, 1987 ; Eastman and Krendl, 1987 ; Griffin, Gillis and Brown, 1986 ; Levin and Gordon, 1989 ; and Swadener and Hannafin (1987) conducted studies on the attitude of students towards computer education. Collis and Williams (1987) conducted study on 8th and 12th grade students with a sample of 1,818 and found that males were significantly higher on the scale. Griffin, Gillis and Brown (1986) made an attitudinal study on 401 students of 4th and 5th grades and observed that males were significantly higher on the scale. In another study, Levin and Gordon (1989) conducted on 222 students belonging to 8th to 10th grades reported similar results.

Johnson, Johnson and Stanne (1985) conducted a study on 71 students of 8th grade and found males to be significantly higher on the scale.

As against the above mentioned studies, there are

investigations which have reported no significant difference between boys and girls in their attitude towards computer education.

The studies by Eastman and Krendall (1987) on 80 students of 8th grade and Swadener and Hannafin (1987) on 32 students studying in 6th grade reported that there exists no gender differences in attitudes towards the computer education.

Studies by Loyd and Loyd (1988) with 777 students belonging to 7th to 11th grade and by Richards, Johnson and Johnson (1986 a) with 370 sample students of 7th grade and another by Richards, Johnson and Johnson (1986 b) with a sample of 95 students of 11th grade observed that there exists no gender differences.

Another study was conducted in 1986 by Nelson (1988) with a sample of 201 primary and secondary school students in Western Australia. The study measured the attitude of students towards microcomputers using a 20 item questionnaire which was designed for the purpose. The results of the study indicated the following - Favourable attitudes were found with no noticeable gender differences;

attitudes of younger students were slightly more positive than those of older students ; and attitudes of students having a computer at home were more positive than those of students without a home computer. The investigator has claimed that the results generally supported those found in other studies from the USA and the UK where the same questions were asked.

Collis and Williams (1987) found that Chinese high-school students were more positive in their attitudes towards computers when compared to Canadian students. Also, there were fewer gender differences among Chinese students in their attitudes towards computers.

Sangha and Kohli (1993) in a study on Student's Reactions regarding Computer Classes in Ludhiana Schools selected four schools of the Ludhiana city and the data were collected from 20 randomly selected students of the 10th class of each of the selected school. The study observed that

1) in 46.25 percent cases the students were allowed to work independently on the computer ;
2) in majority of the cases, the parents were satisfied with the progress made by their children in the computer class;
3) in 86.25 percent cases, the students were willing to continue computer training after the 10th class ;

4) in more than 90 percent cases, the students were able to display the desired matter on the monitor and make changes in the floppy disks ;

5) about one-third of the students reported that the computer charges were high or very high ;

6) in 41.25 percent and 28.75 percent cases the students were inspired by their parents and teachers respectively to attend the computer classes.

Commenting on the students' attitude towards computer education Daley and Walker (1984) indicated two contributory factors to the attitudes towards computers among high school students - firstly, interest in learning about computers and secondly, belief in the potential benefits involved in computing expertise. They further indicated that these two factors, however, are largely confounded in affective responses and may properly be viewed as a single construct, that is, enthusiasm for computers.

2.5. STUDIES ON STUDENT INTERACTION AND STUDENT PERFORMANCE IN RELATION TO COMPUTER EDUCATION

Sutton (1991), expressed that no research work exists on student interactions while using computers that systematically examined the role of race/ethnicity and social

class. But he reported that "Students who had more experience using computers were more competent in their knowledge about computers (Martinez and Mead, 1988) and in their use of computers (Kerstien, Linn, Clancy and Hardyck, 1988 ; Martinez and Mead, 1988)".

Referring again to Sutton (1991), it is reported, "Gender differences were found in computer competence in 7th grade and 11th grade students (Lockheed, Thorpe, Brooks-Gunn, Casserly and Mc Aloon, 1985 ; Martinez and Mead, 1988) and in computer literacy in 12th grade students (Fetler, 1985)".

Johnson, Johnson and Stanne (1985), using a sample of 51 fourth graders from a midwestern inner city of USA, found that in the competitive condition, compared to individual or cooperative conditions, girls performed less well than boys, were less motivated, liked computers less, were less confident in their ability to work with computers, and perceived less personal support from their teachers.

With respect to the student interaction or student performance in computer education, no study seems to have been conducted in Indian situations.

A look at the above mentioned researches highlights the need for undertaking research on various aspects of computer education in Indian settings.

CHAPTER III

METHODOLOGY AND PROCEDURE

METHODOLOGY AND PROCEDURE

3.1.0. INTRODUCTION

In this chapter, a detailed description is presented of the methodology and procedure used in carrying out the present study, keeping in view its objectives. These details refer to the sample, development of the tools and the collection of data.

3.2.0. POPULATION AND SAMPLE

To start with, a list of all the high schools, government, deficit, adhoc as well as private schools, which were in the four State capitals (Guwahati, Shillong, Aizawl and Kohima) under consideration was made. From among these, high schools which offered Computer Education facilities to students were identified. On enquiry, it was ascertained which of these schools introduced the Computer Education course prior to 1991. It was found that in all these schools the course was not yet taught upto Class X. Only those schools which offered the course upto Class X were only considered. Thus they formed the population of schools for the study. The list of such schools is presented in Table 13.

Table 13 List of High Schools which formed the Population of Schools for the Study

State	Capital Town	Number of Schools	Name of the Schools
Assam	Guwahati	12	1. South Point School 2. Happy Child School 3. Holy Child School 4. St. Mary's School 5. Don Bosco School 6. Vidya Mandir School 7. D.A.V. School 8. Army School 9. Mandakenee School 10. Disneyland School 11. Anand Academy School 12. Miles Bronson Residential School
Meghalaya	Shillong	15	1. St. Albert's School 2. Pine Mount School 3. Assam Rifles Public School 4. St. Edmund's School 5. St. Anthony's School 6. St. Dominic's School

Table 13 (Contd.)

State	Capital Town	Number of Schools	Name of the Schools
			7. St. Peter's School
			8. B.K.Bajoria School
			9. East End Chambers School
			10. St. Xavier's School
			11. Auxilium School
			12. All Saints' School
			13. Seven Set School
			14. Loretto School
			15. Mawprem Modern School
Mizoram	Aizawl	4	1. St. Paul's School
			2. Government Higher Secondary School
			3. Republic School
			4. Zelbawk School
Nagaland	Kohima	6	1. Don Bosco School
			2. Little Flower School
			3. Minister Hill Baptist School
			4. Baptist English School
			5. Government Higher Secondary School
			6. Kohima English School
Total		37	

Thus,the populationn included 37 high schools, of which 12 were located in Guwahati, 15 in Shillong, 4 in Aizawl and 6 in Kohima. Since, the number of schools were not many, all these were taken as the sample of the study. Out of these 37 high schools, 3 high schools were randomly selected for the purpose of development of tools. These schools happened to be

1. St. Albert's School, Shillong
2. South Point School, Guwahati
3. Happy Child School, Guwahati

The rest of the 34 high schools formed the sample of schools for the purpose of collection of data for the study.

Both at the stage of development of tools and at collection of data, all the Class X students and all the teachers teaching the Computer Education course were included as the sample at the respective stages. Tables 14 and 15 show the total number of students and teachers involved in the study at the two above mentioned stages.

Table 14 Number of Students and Teachers involved in the Development of Tools stage

Name of the School	Number of Students	Number of Teachers
1. St. Albert's School, Shillong	63	2
2. South Point School, Guwahati	75	3
3. Happy Child School, Guwahati	44	3
Total	182	8

Table 15 Number of Students and Teachers involved in the Final Data Collection stage

Schools	Number of Schools	Number of Students	Number of Teachers
Schools from Guwahati	10	391	18
Schools from Shillong	14	389	24
Schools from Aizawl	4	105	10
Schools from Kohima	6	257	14
Total	34	1,142	66

(N.B. :- Details of the split with respect of each of the schools is given in **Appendix - 1**)

The sample of students with reference to objectives (v) and (vi) (Refer caption 1.12.0.) happened to be the Class X students of these schools following Indian Certificate of School Education (ICSE) system from among the 34 schools drawn for the final data collection (Refer Table 15). The number of such schools happened to be only 2 and the number of students to be only 55. The details of this sample is given below in Table 15 (a).

Table 15 (a) Number of Students involved in the Data Collection with reference to their Performance

School	Number of Students
1. St. Edmund's School, Shillong	50
2. Pine Mount School, Shillong	5
Total	55

3.3.0. TOOLS USED

Tools were developed by the investigator in order to collect data with reference to objectives (i), (ii), (iii), (iv) and (vii) (Refer caption 1.12.0.).

1. A Questionnaire for the teachers was developed to

a) elicit information regarding the facilities provided for the computer education course in the school,

b) elicit information regarding the computer education curriculum followed, and

c) find out the views of teachers towards different aspects of computer education (to fulfil the objectives (i), (ii) and (iii)).

2. A Questionnaire for the students was developed to find out their views towards different aspects of computer education course (to fulfil the objective (iv)).

3. With reference to objectives (v) and (vi) (Refer caption 1.12.0.), the performance of students in the computer education course and their performance in other school subjects had to be measured. School final examinations were taken as the tools to provide the required data. Since, at the time of the study, the Indian Certificate of School Education (ICSE) system alone was conducting the final examination in 'Computer Studies' for Class X, the ICSE final examinations served to provide data required to fulfil the above objectives.

4. An Attitude Scale to measure the attitude of students towards computer education course (to fulfil the objective (vii)).

The details of developemnt of the three tools (refer 1, 2, and 4) are presented further.

3.3.1. DEVELOPMENT OF QUESTIONNAIRE FOR TEACHERS

It was felt that though all the computer education teachers in the schools could respond to the questionnaire, some information regarding the facilities offered for the course could be responded more precisely by the seniormost teacher as he is expected to be knowing greater details. Hence, these aspects were drawn up separately and added as a part of the questionnaire only to the seniormost teacher while the rest of the questionnaire was meant for all the computer education teachers. This general form of the questionnaire is considered below, to start with. Items included in the questionnaire were drawn

- from review of related literature ;
- through informal interviews with an educationist, a scientist both from the University ; two experienced managers of two different private computer education institutes ; and two computer education teachers teaching in schools ; and
- from investigator's experience acquired from a computer education institute.

The questionnaire consisted of three sections, the first section seeking certain general information from the teachers, the second section seeking information about the computer education course offered in their schools, and the third section seeking certain views from the teachers towards certain aspects of computer education. Table 16 below gives the details of the number of items falling under each of these sections and indicating the aspects on which the items were drafted.

Table 16 Details showing the Number of Items on the Different Aspects under Different Sections of Draft Form of the Questionnaire for Teachers

Section	Aspects on which items drawn	Number of items
A	General Information of Teachers	3
B	(i) Computer Education Syllabus	11
	(ii) Evaluation of Computer Education course	6
	(iii) Schedule of timing for Computer Education course	2
	(iv) Other aspects related to Computer Education	8
C	Views towards certain aspects of Computer Education	32

The format of items in Section B were either multiple-choice, Yes/No, or open-ended depending upon the type of information sought.

Each of the items in Section C sought the respondent to indicate the response on any of the five choices provided, namely, 'strongly agree', 'agree', 'undecided', 'disagree', and 'strongly disagree'. The items were concerned on aspects related to Students' learning or Achievement, Teaching-Learning process, Facilities, Training of Teachers and Social Benefits. The number of items drawn on these aspects are given in Table 17.

Table 17 Details showing the Number of Items on the Different Aspects under Section C of the Draft Form of the Questionnaire for Teachers

	Items related to	Number of Items
(i)	Students' learning or Achievement	8
(ii)	Teaching-Learning process	11
(iii)	Facilities	4
(iv)	Training of Teachers	3
(v)	Social Benefits	6
	Total	32

As already indicated earlier in this caption, an additional section (Section D) was added to the other three sections (Sections A, B, C), if the respondent was the seniormost computer education teacher of the school. This section consisting of 35 items sought specific information regarding the infra-structural facilities available in the school for running the computer education course. The format of these items were either of multiple-choice, Yes/No, or open-ended depending upon the type of information sought.

In order to find out the suitability of the items, the draft form of the questionnaire thus developed was tried out on all computer education teachers from three randomly drawn schools. Table 18 shows the details regarding the sample of schools and the teachers involved in the try-out of the questionnaire.

Table 18 Details of Sample of Schools and Teachers used in the Try-out of the Draft Form of the Questionnaire for Teachers

Sl. No.	Name of the High School	Number of Computer Education Teachers		
		Senior	Junior	Total
1.	St. Albert's School, Shillong	1	1	2
2.	South Point School, Guwahati	1	2	3
3.	Happy Child School, Guwahati	1	2	3
	Total	3	5	8

It was found that the draft form of the questionnaire was suitable and could elicit the required information without any ambiguity or difficulty. Thus, it was accepted as the Final Form of the Questionnaire for Teachers (A copy of the same is provided in **Appendix - 2**).

3.3.2. DEVELOPMENT OF QUESTIONNAIRE FOR STUDENTS

As stated earlier in caption 3.3.0., the questionnaire for students was to elicit from students

(i) their purpose of learning the Computer Education course ;

(ii) their views on certain aspects of the Computer Education course ;

(iii) their perception about the influence of Computer Education course on learning other school subjects ;

(iv) their liking for working with computers at a later time ;

(v) their identification of the various uses of computers ;

(vi) their interactions with the peer group.

The total number of items thus drafted happened to be 22. They included items of multiple-choice, Yes/No, and open-ended types.

Four teacher experts at various levels were requested to scrutinize the draft form of the questionnaire, particularly with reference to the content and language of items.

To find out whether the questionnaire is suitable for the students for whom it is developed, a try-out of the above draft form of questionnaire was carried out. The sample of students consisted of Class X students of two randomly drawn high schools. Table 19 shows the details of the sample

of students involved in the try-out of the questionnaire.

Table 19 Details of Sample of Schools and Students used in the Try-out of the Draft Form of the Questionnaire for Students

Sl. No.	Name of the High School	Number of Students
1.	St. Albert's School, Shillong	63
2.	South Point School, Guwahati	75
	Total	138

It was found that the draft form of the questionnaire was suitable and could elicit the required information without any ambiguity or difficulty. It was also found that about 20 minutes of time will be required by the students to respond to all the items and that the questionnaire could be administered to a group of students with no difficulty. Hence, the draft form was accepted as the Final Form of the Questionnaire for Students (A copy of the same is provided in **Appendix - 3**).

3.3.3.0. ATTITUDE SCALE

Attitude Scale was developed to measure the attitude of Class X students towards Computer Education

course for the purpose of the study. For our better understanding, it is perhaps essential to review the concept of attitude first (referring to caption 1.11.0., it was stated there, that the term "attitude" would be discussed under this caption) followed by a description on the procedure carried out to develop the Attitude Scale.

3.3.3.1. ATTITUDE - TERM DEFINED

Various researchers have defined the term 'attitude' in different ways.

According to Thurstone and Chave (1928), 'Attitude denotes the sum total of man's inclinations and feelings, prejudices or biases, preconceived notions, ideas, fears, threats and conviction about any specific topic'.

Thurstone (1936) states that "Attitude is a generalised reaction for or against a specific psychological object". The same author in 1946 defines an attitude "as degree of positive or negative affect associated with some psychological object". By a psychological object, Thurstone means any symbol, phrase, slogan, person, institution, ideal, or idea towards which people can differ with respect to positive or negative affect.

Murphy, Murphy and Newcomb (1937) view "Attitude as primarily a way of being 'set' towards or against certain things".

According to Kretch and Crutchfield (1948), an attitude can be defined as "an enduring organization of motivational, emotional, perceptual, and cognitive process with respect to some aspect of the individual's world". Mc Keachie and Doyle (1966) put it as "an organisation of concepts, beliefs, habits, and motives associated with a particular object". Katz (1967) reiterates a similar meaning by defining "Attitude as a predisposition of the individual to evaluate some symbol or object or aspect of his world in a favourable or unfavourable manner".

Newcomb (1952) states, "An attitude is not a response but a more or less persistent set to respond in a given way to an object or situation. The concept of attitude relates the individual to any aspect of his environment which has positive or negative value for him". This view has been supported by Mac Donald (1965) who points out that "An attitude is a predisposition to act in a positive or negative way towards persons, objects, ideas, and events".

Attitude has been defined by Cronbach (1954)

as, "a readiness to react toward or against some situation, person, or thing, in a particular manner, for example, with love or hate, or fear or resentment, to a particular degree of intensity". In his work in (1963), he explains that "An attitude consists of the meanings that one associates with a certain object (or abstraction) and that influences his acceptance of it".

Rosenberg (1960) considers an attitude "as a relatively stable affective response to an object".

Allen (1960) states, "Attitude is an arrangement of mental processess, a mental set, an internal disposition or the way certain mental processess are organised in a person to make him act in a particular way".

Allport (1967) views attitude as a "mental and neural state of readiness, organised through experience and exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related".

According to the International Encyclopedia of the Social Sciences (Volume I, 1968), "An attitude is a relatively enduring organization of beliefs around an object

or situation predisposing one to respond in some preferential manner".

In the words of Whittaker (1970), "An attitude is a predisposition or readiness to respond in a predetermined manner to relevant stimuli", while Travers (1973) considers an attitude "as a readiness to respond in such a way that behaviour is given a certain direction".

Encyclopedia of Psychology (Volume I, 1972) has expressed, "Attitude is a perceptual orientation and response readiness in relation to a particular object or class of objects".

Garrett (1975) states, "Attitude is primarily an inner state rather than an outer expression. It is an implicit response toward or away from an individual value or social value. An attitude is always a stand or position which an individual takes towards a person or an issue".

According to Anastasi (1976), "Attitude is a tendency to react favourably or unfavourably towards a designated class of stimuli, such as, a national or racial group, a custom, or an institution".

Sorenson (1977) expresses, "An attitude is a particular feeling about something. It therefore involves a tendency to behave in a certain way in situations which involve that something, whether it be a person, idea or object. It is partially rational and partially emotional and is acquired, not inherent, in an individual".

Taking a gestalt view of the various definitions presented, the term "attitude" may be said to connote the degree of affect, whether positive or negative, associated with a particular psychological object. These affects are expected to give direction to the actions of an individual in relation to the psychological object. It is in this meaning the term is used in the present study. The psychological object under consideration in the study is the Computer Education course.

3.3.3.2. DEVELOPMENT OF STATEMENTS

The Statements for the attitude scale were developed through the following sources :

(i) A critical review of the conceptual as well as research literature related to the field of Computer Education

(ii) Informal discussions with 50 students, 5 teachers teaching Computer Education course, and 5 teachers teaching different subjects in schools. All the above

persons were drawn from 4 high schools where computer education course was offered

(iii) A discussion with four experts in the fields of Education and Science teaching at the higher education level.

Statements were written keeping in mind to keep a balance between positive and negative ones. Statements thus developed were pooled. The total number of such statements thus pooled happened to be 52. These tentatively selected statements were presented to experts to give their critical comments and suggestions to improve them. On the basis of the experts' comments, some statements were modified. The process yielded 26 positive and 26 negative statements. They were arranged randomly. Suitable instructions for the respondents as to how to respond were also framed. Each statement was provided for a response on a 5-point Likert Scale, the points indicating the responses as 'Strongly Agree', 'Agree', 'Undecided', 'Disagree' and 'Strongly Disagree'. This resulted in the Draft Form of the Attitude Scale. (A copy of this Draft Form of the attitude scale is given in **Appendix - 4**).

The scoring scheme for the positive statements was 4, 3, 2, 1, 0 corresponding to the five points as stated

Similarly, 0, 1, 2, 3, 4, were the scores for the corresponding points of the negative statements.

3.3.3.3. TRYOUT OF THE DRAFT FORM OF THE ATTITUDE SCALE

The purpose of the tryout of the Draft Form of the Attitude Scale was to select statements which could differentiate students who had a high attitude towards Computer Education course from students who had a low attitude towards Computer Education course.

Sample for the tryout was drawn as follows :

Out of a total of 37 high schools, 2 high schools were randomly selected. All available students studying Computer Education course in Class X of these schools formed the sample. The details of the name of the schools selected and the number of students drawn are shown in Table 20.

Table 20 Details of Schools and the Number of Students drawn for the tryout of the Draft Form of the Attitude Scale

Sl. No.	Name of the School	Number of Students from Class X
1.	St. Albert's School, Shillong	63
2.	South Point School, Guwahati	75
	Total	138

Thus the sample for the tryout happened to be 138 students of Class X.

The Draft Form of the Attitude Scale was administered to the sample selected and the responses were scored accroding to the scoring scheme (refer caption 3.3.3.2.). (The raw scores thus obtained are presented in **Appendix - 5**).

3.3.3.4. ITEM ANALYSIS

The following procedure was followed in carrying out item analysis and further in the selection of items.

(i) The 138 scripts of the Attitude Scale which were scored (refer caption 3.3.3.3.) were arranged in the order of total scores from highest to lowest.

(ii) After arranging, the top 35 (covering top 25%) answer scripts and the bottom 35 (covering bottom 25%) answer scripts were separated out. These two groups formed respectively the high and low groups.

(iii) The 't' value for each of the statements was calculated using the following formula -

$$t = \frac{\bar{X}_H - \bar{X}_L}{\sqrt{\frac{n_H^2}{N_H} + \frac{n_L^2}{N_L}}}$$

where, $\overline{X_H}$ = The mean score on a particular statement for the high group

$\overline{X_L}$ = The mean score on the same statement for the low group

n_H = Standard Deviation on the same statement for the high group

n_L = Standard Deviation on the same statement for the low group

N_H = Number of subjects in the high group

N_L = Number of subjects in the low group

The 't' values obtained for each of the statements are given in Table 21 (arrangement of 't' values are prseneted in descending order).

Table 21 't' values obtained for each statement of the Draft Form of the Attitude Scale
(Arranged in the Descending order of the 't' - values)

Sl. No.	Item No.	N/P	't' value	Sl. No.	Item No.	N/P	't' value
1.	6	N	7.356^{xx}	5.	46	N	6.779^{xx}
2.	48	P	7.130^{xx}	6.	40	N	6.713^{xx}
3.	49	P	7.081^{xx}	7.	2	N	6.617^{xx}
4.	52	N	6.822^{xx}	8.	43	P	6.537^{xx}

Table 21 (Contd.)

Sl. No.	Item No.	N/P	't' value	Sl. No.	Item No.	N/P	't' value
9.	17	N	6.400**	31.	10	N	4.678**
10.	47	P	6.375**	32.	11	P	4.578**
11.	18	P	6.305**	33.	1	P	4.331**
12.	26	N	6.213**	34.	15	P	4.078**
13.	39	P	6.024**	35.	37	P	4.057**
14.	50	N	5.996**	36.	3	P	3.972**
15.	13	P	5.906**	37.	9	P	3.957**
16.	16	P	5.855**	38.	36	N	3.897**
17.	35	P	5.841**	39.	12	N	3.822**
18.	19	N	5.774**	40.	28	N	3.753**
19.	45	P	5.688**	41.	42	P	3.656**
20.	44	N	5.685**	42.	41	N	3.403**
21.	51	N	5.613**	43.	30	N	3.343**
22.	25	P	5.608**	44.	23	N	3.191**
23.	34	N	5.534**	45.	20	P	3.189**
24.	4	N	5.508**	46.	27	P	2.969**
25.	5	P	5.463**	47.	29	P	2.721**
26.	21	N	5.408**	48.	31	P	2.281*
27.	14	N	5.131**	49.	22	P	2.005*
28.	33	P	5.123**	50.	8	N	1.379 N.S.
29.	7	P	5.110**	51.	38	N	1.365 N.S.
30.	24	N	4.906**	52.	32	N	0.960 N.S.

Note :- N - Negative Statements

P - Positive Statements

x - 't' value significant at 0.05 level

xx - 't' value significant at 0.01 level

N.S. - Not Significant

It was found that out of the total of 52 statements, the 't' values for 47 were significant at 0.01 level, the 't' values for 2 were significant at 0.05 level and the 't' values for the remaining 3 were not significant. Since, the statements whose 't' values were not significant happened to be negative statements, the retained number of negative statements happened to be 23. To have an equal number of positive statements, three positive statements having the lowest 't' values (2 having significance at 0.05 level and 1 having significance at 0.01 level) were removed. Thus, the selected statements included 23 positive and 23 negative statements, all having their 't' values significant at 0.01 level.

Table 22 presents the 't' values of the finally selected statements.

Table 22 't' values obtained for the selected statements for the Final Form of the Attitude Scale

Positive Statements				Negative Statements			
Sl. No.	Sl.No. of the Statement in the Draft For	Sl. No. of the Statement in the Final Form	't' value	Sl. No.	Sl. No. of the Statement in the Draft Form	Sl. No. of the Statement in the Final Form	't' value
1.	48	42	7.130	1.	6	6	7.356
2.	49	43	7.081	2	52	46	6.822
3.	43	37	6.537	3.	46	40	6.779
4.	47	41	6.375	4.	40	34	6.713
5.	18	17	6.305	5.	2	2	6.617
6.	39	33	6.024	6.	17	16	6.400
7.	13	12	5.906	7.	26	24	6.213
8.	16	15	5.855	8.	50	44	5.996
9.	35	30	5.841	9.	19	18	5.774
10.	45	39	5.688	10.	44	38	5.685
11.	25	23	5.608	11.	51	45	5.613
12.	5	5	5.463	12.	34	29	5.534
13.	29	27	5.123	13.	4	4	5.508

Table 22 (Contd.)

Positive Statements				Negative Statements			
Sl. No.	Sl. No. of the Statement in the Draft Form	Sl. No. of the Statement in the Final Form	't' value	Sl. No.	Sl. No. of the Statement in the Draft Form	Sl. No. of the Statement in the Final Form	't' value
14.	7	7	5.110	14.	21	20	5.408
15.	11	10	4.578	15.	14	13	5.131
16.	1	1	4.331	16.	24	22	4.906
17.	15	14	4.078	17.	10	9	4.678
18.	37	32	4.057	18.	36	31	3.897
19.	3	3	3.972	19.	12	11	3.822
20.	9	8	3.957	20.	28	26	3.753
21.	42	36	3.656	21.	41	35	3.403
22.	20	19	3.189	22.	30	28	3.343
23.	27	25	2.969	23.	23	21	3.191

(Note :- All 't' values are significant at 0.01 level)

These selected statements were randomly arranged. These randomly arranged statements alongwith the instructions formed the Final Form of the Attitude Scale. A copy of the Final Form of the Attitude Scale is given in **Appendix - 6)**.

3.3.3.5. VALIDITY OF THE ATTITUDE SCALE

The statements for the Attitude Scale were developed through

(i) the review of related literature, and

(ii) individual's expressions about their opinions towards computer education course.

These statements were further subjected to experts' scrutiny. Thus, the process of the development of items ensures the content validity of the Attitude Scale.

3.3.3.6. RELIABILITY OF THE ATTITUDE SCALE

The reliability of the Final Form of the Attitude Scale developed was established by the odd-even method. The sample for this purpose was selected as follows :

After randomly selecting 2 high schools at the tryout stage for the purpose of item analysis in the development of Attitude Scale (refer caption 3.3.3.3.), there were 35 high schools remaining in the population. Out of these 35 high schools, one high school was selected randomly.

All the students of Class X (N = 44) of this school were taken as the sample for establishing the reliability of the Attitude Scale. Details are shown in Table 23.

Table 23 Sample drawn for establishing the Reliability of the Attitude Scale

Sl. No.	Name of the School	Number of Students of Class X
1.	Happy Child School, Guwahati	44

These 44 students were not involved during any other stage either in the development of the Attitude Scale or in the collection of the final data.

The Final Form of the Attitude Scale was administered to these 44 students. Scores on odd numbered statements and even numbered statements were found out for each of the students. Table 24 provides these odd and even scores thus obtained.

Table 24 Odd Scores and Even Scores obtained by the Reliability Sample on the Attitude Scale

Sl.No. of the Student	Odd Score (X)	Even Score (Y)	Sl.No. of the Student	Odd Score (X)	Even Score (Y)
1.	83	80	23.	61	75
2.	71	70	24.	75	83
3.	83	71	25.	53	67
4.	84	89	26.	53	57
5.	43	40	27.	47	56
6.	70	73	28.	58	67
7.	32	28	29.	32	47
8.	51	46	30.	60	65
9.	65	65	31.	38	42
10.	67	69	32.	69	80
11.	68	69	33.	57	54
12.	72	81	34.	58	57
13.	68	68	35.	64	64
14.	47	66	36.	66	63
15.	67	70	37.	52	57
16.	58	65	38.	51	48
17.	59	68	39.	83	72
18.	66	74	40.	59	62
19.	55	78	41.	78	80
20.	69	89	42.	84	85
21.	64	83	43.	78	69
22.	59	63	44.	45	45

The Odd-Even reliability was calculated in the following way :

Odd Scores (X)	**Even Scores (Y)**
$\Sigma X = 2,722$	$\Sigma Y = 2,900$
$\Sigma X^2 = 1,76,012$	$\Sigma Y^2 = 1,99,164$

$$\Sigma XY = 1,85,846$$

$$N = 44$$

$$r = \frac{N\Sigma XY - \Sigma X \Sigma Y}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}}$$

$$= \frac{44\ (185846) - (2722)\ (2900)}{\sqrt{[44\ (176012) - (2722)^2][44\ (199164) - (2900)^2]}}$$

$$= \frac{8177224 - 7893800}{\sqrt{(7744528 - 7409284)\ (8763216 - 8410000)}}$$

$$= \frac{283424}{\sqrt{(353216)\ (335244)}}$$

$$= \frac{283424}{(594.319779)\ (579.00259)}$$

r = 0.82364

Applying Spearman-Brown Prophecy Formula to estimate the reliability of the full scale, the reliability of the Attitude Scale is -

$$r_{11} = \frac{2\,r}{1 + r}$$

$$= \frac{2\,(0.82364)}{1 + 0.82364}$$

$$= \frac{1.64728}{1.82364}$$

$$r_{11} = 0.9033$$

$$r_{11} \simeq \mathbf{0.90}$$

Referring to Table 25 in Garrett (1981), the obtained value of r_{11} is significant at 0.01 level.

Therefore, the Odd-Even reliability of the Attitude Scale was found to be 0.90.

3.4.0. COLLECTION OF DATA

With reference to the objectives (i), (ii), (iii), (iv), and (vii) (refer caption 1.12.0.) the study needed the administration of three tools, in all, to the sample of

students and computer education teachers drawn for the purpose (refer Table 15 under caption 3.2.0.). The heads of the 34 high schools drawn for the collection of final data were first contacted to seek their permission and cooperation in the administration of the tools. The Questionnaire for Computer Education Teachers, the Questionnaire for Students and the Attitude Scale for Students were administered to the respective sample groups, namely, the Computer Education Teachers and the Students studying Computer Education course. Responses obtained from the Computer Education teachers and students on the respective tools formed the data for the study and they were suitably analysed.

(The raw scores obtained on the Attitude Scale is given in **Appendix - 7**).

With reference to the objectives (v) and (vi) (refer caption 1.12.0.), the data required were the final examination marks of the students under consideration (refer Table 15(a) under caption 3.2.0.) in the ICSE examinations. They were obtained from the respective schools.

3.5.0. STATISTICAL MEASURES EMPLOYED FOR ANALYSING THE DATA

The data were analysed using the statistical techniques, namely, percentage, F-test, t-test, product moment correlation, were used wherever necessary. Details of the analysis are presented in the next chapter.

CHAPTER IV

ANALYSIS OF THE DATA AND DISCUSSION OF RESULTS

ANALYSIS OF THE DATA AND DISCUSSION OF RESULTS

4.1.0. INTRODUCTION

This Chapter presents an account of the analysis and interpretation of data collected keeping in view the objectives of the study. Data obtained from the 34 schools (Guwahati : 10 ; Shillong : 14 ; Aizawl : 4 ; Kohima : 6) were analysed accordingly. The details obtained are presented further.

4.2.0. FACILITIES AVAILABLE FOR COMPUTER EDUCATION COURSE IN HIGH SCHOOLS

Analysis of the Questionnaire for Teachers provided the information with regard to facilities available for Computer Education course conducted in high schools. The details were pooled under the following aspects :

a) General Information about the schools ;

b) Physical Facilities (in relation to computers, computer softwares, installation of computer sets, and room and electricity for holding Computer Education course) ;

c) Enrolment of Students in Computer Education course ;

d) Teachers of Computer Education course.

Each of the above aspects are put forth separately with respect to the four capital cities under the study, namely,

Guwahati, Shillong, Aizawl, and Kohima. An overall summary picture of all of them is provided after the individual descriptions.

4.2.1. GENERAL INFORMATION ABOUT THE SCHOOLS

a) Guwahati

The sample of schools from Guwahati happened to be 10 in number. The general information obtained from these 10 schools is provided in Table 25.

Table 25 General Information of the Schools with Computer Education Facilities (Guwahati)

Sl. No.	Name of the School	Year of Establ-ishment	Type of Manage-ment of the Instit-ution	Type of Instit-ution	Year of starting Computer Education course	Number of Students in Computer Education course in 1992		Number of Computer Education Teachers in 1992
						Class X	Total	
1.	Holy Child	1972	P.U.A.	Girls	1988	50	500	2
2.	St. Mary's	1923	P.U.A.	Girls	1988	60	800	2
3.	Don Bosco	1948	P.A.	Boys	1987	155	1,100	3
4.	Vidya Mandir	1987	P.A.	Co-ed.	1990	16	70	3
5.	D.A.V.	1969	P.U.A.	Co-ed.	1990	20	380	2
6.	Army School	1982	P.A.	Co-ed.	1990	37	570	2
7.	Mandakenee	1974	P.U.A.	Co-ed.	1990	10	49	1
8.	Disneyland	1980	P.U.A.	Co-ed.	1990	25	95	1
9.	Anand Academy	1974	P.U.A.	Co-ed.	1990	10	37	1
10.	Miles Bronson	1988	P.U.A.	Co-ed.	1990	8	40	1
	Total					391	3,641	18

(Note :- P.U.A. - Private Unaided ; P.A. - Private Aided ; Co-ed. - Co-educational

It may be observed that the schools in the sample happened to be established in different decades. Out of the selected 10 schools, 7 schools were Private Unaided and the remaining 3 were Private Aided. Majority (7 out of 10) of the schools were found to be co-educational, only 2 schools were solely meant for girls, and the number of boys school was only one. Don Bosco School was the first school in Guwahati to introduce Computer Education course for the school students in the year 1987. Most of the schools started introducing Computer Education course during the year 1990. The total number of students enrolled for Computer Education course during the 1992 session were 3,641 out of which only 391 students belonged to Class X in the selected 10 schools. The total number of Computer Education teachers happened to be 18.

Out of the 10 schools, two had introduced the Computer Education course completely on their own, while the other eight introduced the same with the help of private computer institutes. The details regarding the arrangement made between the schools and the private computer institutes are shown in Table 26.

Table 26 Arrangement between Schools and Private Computer Institutes (Guwahati)

Sl. No.	Name of the School	Information about the arrangement made by the School with the Private Computer Institutes		
		Name of the Computer Centre	Period of Contract	Contract in Years
1.	Holy Child	Tokyon	1988-1990	3
2.	St. Mary's	Informatics Computer Systems (ICS)	1988-1990	3
3.	D.A.V.	Tokyon	1990-1992	3
4.	Army School	ICS	1990-1992	3
5.	Mandakenee	Compu Teach-Soft Tech	1990-1992	3
6.	Disneyland	ICS	1990-1992	3
7.	Anand Academy	Compu Teach-Soft Tech	1990-1992	3
8.	Miles Bronson	ICS	1990-1992	3

It may be noted that normally there exists a contract for 3 years between the schools and the institutes. It was found out on enquiry that the terms of contract differed from institute to institute. It was also informed by two schools where the contract finished in 1990, that further the schools were running the Computer Education

on their own.

Each of the 10 schools offered the Computer Education course to start from different classes, the earliest being Class III. The course is offered to students of classes extending upto Class X. The details of the position are put forth in Table 27.

Table 27 Classes for which Computer Education course is offered (Guwahati)

Sl. No.	Name of the School	Computer Education course available from Class
1.	Don Bosco	III to X
2.	Holy Child	III to X
3.	St. Mary's	IV to X
4.	Vidya Mandir	IV to X
5.	D.A.V.	IV to X
6.	Army School	III to X
7.	Mandakenee	IV to X
8.	Disneyland	V to X
9.	Anand Academy	V to X
10.	Miles Bronson	VI to X

b) Shillong

General information about the 14 sample schools from Shillong are highlighted in Table 28.

Table 28 General Information of the Schools with Computer Education Facilities (Shillong)

Sl. No.	Name of the School	Year of Establishment	Type of Management of the Institution	Type of Institution	Year of starting Computer Education course	Number of Students in Computer Education course in 1992		Number of Computer Education Teachers in 1992
						Class X	Total	
1.	Pine Mount	1900	Government	Girls	1988	5	220	1
2.	Assam Rifles Public School	1980	P.U.A.	Boys	1988	68	530	2
3.	St. Edmund's	1916	P.U.A.	Boys	1986	50	243	2
4.	St. Anthony's	1901	P.A.	Boys	1988	15	215	2
5.	St. Dominic	1962	P.A.	Boys	1988	15	250	2
6.	St. Peter's	1957	P.U.A.	Boys	1987	25	300	2
7.	B.K.Bajoria	1975	P.U.A.	Co-ed.	1988	20	320	2
8.	East End Chambers	1982	P.U.A.	Co-ed.	1989	25	400	1
9.	St.Xavier's	1982	P.U.A.	Co-ed.	1987	12	212	1
10.	Seven Set	1968	P.U.A.	Co-ed.	1988	10	150	1
11.	All Saints'	1967	P.U.A.	Co-ed.	1988	11	4,000	2
12.	Mawprem Modern	1969	P.A.	Co-ed.	1989	9	96	2
13.	Auxilium	1958	P.A.	Girls	1989	50	463	2
14.	Loretto	1909	P.U.A.	Girls	1988	74	419	2

Table 28 (Contd.)

(Note :- P.U.A. - Private Unaided ; P.A. - Private Aided ; Co-ed. - Co-educational)

Out of the total of 14 schools in the sample, only one school belonged to government, 4 schools though privately managed received aid from government and the rest 9 schools were completely private. These 14 schools consisted of 3 schools for girls, 5 for boys and 6 for both boys and girls. St. Edmund's school was the first to introduce Computer Education course for the school students in 1986. In the 14 schools, the total number of students studying Computer Education course happened to be 4,218 out of which 389 were in Class X. The number of Computer Education teachers were 24 during the year 1992.

Responses obtained from the respondent teachers revealed that out of the 14 schools, six had introduced the Computer Education course completely on their own, while the other eight introduced the same with the help of private computer institutes. The details regarding the arrangement made between the schools and the private computer institutes are shown in Table 29.

Table 29 Arrangement between Schools and Private Computer Institutes (Shillong)

Sl. No.	Name of the School	Information about the arrangement made by the Schoolwith the Private Computer Institutes			
		Name of the Computer Centre	Period of Contract	Contract in Years	
1.	Pine Mount	i) Goodman's	1988-1990	3	5
		ii) ICS	1991-1992	2	
2.	St.Anthony's	DECONS	1988-1990		3
3.	St. Dominic	i) BDPS	1988-1990	3	6
		ii) ICI	1991-93	3	
4.	East End Chambers	Alpha Computer Academy	1989-1993		5
5.	Seven Set	i) Goodman's	1988-1990	3	6
		ii) ICS	1991-1993	3	
6.	All Saints'	i) BDPS	1988-1990	3	6
		ii) Alpha Computer Academy	1991-1993	3	
7.	Mawprem Modern	i) Goodman's	1989-1990	2	5
		ii) Cubic Computers	1991-1993	3	
8.	Auxilium	i) ICS	1989-1991	3	6
		ii) Alpha Computer Academy	1992-1994	3	

Table 29 (Contd.)

(Note :- ICS - Informatics Computer Systems ; DECONS - Data Electronics of National Software ; BDPS - Bureau of Data Processing Systems ; ICI - Informatics Computer Institute)

From the given Table 29 it may be observed that a number of private computer institutes assisted in introducing Computer Education course. In one of the schools (Assam Rifles Public School), though Computer Education course was started without the help of any private computer institute, yet, in 1992 it made a contract for five years with ICS. It was informed by one of the schools where the contract finished in 1990, that further the school was running the Computer Education course on their own.

Each of the 14 schools offered the Computer Education course to start from different classes, the earliest being Class III. The course is offered to students of Classes extending upto Class X. The details of classes is further presented in Table 30.

Table 30 Classes for which Computer Education course is offered (Shillong)

Sl. No.	Name of the School	Computer Education course available from Class
1.	Pine Mount	V to X
2.	Assam Rifles Public	IV to X
3.	St. Edmund's	VIII to X
4.	St. Anthony's	IV to X
5.	St. Dominic	VIII to X
6.	St. Peter's	IV to X
7.	B. K. Bajoria	V to X
8.	East End Chambers	IV to X
9.	St. Xavier's	IV to X
10.	Seven Set	VI to X
11.	All Saints'	III to X
12.	Mawprem Modern	IV to X
13.	Auxilium	IV to X
14.	Loretto	VI to X

c) Aizawl

In Aizawl only four schools provided the Computer Education facilities and all the four came under the CLASS project of Government of India. All these four schools formed the sample of the present study. Certain general information about these schools are provided in Table 31.

Table 31 General Information of the Schools with Computer Education Facilities (Aizawl)

Sl. No.	Name of the School	Year of Establishment	Type of Management of the Institution	Type of Institution	Year of starting Computer Education course	Number of Students in Computer Education course in 1992		Number of Computer Education Teachers in 1992
						Class X	Total	
1.	St. Paul's	1954	P.A.	Co-ed.	1988	25	40	2
2.	Government Hr. Sec. School	1944	Government	Co-ed.	1990	50	78	3
3.	Republic	1962	P.A.	Co-ed.	1989	10	50	2
4.	Zelbawk	1948	Government	Co-ed.	1990	20	55	3
	Total					105	223	10

(Note :- P.A. - Private Aided ; Co-ed. - Co-educational ; Hr. Sec. - Higher Secondary)

It is evident from Table 31 that all the schools are co-educational and St. Paul's School was the first to introduce Computer Education course. During the year 1992, a total of 223 students opted for Computer Education course out of which 105 students were studying in Class X.

Since all the schools were found to operate under the CLASS project, accordingly the course is provided to Class VIII, IX and X only.

d) Kohima

In Kohima, only six schools provided the Computer Education course. All these schools were included in the sample. Some general information about these six schools are presented in Table 32.

Table 32 General Information of the Schools with Computer Education Facilities (Kohima)

Sl. No.	Name of the School	Year of Establishment	Type of Management of the Institution	Type of Institution	Year of starting Computer Education course	Number of Students in Computer Education course in 1992		Number of Computer Education Teachers in 1992
						Class X	Total	
1.	Don Bosco	1971	P.U.A.	Co-ed.	1987	55	657	3
2.	Little Flower	1974	P.U.A.	Girls	1990	76	530	3
3.	Minister Hill Baptist	1980	P.U.A.	Co-ed.	1990	10	245	2
4.	Baptist English	1959	P.U.A.	Co-ed.	1989	35	443	2
5.	Govt. Hr. Sec.	1941	Government	Co-ed.	1990	20	114	2
6.	Kohima English	1958	P.A.	Co-ed.	1990	61	400	2
	Total					257	2,389	14

(Note :- P.U.A. - Private Unaided ; P.A. - Private Aided ; Co-ed - Co-educational ; Govt. Hr. Sec. - Government Higher Secondary)

In these schools, a total of 2,389 students were studying the Computer Education course out of which 257 happened to be in Class X. Further, in these schools there were 14 teachers who taught Computer Education course.

Out of the 6 schools, two schools were operating under the CLASS project. One school was running the Computer Education course on its own.

In the remaining three schools Computer Education course was imparted with the assistance of private computer institutes. The details regarding the arrangement made between these schools and the private computer institutes are shown in Table 33.

Table 33 Arrangement between Schools and Private Computer Institutes (Kohima)

Sl. No.	Name of the School	Information about the arrangement made by the School with the Private Computer Institutes		
		Name of the Computer Centre	Period of Contract	Contract in Years
1.	Little Flower	NCS, Guwahati	1990-1994	5
2.	Minister Hill Baptist	NCS, Guwahati	1990-1994	5
3.	Kohima English	NCS, Guwahati	1990-1994	5

(Note :- NCS - National Computer Systems)

From the Table 33 it may be seen that only a single private computer institute assisted in introducing Computer Education course.

Each of the 6 schools offered the Computer Education course to start from different classes, the earliest being Class III. The course is offered to students of Classes extending upto Class X. The details of classes is further illustrated in Table 34.

Table 34 Classes for which Computer Education course is offered (Kohima)

Sl. No.	Name of the School	Computer Education course available from Class
1.	Don Bosco	IV to X
2.	Little Flower	III to X
3.	Minister Hill Baptist	VI to X
4.	Baptist English	VI to X
5.	Government Higher Secondary	VIII to X
6.	Kohima English	IV to X

A look at the scenario in all the four places, namely, Guwahati, Shillong, Aizawl, and Kohima, highlights the following points :

1) Out of all the four places, Computer Education course was first introduced in Shillong in 1986.
2) It was found that out of a total of 34 schools, 6 schools introduced Computer Education course under the CLASS project, 9 schools started the course on its own and the rest 19 schools launched with the help of private computer institutions on a contract basis.
3) Majority (about 38 percent) of the schools impart Computer Education course right from Class IV onwards.

Further, a pooled picture about the general information of schools is shown in Table 35.

Table 35 Comprehensive General Information of the Schools with Computer Education Facilities

Particulars		Guwahati	Shillong	Aizawl	Kohima	Total
Number of Schools Studied		10	14	4	6	34
Types of Schools Studied	Boys	1	5	-	1	7
	Girls	2	3	-	1	6
	Co-ed.	7	6	4	4	21
Number of respondent Students	Boys	220	214	49	122	605
	Girls	171	175	56	135	537
	Total	391	389	105	257	1,142
Number of Computer Education Teachers		18	24	10	14	66

(Note :- Co-ed. - Co-educational)

4.2.2.0. PHYSICAL FACILITIES FOR COMPUTER EDUCATION COURSE IN THE SCHOOLS

Physical facilities in the present study includes information in connection with computers, installation of computer sets, computer softwares, and room and electricity for holding Computer Education classes in the schools.

4.2.2.1. COMPUTER FACILITIES AVAILABLE IN THE SCHOOLS

a) Guwahati

The ten schools which came under the purview of the study were catering to a total of 391 students of Class X through 80 computer sets. This amounted to a computer-student ratio of 1 : 5.

A picture of the details regarding the brand of computers, investment and maintenance costs involved, accessories available, and the number of software available are presented in Table 36.

Table 36 Computer Facilities available in Schools (Guwahati)

Name of the School	Number of Computer sets	Brand of Computer	Initial Investment cost per set	Maintenance cost per set	Facilities available in computer	Number of Software Programme available
Holy Child	7	BBC Micro, IBM PC	Rs.30,000 Rs.28,000	Not required	a,b,g,h	15
St. Mary's	6	BBC Micro, IBM PC	Rs.30,000 Rs.22,800	Not required	a,b,c,g,h	12
Don Bosco	46	BBC Micro-SCL, IBM PC-HCL	Rs.30,000 Rs.30,000	Not required	a,b,g,h	10
Vidya Mandir	1	Usha Teleformatics	Rs.50,000	Not required	a,b,c,e,f,g,h	3
D.A.V.	6	BBC Micro IBM PC	Rs.30,000 Rs.28,000	Not required	a,b,g,h	2
Army School	5	IBM PC	Rs.28,000	Not required	a,b,g,h	10
Mandakenee	2	IBM PC-XT Dolphine	Rs.39,000	Rs.7,000	a,b,g,h	2
Disneyland	4	IBM PC	Rs.30,000	Not required	a,b,g,h	8

Table 36 (Contd.)

Name of the School	Number of Computer sets	Brand of Computer	Initial Investment cost per set	Maintenance cost per set	Facilities available in computer	Number of Software Programme available
Anand Academy	2	IBM PC	Rs.30,000	Not required	a,b,g,h,	2
Miles Bronson	1	IBM PC	Rs.30,000	Not required	a,b,g,h	2
Total	80					66

(Note :- a - Printers, b - Keyboard, c - Cassette, d - Light Pen, e - Mouse,
f - Joystick, g - Visual Display Unit, h - Floppy Disks)

It may be noted from Table 36 that the initial investment cost per set has varied from Rs.22,800 to Rs.50,000. Most of the schools claim no requirement of maintenance cost.

All the schools have the printer, keyboard, visual display unit and floppy disks as the accessories with the computer sets. Additional facilities of cassettes, mouse, joystick, are available in only very few schools.

The number of software packages vary from 2 to 15. Only 2 schools have developed some software on their own. One school (Don Bosco) has developed the softwares -

a) Preparation of Hydrogen gas
b) Mathematics Package
c) Computer games
d) Graphical programmes
e) Musical programmes

The other school (Vidya Mandir) has developed the softwares

a) Marksheet
b) Package on Geometry
c) Computer games

b) Shillong

In Shillong fourteen schools were catering to a total of 389 students of Class X through 88 computer sets, which amounts to a computer-student ratio of 1 : 4.

As in the case of schools of Guwahati, a picture of the details regarding the brand of computers, investment and maintenance costs involved, accessories available, and the number of software available are presented in Table 37.

Table 37 Computer Facilities available in Schools (Shillong)

Name of the School	Number of Computer sets	Brand of Computer	Initial Investment cost per set	Maintenance cost per set	Facilities available in computer	Number of Software Programme available
Pine Mount	4	BBC Micro, IBM PC	Rs.30,000 Rs.28,000	Not required	a,b,g,h	20
A.R.P.S.	6	PC-256 Kb-4 PC-640 Kb-1 PC-XT-1	Rs.28,000 Rs.35,000 Rs.45,000	Rs.7,000	a,b,g,h,	35
St. Edmund's	22	BBC Micro IBM PC	Rs.25,000 Rs.30,000	Rs.5,000	a,b,g,h	40
St. Anthony's	6	IBM PC BBC Micro	Rs.32,000 Rs.25,000	Rs.7,000	a,b,c,g,h	28
St. Dominic	4	IBM PC	Rs.35,000	Not required	a,b,g,h	20
St. Peter's	6	IBM PC, IBM PC-XT	Rs.30,000 Rs.45,000	Not required	a,b,g,h	15
B.K.Bajoria	3	IBM PC-XT	Rs.45,000	Rs.3,000	a,b,g,h	11
East End Chambers	5	IBM PC	Rs.38,000	Rs.5,000	a,b,g,h	5

Table 37 (Contd.)

Name of the School	Number of Computer sets	Brand of Computer	Initial Investment cost per set	Maintenance cost per set	Facilities available in Computer	Number of Software Programme available
St.Xavier's	3	IBM PC	Rs.25,000	Not required	a,b,g,h	6
Seven Set	4	BBC Micro IBM PC	Rs.30,000 Rs.35,000	Rs.5,000	a,b,g	18
All Saints'	3	BBC Micro	Rs.30,000	Rs.5,000	a,b,g	10
Mawprem Modern	2	IBM PC	Rs.28,000	Not required	a,b,g,h	3
Auxilium	5	IBM PC	Rs.30,000	Not required	a,b,g,h	5
Loretto	15	IBM PC	Rs.35,000	Not required	a,b,g,h	30
Total	88					246

(Note :- A.R.P.S. - Assam Rifles Public School ; a - Printers ; b - Keyboard ;
c - Cassette ; g - Visual Display Unit ; h - Floppy Disks)

c) Aizawl

In the four schools there were 13 computer sets for a total of 105 students of Class X which indicates that the computer-student ratio is of 1 : 8.

Schoolwise information regarding the computer facilities available is illustrated in Table 38.

Table 38 Computer Facilities available in Schools (Aizawl)

Name of the School	Number of Computer sets	Brand of Computer	Initial Investment cost per set	Maintenance cost per set	Facilities available in in Computer	Number of Software Programmes available
St. Paul's	2	BBC Micro	Not known	Carried out at REC, Silchar	a,b,c,g,h	24
Govt. Hr. Sec.	2	BBC Micro	Not known	- do -	a,b,c,g,h	11
Republic	4	BBC Micro	Not known	- do -	a,b,c,g,h	20
Zelbawk	5	BBC Micro	Not known	- do -	a,b,c,g,h	15
Total	13					70

(Note :- Govt. Hr. Sec. - Government Higher Secondary ; a - Printers ;
b - Keyboard ; c - Cassette ; g - Visual Display Unit ;
h - Floppy Disks ; REC - Regional Engineering College)

The computer sets available in the schools are provided directly by the Computer Manufacturing Corporation (CMC) through the NCERT, New Delhi. The brand of computers available to the schools is BBC-Micro Computers. Since, the computers are provided through the NCERT, New Delhi, the cost of the computers are not known. For maintenance, schools need to take the computers to Silchar Regional Engineering College. All the four schools were provided with necessary softwares by NCERT, New Delhi. All the software packages (numbering 70) were provided by the NCERT itself. None of the schools have developed any computer software on their own.

d) Kohima

For a total of 257 students of Class X in the six schools there were 45 computer sets, the computer-student ratio resulting to 1 : 6.

A picture of the details of computer facilities available in the schools is depicted in Table 39.

Table 39 Computer Facilities available in Schools (Kohima)

Name of the School	Number of Computer sets	Brand of Computer	Initial Investment cost per set	Maintenance cost per set	Facilities available in computer	Number of Software Programmes available
Don Bosco	12	IBM PC	Rs.30,000	Not required	a,b,g,h	4
Little Flower	11	IBM PC	Rs.28,000	Not required	a,b,g,h	6
Minister Hill Baptist	3	IBM PC	Rs.30,000	Not required	a,b,g,h	3
Baptist English	7	BBC Micro	Not known	Not required	a,b,c,g,h	20
Govt. Hr. Sec.	2	BBC Micro	Not known	Not required	a,b,c,g,h	25
Kohima English	10	IBM PC	Rs.28,000	Not required	b,g,h	3
Total	45					61

(Note :- Govt. Hr. Sec. - Government Higher Secondary ; a - Printers ;
b - Keyboard ; c - Cassette ; g - Visual Display Unit ;
h - Floppy Disks)

Table 39 reveals that cost per computer set is known for four schools but, the cost is not furnished by the remaining two schools because, the sets were provided directly by the CMC through the NCERT, New Delhi.

Necessary accessories such as printer, keyboard, visual display unit, and floppy disks with the computer sets were present in almost all the schools. Out of a total of 61 software packages available in the schools, 45 were provided by the NCERT, New Delhi in two schools (being under the CLASS project). Like the schools of Aizawl, in Kohima too, none of the schools have developed any computer software on their own.

To sum up,

1) All the 34 schools did possess computer sets. There were a total of 226 computer sets and 443 number of software programmes possessed by the schools. According to information gathered from the Computer Education teachers, it was found that only 8 out of 34 schools required to spend certain amount of money in maintenance of computers and the amount varied from Rs.3,000 to Rs.7,000 per computer set.

2) Facilities available concerning computers in schools

located at various places is shown in Table 40.

Table 40 Computer Facilities available in Schools

Particulars	Guwahati	Shillong	Aizawl	Kohima	Total
Number of Schools	10	14	4	6	34
Number of Computer sets	80	88	13	45	226
Brand of Computers	BBC Micro, SCL, IBM-PC, Dolphine, Usha Teleform-atics	IBM PC, PC-XT, BBC-Micro	BBC Micro	IBM PC, BBC-Micro	
Facilities available in computers	a,b,c, g,h	a,b,c, g,h	a,b,c, g,h	a,b,c, g,h	
Number of Software Programmes available	66	246	70	61	443
Number of Schools who have developed software packages	2	4	-	-	6
Computer-Student Ratio for Class X Students	1 : 5	1 : 4	1 : 8	1 : 6	1 : 5

3) Some of the Computer Education teachers from the schools of Guwahati and Shillong have developed certain software programmes.

4.2.2.2. INSTALLATION OF COMPUTER SETS IN SCHOOLS

a) Guwahati

It was noticed that two ways were followed in procuring and getting the computer sets installed in the schools ; one was the direct purchase of the sets from the school funds and the other was entering into a contract with some private computer institute. The number of schools which fell into the former category was 3 and those into the latter category was 7 (as shown in Table 41).

Table 41 Details regarding the installation of Computer Sets (Guwahati)

Computer Sets possessed by the Schools	Number of Schools	Number of Computer Sets
Purchased from the school funds	3	10
Received as gift	0	0
Provided by Private Computer Institutes	7	70

Under the contract, schools were required to provide rooms, furniture and suitable time for conducting the Computer Education classes. On the other hand, private computer institutes provided the facilities such as Computer Education teachers, computer sets and study materials for the students. (Only in one of the schools, Computer Education teachers belonged to school staff). On completion of the contract period the computer sets become the property of the schools (as per the agreement made).

Thus, it could be noted, two distinct types of set up of running the Computer Education course in schools. In one type, the schools purchased their own computers, taught the course through their own teachers, and followed the syllabus which they decided. But, in the other type, the computers were placed in the schools (for the contract period) by private computer institutes, and these institutes taught the course through their own teachers, and followed the syllabus which they decided to.

But, it was found that since the computers would be the property of the schools after the contract period, principals of some such schools used their authority in the selection of the brand of computer sets to be purchased and installed in the schools by the private computer institutes.

Table 42 presents this picture in brief.

Table 42 Matter relating to purchase of Computer Sets (Guwahati)

Authority responsible for the selection of the brand of computer sets	Experience of the person who made the decision	Number of Schools
Principal of the School	General administrative experience only	6
Head of the Private Computer Institutes	Technical experience – varies from 4 years to 16 years	4

It was also recorded, that, while making the choice of the brand, the principals made some consultations with knowledgeable persons. Principals of 3 schools consulted with the Professors of Physics teaching in Gauhati University, Guwahati alongwith the heads of different private computer institutes. Principals of the other 3 schools discussed with the various private computer institutes.

All the respondents expressed that computer service centres are existing in Guwahati.

b) Shillong

As was observed in Guwahati, even in Shillong there were two ways followed by schools in procuring the computer sets. One way by entering into a contract with some private computer institutes and the other by direct purchase from the school funds. In 8 out of 14 schools, computer sets were installed by the private computer institutes and in the remaining 6 schools computer sets were purchased from school funds. Details about the installation of computer sets is shown in Table 43.

Table 43 Details regarding the installation of Computer Sets (Shillong)

Computer Sets possessed by the Schools	Number of Schools	Number of Computer Sets
Purchased from the school funds	6	35
Received as gift	0	0
Provided by Private Computer Institutes	8	53

Like the schools of Guwahati, in Shillong, the schools which were under the contract with the private computer institutes required to provide rooms, furniture and suitable time for conducting the Computer Education

classes. On the other hand, private computer institutes provided the facilities such as Computer Education teachers, computer sets, and study materials for the students. On completion of the contract period the computer sets becomes the property of the schools (as per the agreement made).

It was also found that the schools which purchased their own computers, taught the course through their own teachers, and followed the syllabus which they decided. And, in the schools which enetered into a contract with the private computer institutes, the instruction in Computer Education programme was imparted by the teachers of the institutes, who followed the syllabus which was decided by the institutes.

It was further noticed that in the schools under the contract system, the computers become the property of the schools after the contract period, and as such the principals used their authority in the selection of the brand of computer sets to be purchased and installed in the schools by the private computer institutes. A brief picture of the same is presented in Table 44.

Table 44 Matter relating to purchase of Computer Sets (Shillong)

Authority responsible for the selection of the brand of computer sets	Experience of the person who made the decision	Number of Schools
Principal of the School	General administrative experience only	6
Head of the Private Computer Institutes	Technical experience - varies from 4 years to 16 years	4

While making choice by the respective principals of the schools, consultations were carried out with experienced teachers and computer experts. The private computer institutes had discussions with the respective school principals regarding various brands of computers, thereafter, particular brand of computer was selected and installed in the schools.

Out of a total of 14 schools, respondents from 8 schools expressed that computer service centre exists in Shillong but, the respondents from the remaining schools asserted negatively. According to the respondents from these 6 schools, computer servicing was generally carried out at Guwahati.

c) Aizawl

In Aizawl, all the schools providing Computer Education course were under the CLASS project. And, consequently, the computer sets were provided to the schools by Computer Manufacturing Corporation (CMC) through the National Council for Educational Research and Training (NCERT), New Delhi. Hence, there was no choice on the part of the schools to select any particular brand of computer.

As mentioned earlier, all the schools have to take the computer sets to Regional College of Engineering, Silchar for service purposes.

d) Kohima

In Kohima, it was found that there were three ways followed in procuring and getting the computer sets installed in the schools ; one was the direct purchase of the sets from the school funds ; the other was entering into a contract with some private computer institute ; and the third was to receive computer sets as gifts. The details are given in Table 45.

Table 45 Details regarding the installation of Computer Sets (Kohima)

Computer Sets possessed by the Schools	Number of Schools	Number of Computer Sets
Purchased from the school funds	1	15
Received as gift (as part of CLASS project)	2	6
Provided by Private Computer Institutes	3	24

Here too, the schools which were under the contract with the private computer institutes followed the same procedure as are described for Guwahati and Shillong. The computers which were provided by the private computer institutes shall be the property of schools after a period of five years.

In one of the schools of Kohima it was found that the school purchased its own computers, taught the course through the teachers recruited by the school, and followed the syllabus which the school decided. On the other hand the schools which entered into a contract with the private computer institutes, the instruction in Computer Education programme was imparted by their own teachers, and followed

the syllabus which they decided to.

In making the choice of the brand of computers Table 46 presents a clear picture of the authority responsible for the selection.

Table 46 Matter relating to purchase of Computer Sets (Kohima)

Authority responsible for the selection of the brand of computer sets	Experience of the person who made the decision	Number of Schools
Principal of the School	General administrative experience only	1
Head of the Private Computer Institutes	Technical experience - 12 years	3
NCERT, New Delhi	Not known	2

As in the schools of Guwahati and Shillong, the principals from the schools of Kohima used their authority in the selection of the brand of computer sets to be purchased and installed in the schools by the private computer institutes. Respondents from 4 out of 6 schools stated that servicing personnel were made available from

Guwahati. The other two schools (under the CLASS project) informed that they were required to take the computer sets to Gauhati Engineering College, Guwahati for servicing purposes.

Summarising,

1) Out of 34 schools, only 10 schools purchased computer sets from their respective school funds ; another 6 schools received computer sets as gift from NCERT-CMC, New Delhi ; and in the remaining 18 schools, private computer institutes installed the necessary equipments.
2) In 13 schools, principal of the respectivve school made the choice of the brand of computers installed in the schools and all the principals possessed general administrative experience only. The selection of the brand of computers provided by the NCERT and the CMC to 6 schools was made by the concerned authority, that is, the NCERT and the CMC.
3) Service facilities were available for schools of Guwahati and Shillong at their respective cities only. But, the schools at Aizawl and Kohima had to depend on the servicing facilities at Silchar and Guwahati respectively. In most of the cases, these schools were required to take the computer sets to the servicing centres.

4.2.2.3. COMPUTER ROOM AND ELECTRICITY FACILITIES

a) Guwahati

Table 47 indicates availability of a separate computer room, electricity and other essential facilities for holding the Computer Education classes in the schools under study.

Table 47 Physical facilities available for holding Computer Education classes (Guwahati)

Facilities available	Number of Schools	
	having	not having
i) Separate room for holding Computer Education classes	10	0
ii) Computer room being air conditioned	6	4
iii) Electric power supply appropriate during practical class hours	8	2

A separate room (Computer room) for holding Computer Education classes was available in all the schools studied. But, in only 6 schools, the computer room was found to be air-conditioned. Eight schools had expressed that there would be no problem with regard to the power supply during practical

classes. But, this seems to be not the case in the remaining two schools.

b) Shillong

Facilities such as separate computer room, electricity and other requirements essential for holding the Computer Education classes in the schools is indicated in Table 48.

Table 48 Physical facilities available for holding Computer Education classes (Shillong)

Facilities available	Number of Schools	
	having	not having
i) Separate room for holding Computer Education classes	14	0
ii) Computer room being air-conditioned	0	14
iii) Electric power supply appropriate during practical class hours	14	0

In all the 14 schools there existed a separate computer room for holding Computer Education classes. None of the schools had air-conditioning facilities in the computer

room. It was found that schools need not had to face any problem with regard to the electric power supply during practical class hours.

c) Aizawl

Table 49 indicates the availability of facilities such as room, electricity and other essential things for holding the Computer Education classes.

Table 49 Physical facilities available for holding Computer Education classes (Aizawl)

Facilities available	Number of Schools	
	having	not having
i) Separate room for holding Computer Education classes	2	2
ii) Computer room being air-conditioned	0	4
iii) Electric power supply appropriate during practical class hours	0	4

Out of the 4 schools, only two had separate room where computers were placed and Computer Education classes were

held. But, in the remaining two, it was learnt that computers were stored in a store room, and they would be brought to the classroom as and when required. As could be seen, not a single school had air conditioning facility in the room where computer sets were installed or stored.

The schools in Aizawl find a major problem with respect to the electric power supply. Irregular power supply, voltage fluctuation happened to be the disturbing aspects and for the same reason, the teachers felt that the students could not perform the practicals on computers satisfactorily. Also, it was expressed that because of the same reason the computer sets go out of order frequently.

d) Kohima

In Table 50 necessary data are provided with regard to the facilities available like, room, electricity, and other essential things for holding the Computer Education classes.

Table 50 Physical facilities available for holding Computer Education classes (Kohima)

Facilities available	Number of Schools	
	having	not having
i) Separate room for holding Computer Education classes	6	0
ii) Computer room being air-conditioned	0	6
iii) Electric power supply appropriate during practical class hours	3	3

All the schools had a separate room (Computer room) for holding Computer Education classes though, none of them were air-conditioned. But, it was noticed that the computer rooms were maintained neat and dust free. The electric power supply for conducting practical classes was felt dissatisfactory by Computer Education teachers of three of the six schools studied.

Summing up, it was found that

1) In most of the schools (32 out of 34) a separate computer room was there for holding the Computer Education classes. In the remaining 2 schools the computer sets

were brought to their regular classroom.

2) Only 6 out of 10 schools of Guwahati were found to have air conditioning facility in computer rooms. Such facility did not exist in any other schools of Shillong, Aizawl or Kohima.

3) The irregular power supply seemed to be a great hurdle in the efficient running of the practical classes on computers. This problem seemed to be of a serious nature in Aizawl, and to a certain extent in Guwahati and Kohima.

4.2.3. ENROLMENT OF STUDENTS IN COMPUTER EDUCATION COURSE

a) Guwahati

Only in one out of 10 schools, students were selected for the Computer Education course on the basis of an admission test. The test comprised of fundamental knowledge of mathematical operations (addition, substraction, multiplication and division).

Table 51 illustrates detailed information of enrolment of students for Computer Education course at various classes and in different years.

Table 51 Schoolwise analysis of the number of students Admitted and Completed with regard to Computer Education course (Guwahati)

Name of the School	Year	Number of Students					
		Admitted			Completed		
		VIII	IX	X	VIII	IX	X
Don Bosco	1987	100	90	75	100	90	75
	1988	150	130	120	150	130	120
	1989	160	155	160	160	155	160
	1990	158	153	157	158	153	157
	1991	158	160	160	158	160	160
	1992	165	160	155	165	160	155
Holy Child	1988	60	42	35	60	42	35
	1989	85	58	42	85	58	42
	1990	91	62	45	91	62	45
	1991	104	89	48	104	89	48
	1992	108	95	50	108	95	50
St. Mary's	1988	60	74	55	60	74	55
	1989	68	72	55	63	70	55
	1990	65	57	58	62	52	56
	1991	70	62	58	67	58	65
	1992	70	65	60	65	61	60

Table 51 (Contd.)

Name of the School	Year	Number of Students					
		Admitted			Completed		
		VIII	IX	X	VIII	IX	X
Vidya Mandir	1990	10	8	10	10	8	10
	1991	12	8	12	12	8	12
	1992	12	10	16	8	9	13
D.A.V.	1990	25	15	-	25	15	-
	1991	45	28	15	45	28	15
	1992	54	34	20	54	34	20
Army School	1990	60	70	40	60	70	40
	1991	65	75	40	65	75	40
	1992	85	86	37	85	86	37
Mandakenee	1990	12	10	5	12	10	5
	1991	23	15	8	23	15	8
	1992	25	22	10	25	20	10
Disneyland	1990	28	12	5	28	12	5
	1991	45	32	20	45	32	20
	1992	50	36	25	48	32	25
Anand Academy	1990	10	15	5	10	15	5
	1991	15	20	8	15	20	8
	1992	12	25	10	12	25	8

Table 51 (Contd.)

Name of the School	Year	Number of Students					
		Admitted			Completed		
		VIII	IX	X	VIII	IX	X
Miles Bronson	1990	24	15	-	22	12	-
	1991	40	21	5	35	18	5
	1992	42	36	8	38	32	8

From the Table (Table 51) it may be noted that almost all the students who were admitted to the course did complete the same.

A yearwise analysis of the total number of students who were admitted to the Computer Education course in all the schools taken together (Table 52) reveals that the enrolment of students was steadily increasing year after year.

Table 52 Yearwise analysis of the number of students pursuing the Computer Education course (Guwahati)

Year	Number of Students			
	VIII	IX	X	Total
1987	100	90	75	265
1988	270	246	210	726
1989	313	285	257	855
1990	483	417	325	1,225
1991	577	510	374	1,461
1992	623	569	391	1,583

b) Shillong

Only in one out of 14 schools, students were selected for the Computer Education course on the basis of percentage of marks obtained in different school subjects.

Table 53 presents a detailed information of enrolment of students for Computer Education course at various classes and in different years.

Table 53 Schoolwise analysis of the number of students Admitted and Completed with regard to Computer Education course (Shillong)

Name of the School	Year	Number of Students					
		Admitted			Completed		
		VIII	IX	X	VIII	IX	X
Pine Mount	1988	35	30	16	35	30	16
	1989	40	32	26	40	32	26
	1990	42	36	29	42	36	29
	1991	11	10	4	11	10	4
	1992	34	18	5	34	18	5
Assam Rifles	1988	76	55	48	76	55	48
Public School	1989	82	64	56	82	64	56
	1990	78	65	45	78	65	45
	1991	76	68	52	76	68	52
	1992	78	70	68	78	70	68
St. Edmund's	1986	120	60	-	120	60	-
	1987	120	80	60	120	80	60
	1988	120	70	50	120	70	50
	1989	130	80	60	130	80	60
	1990	121	62	73	118	56	71
	1991	125	61	48	124	57	46
	1992	127	66	50	127	66	50

Table 53 (Contd.)

Name of the School	Year	Number of Students					
		Admitted			Completed		
		VIII	IX	X	VIII	IX	X
St. Anthony's	1988	30	35	40	28	30	35
	1989	35	25	10	35	22	8
	1990	43	28	12	40	24	11
	1991	56	35	12	55	33	12
	1992	60	42	15	56	40	15
St. Dominic	1988	15	10	5	15	10	5
	1989	20	15	10	20	15	10
	1990	25	20	12	25	20	12
	1991	30	22	12	30	22	12
	1992	35	25	15	35	25	15
St. Peter's	1987	40	35	25	40	35	25
	1988	38	32	24	38	32	24
	1989	30	34	26	30	34	26
	1990	35	48	22	35	48	22
	1991	60	47	26	60	47	26
	1992	82	38	25	82	38	25
B.K.Bajoria	1988	6	4	3	6	4	3
	1989	5	6	4	5	6	4

Table 53 (Contd.)

Name of the School	Year	Number of Students					
		Admitted			Completed		
		VIII	IX	X	VIII	IX	X
	1990	17	16	14	17	16	14
	1991	21	19	17	21	19	17
	1992	28	22	20	28	22	20
East End	1989	30	34	26	30	34	26
Chambers	1990	35	38	22	35	38	22
	1991	40	32	26	40	32	26
	1992	42	38	25	42	38	25
St. Xavier's	1987	12	15	2	10	13	2
	1988	18	10	1	8	5	1
	1989	18	17	7	15	12	5
	1990	18	15	5	15	12	5
	1991	20	15	10	20	15	10
	1992	20	15	12	20	15	12
Seven Set	1988	9	2	-	9	2	-
	1989	15	9	4	15	9	4
	1990	15	12	6	15	12	6
	1991	20	15	10	20	15	10
	1992	20	15	10	20	15	10

Table 53 (Contd.)

Name of the School	Year	Number of Students					
		Admitted			Completed		
		VIII	IX	X	VIII	IX	X
All Saints'	1988	15	10	5	15	10	5
	1989	25	22	10	25	22	10
	1990	15	10	5	15	10	5
	1991	25	15	8	25	15	8
	1992	39	25	11	39	25	11
Mawprem Modern	1989	20	15	5	20	15	5
	1990	20	15	8	20	15	8
	1991	20	18	8	20	18	8
	1992	24	18	9	24	18	9
Auxilium	1989	8	6	5	8	6	5
	1990	12	10	4	10	9	4
	1991	10	10	4	9	8	4
	1992	111	75	50	111	75	50
Loretto	1988	89	92	78	89	92	78
	1989	77	73	69	77	73	69
	1990	82	74	69	82	74	69
	1991	82	79	70	82	79	70
	1992	84	81	74	84	81	74

It may be observed from the Table (Table 53) that almost all the students who were admitted to the course did complete the same.

A yearwise analysis of the total number of students who were admitted to the Computer Education course in all the schools taken together (Table 54) reveals that the enrolment of students was steadily increasing year after year.

Table 54 Yearwise analysis of the number of students pursuing the Computer Education course (Shillong)

Year	Number of Students			
	VIII	IX	X	Total
1986	120	60	-	180
1987	172	130	87	389
1988	451	350	270	1,071
1989	535	432	318	1,285
1990	558	449	326	1,333
1991	596	446	311	1,353
1992	784	548	389	1,721

c) Aizawl

There existed no procedure for selection of students for the Computer Education course, in the schools.

In Table 55 a detailed information of enrolment of students for Computer Education course at various classes and in different years is shown.

Table 55 Schoolwise analysis of the number of students Admitted and Completed with regard to Computer Education course (Aizawl)

Name of the School	Year	Number of Students					
		Admitted			Completed		
		VIII	IX	X	VIII	IX	X
St. Paul's	1988	20	20	-	20	18	-
	1989	20	20	20	20	20	20
	1990	20	20	20	20	20	20
	1991	20	20	25	20	20	25
	1992	20	20	25	20	20	25
Govt. Hr. Sec.	1990	25	20	20	25	20	20
	1991	38	30	30	38	30	30
	1992	45	50	50	45	50	50
Republic	1989	20	15	10	20	15	10
	1990	20	15	10	20	15	10

Table 55 (Contd.)

Name of the School	Year	Number of Students					
		Admitted			Completed		
		VIII	IX	X	VIII	IX	X
	1991	20	15	10	20	15	10
	1992	20	15	10	20	15	10
Zelbawk	1990	30	20	20	30	20	20
	1991	30	20	20	30	20	20
	1992	30	20	20	30	20	20

In Aizawl also, it may be seen that almost all the students who were admitted to the course did complete the same.

A yearwise analysis of the total number of students who were admitted to the Computer Education course in all the schools taken together (Table 56) reveals that the enrolment of students was steadily increasing every year.

Table 56 Yearwise analysis of the number of students pursuing the Computer Education course (Aizawl)

Year	Number of Students			
	VIII	IX	X	Total
1988	20	20	-	40
1989	40	35	30	105
1990	95	75	70	240
1991	108	85	85	278
1992	115	105	105	325

d) Kohima

As in the case of Aizawl, no procedure was followed for selection of students for the Computer Education course in the schools of Kohima.

In Table 57 a detailed information of enrolment of students is provided for Computer Education course at various classes and in different years.

Table 57 Schoolwise analysis of the number of students Admitted and Completed with regard to Computer Education course (Kohima)

Name of the School	Year	Number of Students					
		Admitted			Completed		
		VIII	IX	X	VIII	IX	X
Don Bosco	1987	15	18	5	15	18	5
	1988	119	105	10	119	105	10
	1989	125	110	35	125	110	35
	1990	92	80	42	92	80	42
	1991	96	84	50	96	84	50
	1992	103	82	55	103	82	55
Little Flower	1990	78	84	36	78	84	36
	1991	108	95	58	108	95	58
	1992	122	103	76	122	103	76
Minister Hill Baptist	1990	42	36	5	42	36	5
	1991	45	37	7	45	37	7
	1992	48	42	10	48	42	10
Baptist English	1989	-	122	81	-	122	81
	1990	125	111	67	125	111	67
	1991	124	115	50	124	115	50
	1992	114	142	35	114	142	35
Govt. Hr.Sec.	1990	24	25	10	24	25	10
	1991	28	25	18	28	25	18

Table 57 (Contd.)

Name of the School	Year	Number of Students					
		Admitted			Completed		
		VIII	IX	X	VIII	IX	X
	1992	28	26	20	28	26	20
Kohima English	1990	109	70	41	109	70	41
	1991	119	75	52	119	75	52
	1992	143	93	61	143	93	61

(Note :- Govt. Hr. Sec. - Government Higher Secondary)

It may be observed that almost all the students who were admitted to the course did complete the same.

A yearwise analysis of the total number of students who were admitted to the Computer Education course in all the schools taken together (Table 58) reveals that the enrolment of students was steadily increasing every year.

Table 58 Yearwise analysis of the number of students pursuing the Computer Education course (Kohima)

Year	Number of Students			
	VIII	IX	X	Total
1987	15	18	5	38
1988	119	105	10	234
1989	125	232	116	473
1990	470	406	201	1,077
1991	520	431	235	1,186
1992	558	488	257	1,303

To sum up :

1) Except in 2 schools, none of the schools had any screening procedure for admitting the students to the Computer Education course.

2) The summed up enrolment position classwise and total in the four places, namely, Guwahati, Shillong, Aizawl, and Kohima, are graphically presented in Figures 5, 6, 7 and 8.

It is seen that almost in all cases there is a steady increase in the enrolment of students for the Computer Education course.

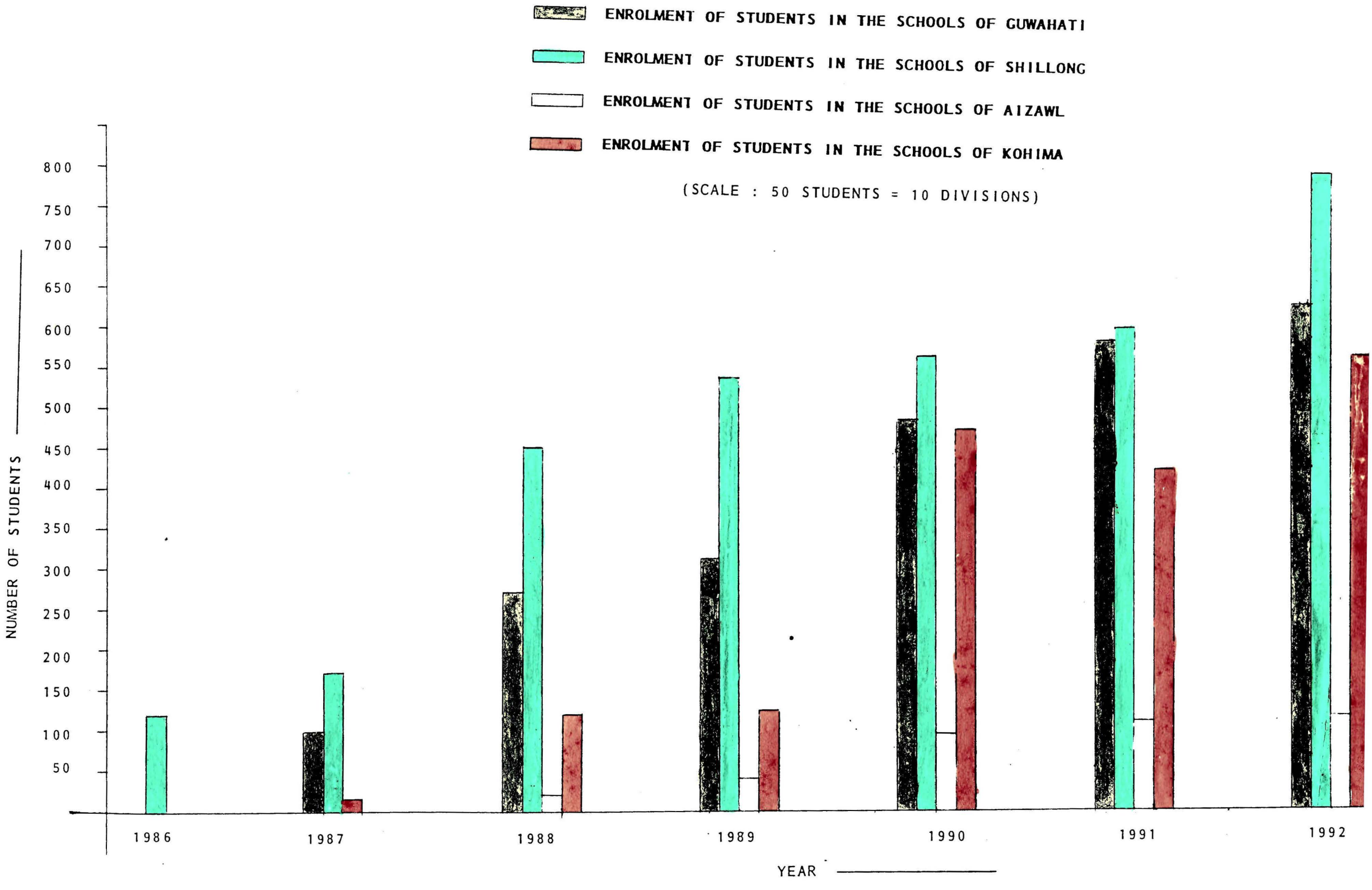


Figure 5 : ENROLMENT OF STUDENTS IN CLASS-VIII FOR COMPUTER EDUCATION COURSE

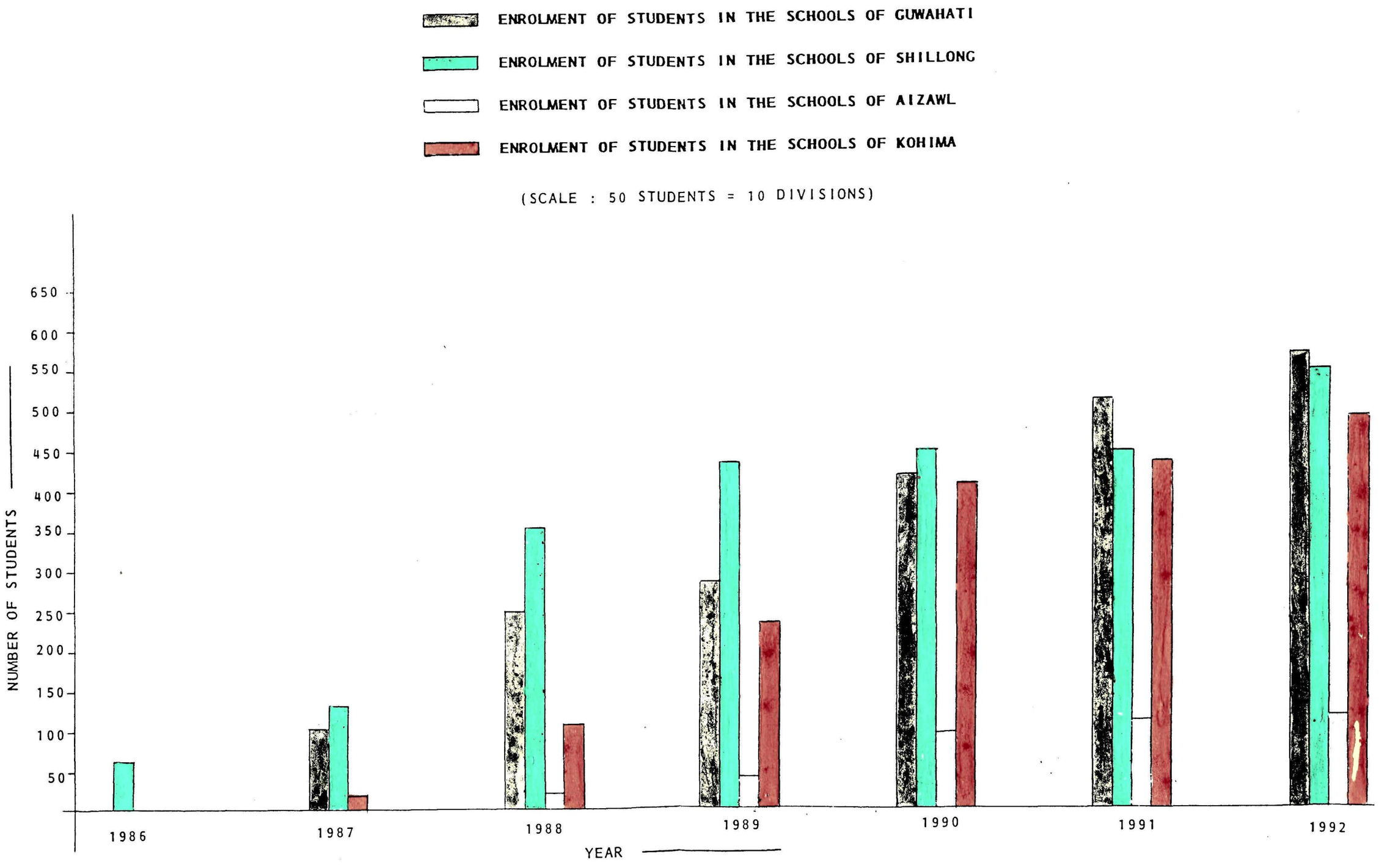


Figure 6 : ENROLMENT OF STUDENTS IN CLASS-IX FOR COMPUTER EDUCATION COURSE

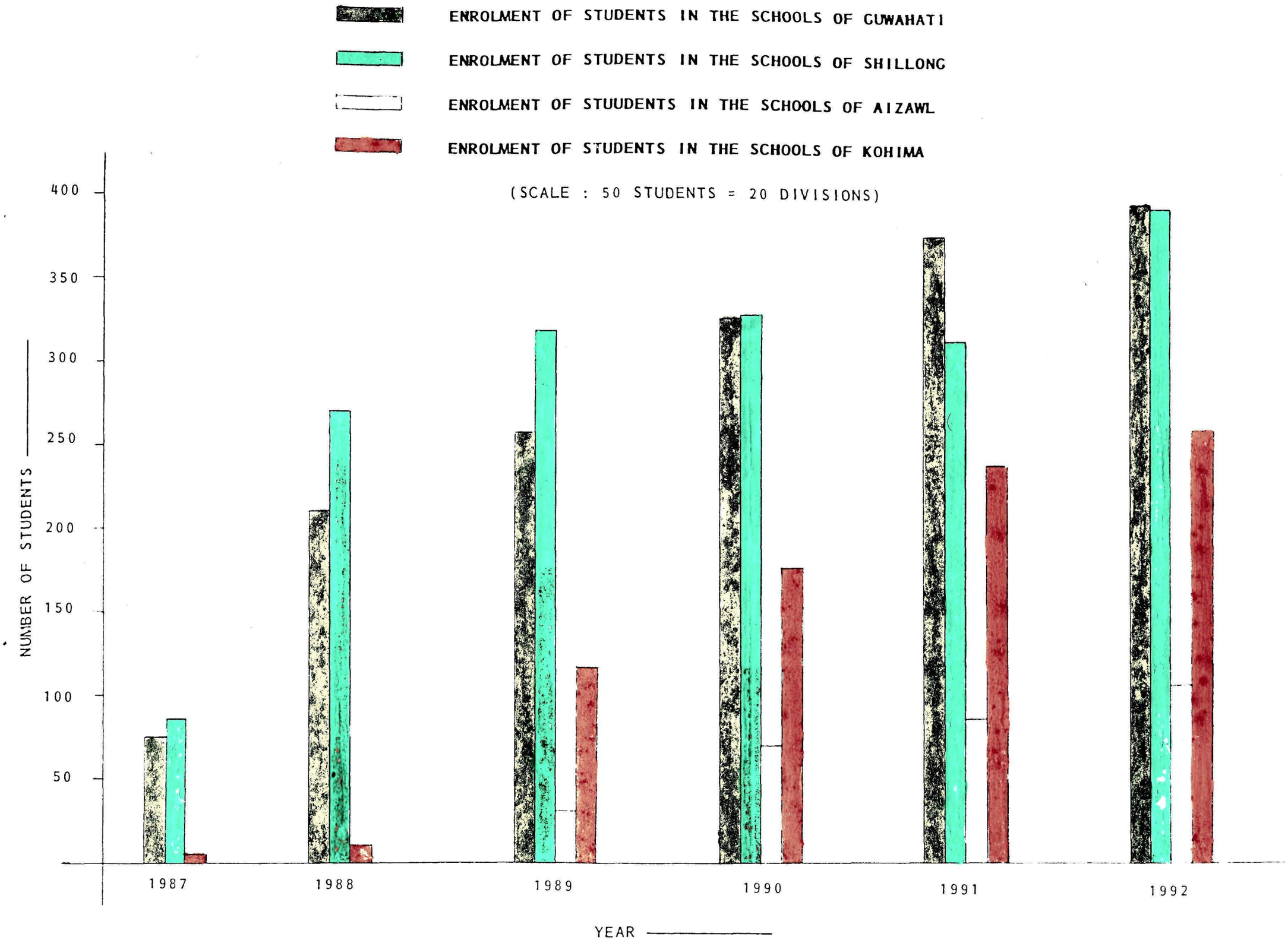


Figure 7 : ENROLMENT OF STUDENTS IN CLASS-X FOR COMPUTER EDUCATION COURSE

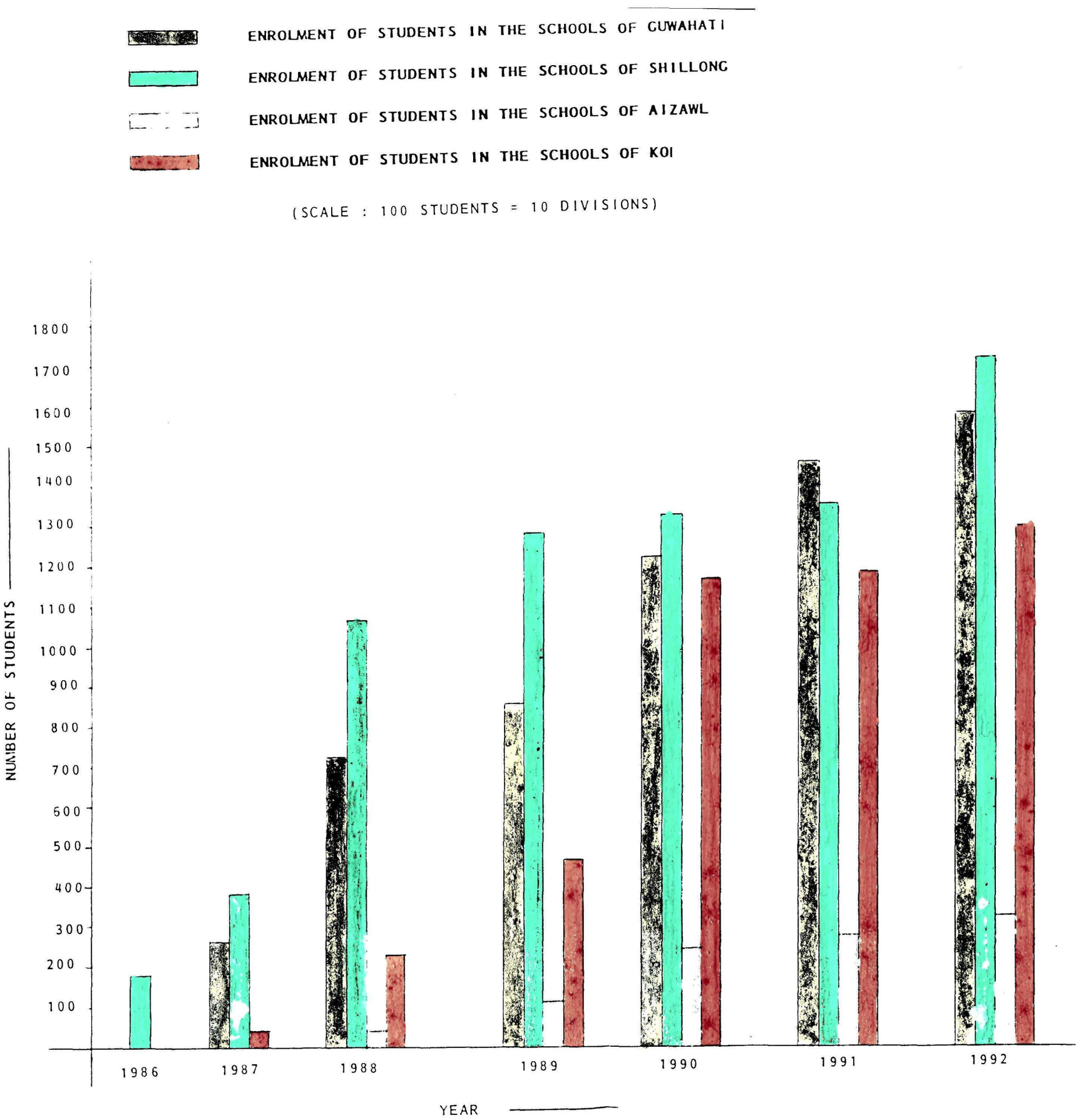


Figure 8 : TOTAL ENROLMENT OF STUDENTS IN CLASSES - VIII, IX, X FOR COMPUTER EDUCATION COURSE

4.2.4. TEACHERS OF COMPUTER EDUCATION COURSE

a) Guwahati

In the 10 schools studied there were 18 computer education teachers. Details regarding their qualification and experience are given in Table 59.

Table 59 Qualification and Experience of Computer Education Teachers (Guwahati)

Name of the School	Number of Teachers	General Qualification (i)	Qualification with regard to computers (ii)	Institution's name from where qualified with respect to (ii)	Experience as computer education teachers in years
Don Bosco	3	B.Sc.	ADCSM	ICS, Guwahati	3
		P.U.	DCS	ICS, Guwahati	3
		B.Com.	PGDCS	ICS, Guwahati	3
Holy Child	2	B.Com.	PGDCS	ICS, Guwahati	3
		B.Sc.	PGDCS	BDPS, Guwahati	1
St. Mary's	2	B.Com., L.L.B.	ADCSM	ICS, Guwahati	5
		B.Sc.	ADCSM	ICS, Guwahati	3
Vidya Mandir	3	B.E.(Civil)	PGDCS	Gauhati Univ.	3
		B.A.	PGDCS	ICS, Guwahati	2
		B.Sc.	PGDCS	BDPS, Guwahati	1
D.A.V.	2	B.E. (Comp.Sc.)	B.E. (Comp.Sc.)	REC, Silchar	2

Table 59 (Contd.)

Name of the School	Number of Teachers	General Qualification (i)	Qualification with regard to computers (ii)	Institution's name from where qualified with respect to (ii)	Experience as computer education teachers in years
		B.Sc.	PGDCS	BDPS, Guwahati	1
Army School	2	B.Sc.	PGDCA	BDPS, Guwahati	5
		B.A.	PGDCS	Gauhati Univ.	2
Mandakenee	1	M.Sc.	PGDCS	Gauhati Univ.	3
Disneyland	1	B.A.	PGDCS	ICS, Guwahati	3
Anand Academy	1	B.Sc.	PGDCS	BDPS, Guwahati	2
Miles Bronson	1	B.Sc.	PGDCS	Gauhati Univ.	3

Note :- 1) ADCSM - Advanced Diploma in Computer Software & Management
DCS - Diploma in Computer Science
PGDCS - Post Graduate Diploma in Computer Science
2) ICS - Informatics Computer Systems
BDPS - Bureau of Data Processing Systems
REC - Regional Engineering College
3) Univ. - University ; Comp. Sc. - Computer Science

Except one teacher, all the other teachers were graduate or post graduate degree holders. But, all were having diploma or degree in computer science. The experience as computer education teachers ranged from 1 to 5 years.

The study also revealed that :

a) none of the teachers in the 10 schools had received Computer Literacy and Studies in Schools (CLASS) training from NCERT ;

b) there was not a single computer education teacher training course conducted by the State Department of Education or by the S.C.E.R.T.

(It was learnt that the NCERT, New Delhi organised a two-week teacher training programme for some selected science and mathematics teachers in computer teaching at the end of 1992).

It is important to note that except in four schools, namely, Don Boscoo, Holy Child, St. Mary's and Vidya Mandir, none of the computer education teachers in the remaining six schools were the employees of the school concerned. All of them were employed by the private computer institutes who had installed the computers in the schools.

All the 18 computer education teachers taught

Computer Education course only except for one who was required to teach additional subjects such as mathematics and science.

b) Shillong

In the 14 schools studied there were 24 computer education teachers. Details regarding their qualification and experience are presented in Table 60.

Table 60 Qualification and Experience of Computer Education Teachers (Shillong)

Name of the School	Number of Teachers	General Qualification (i)	Qualification with regard to computers (ii)	Institution's name from where qualified with respect to (ii)	Experience as computer education teachers in years
Pine Mount	1	B.A.	PGDCS	ICS, Guwahati	3
Assam Rifles Public	2	B.E.	B.E.(Comp.SC.)	Gulbarga Univ.	2
		B.Sc.	PGDCS	ICS, Guwahati	1
St.Edmund's	2	B.Sc.	PGDCS	BDPS, Shillong	7
		B.A.	PGDCS	ICS, Guwahati	6
St.Anthony's	2	B.A.	PGDCS	Kurushetra College New Delhi	3
		B.A. Hons.	PGDCS	BDPS, Shillong	2
St. Dominic	2	B.Sc.	PGDCS	BDPS, Shillong	6
		B.Sc.	PGDCS	BDPS, Shillong	4
St. Peter's	2	B.Sc.	PGDCS	NIIT, Calcutta	8
		P.U.	PGDCS	BDPS, Shillong	3

Table 60 (Contd.)

Name of the School	Number of Teachers	General Qualification (i)	Qualification with regard to computers (ii)	Institution's name from where qualified with respect to (ii)	Experience as computer education teachers in years
B.K.Bajoria	2	P.U.	ADCP	BDPS,Bombay	3
		B.Sc.	PGDCS	BDPS,Shillong	1
East End Chambers	1	P.U.	PGDCS	BDPS,Shillong	1
St.Xavier's	1	B.Sc.	PGDCS	BDPS,Shillong	4
Seven Set	1	B.Sc.	PGDCS	ICS,Guwahati	2
All Saints'	2	P.U.	PGDCS	ICI,Shillong	4
		B.A.	PGDCS	BDPS,Guwahati	1
Mawprem Modern	2	P.U.	PGDCS	BDPS,Madras	6
		B.A.	PGDCS	BDPS,Shillong	1
Auxilium	2	P.U.	PGDCS	ICI,Shillong	2
		B.A.	PGDCS	BDPS,Shillong	1

Table 60 (Contd.)

Name of the School	Number of Teachers	General Qualification (i)	Qualification with regard to computers (ii)	Institution's name from where qualified with respect to (ii)	Experience as computer education teachers in years
Loretto	2	B.A.	PGDCS	ICI, Shillong	3
		B.Sc.	PGDCS	BDPS, Guwahati	4

Note :- 1) PGDCS - Post Graduate Diploma in Computer Science
ADCP - Advance Diploma in Computer Programming

2) P.U. - Pre-University

3) ICI - Informatics Computer Institute
NIIT - National Institute of Information Technology

Excluding six teachers, all the other 18 teachers were found to be graduate degree holders. But, all were having diploma or degree in computer science. The exprience as computer education teachers varied from 1 to 8 years.

The study also revealed that :

a) none of the teachers in the 14 schools had received CLASS training from NCERT ;

b) there was not a single computer education teacher training course conducted by the State Department of Education or by the S.C.E.R.T..

It is essential to mention that except in seven schools, namely, Assam Rifles Public, St. Edmund's, St. Anthony's, St. Peter's, B.K.Bajoria, St. Xavier's and Loretto, none of the computer education teachers in the remaining seven schools were the employees of the school concerned. All the teachers who were not empployed by the respective schools were actually employed by the private computer institutes who had installed the computers in the schools.

All the 24 computer education teachers taught Computer Education course except for five who were required to teach additional subjects such as mathematics and science.

c) Aizawl

In the 4 schools studied there were 10 computer education teachers. Details regarding their qualification and experience are provided in Table 61.

Table 61 Qualifications and Experience of Computer Education Teachers (Aizawl)

Name of the School	Number Teachers	General Qualification (i)	Qualification with regard to computers (ii)	Institution's name from where qualified with respect to (ii)	Experience as computer education teachers in years
St. Paul's	2	B.Sc.	PGDCS	ICS, Guwahati	2
		B.Sc., M.B.A.	PGDCS	BDPS, Guwahati	1
Govt. Hr. Sec.	3	B.Sc., B.Ed.	NCERT Training	REC, Silchar	4
		B.Sc., M.A.	NCERT Training	REC, Silchar	4
		B.Sc., B.Ed.	NCERT Training	REC, Silchar	2
Republic	2	B.Sc., B.Ed.	NCERT Training	REC, Silchar	1
		B.Sc., B.Ed.	NCERT Training	REC, Silchar	1
Zelbawk	3	B.Sc.	NCERT Training	REC, Silchar	3
		B.Sc., B.Ed.	NCERT Training	REC, Silchar	2
		B.Sc., B.Ed.	NCERT Training	REC, Silchar	1

As was mentioned earlier, all the four schools were under the CLASS project sponsored by the NCERT, New Delhi. Hence, all the computer teachers (N = 10) in these schools were trained by the NCERT through the Regional Engineering College, Silchar. But, two of the teachers in one school left the institution and in their place teachers with Post Graduate Diploma in Computer Science were appointed. The experience of these as computer education teachers varied from 1 to 4 years.

Further, it was learnt that the SCERT computer cell at Aizawl had organized an orientation programme for the computer education teachers, during which time the basic knowledge about computers was revised. Only two of the ten computer education teachers attended the course.

d) Kohima

There were 14 computer education teachers in six schools of Kohima. Information with respect to the computer education teachers' qualification and experience are presented in Table 62.

Table 62 Qualification and Experience of Computer Education Teachers (Kohima)

Name of the School	Number of Teachers	General Qualification (i)	Qualification with regard to computers (ii)	Institution's name from where qualified with respect to (ii)	Experience as computer education teachers in years
Don Bosco	3	B.Sc.	PGDCS	ICS,Guwahati	3
		B.Sc.	PGDCS	BDPS,Madras	1
		B.Sc.	PGDCS	BDPS,Madras	1
Little Flower	3	B.A.	PGDCS	NCS, Guwahati	3
		B.A.	PGDCS	NCS, Guwahati	1
		B.Sc.	PGDCS	ICS, Guwahati	1
Minister Hill Baptist	2	B.Sc.	PGDCS	NIIT, Bombay	2
		B.Sc.	PGDCS	ICS, Delhi	1
Baptist English	2	B.Sc.	NCERT Trg.	GEC, Guwahati	4
		M.Sc.	NCERT Trg.	GEC, Guwahati	1
Govt. Hr. Sec.	2	B.Sc.,B.Ed.	NCERT Trg.	Nagaland	4
		B.Sc.,B.Ed.	NCERT Trg.	Nagaland	1
Kohima English	2	B.Sc.	PGDCS	BDPS, Shillong	3
		B.A.,B.Ed.	PGDCS	BDPS, Shillong	2

Table 62 (Contd.)

Note :- Govt. Hr. Sec. - Government Higher Secondary Trg. - Training ; GEC - Gauhati Engineering College ; NCS - National Computer Systems.

All the 14 teachers were found to be graduate degree holders. Out of these 14 teachers only 10 of them were found to possess diploma in computer science. In two schools Computer Education course was under the CLASS project sponsored by the NCERT, New Delhi, where the teachers (4 in numbers) received training sponsored by NCERT through the Nagaland Government. The experience of these 14 as computer education teachers varied from 1 to 4 years only.

The study indicated that

a) two out of 14 computer education teachers were trained by the NCERT through the Gauhati Engineering College, Guwahati, as the school to which they belonged was under the CLASS project

b) a training programme in Computer Literacy was conducted by the Directorate of School Education, Nagaland during August 1991 for a period of two weeks. The topics of the programme included Welcome package, Word Processor and Computer Based Learning package. Only four out of the 14 teachers underwent the training.

To summarise,

1) The number of computer education teachers in the schools studied at Guwahati, Shillong, Aizawl and Kohima happened to be 18, 24, 10, and 14, respectively, thus making a total of 66.

2) Most of the teachers were graduates with a few having passed only Pre-University course. But, all of them had one or the other qualifications with regard to computers. These details are shown in Table 63 and Table 64.

Table 63 General Qualification of the Computer Education Teachers

Qualification	Guwahati	Shillong	Aizawl	Kohima	Total
Pre-University	1	6	-	-	7
B.A./B.Sc./B.Com.	14	17	2	10	43
B.E.	2	1	-	-	3
M.Sc.	1	-	1	1	3
M.B.A.	-	-	1	-	1
B.Sc.,B.Ed.	-	-	6	2	8
B.A., B.Ed.	-	-	-	1	1
Total					66

Table 64 Qualification of Teachers with regard to Computers

Qualification with regard to computers	Guwahati	Shillong	Aizawl	Kohima	Total
Post Graduate Diploma in Computer Science	14	22	2	10	48
Advance Diploma in Computer Software and Management	3	-	-	-	3
Advance Diploma in Computer Programming	-	1	-	-	1
Certificate Course in Computer (NCERT Training)	-	-	8	4	12
Bachelor of Engineering in Computer Science	1	1	-	-	2
Total					66

3) The experience as computer education teachers ranged from 1 to 5 years in Guwahati, 1 to 8 years in Shillong, and 1 to 4 years in Aizawl and Kohima.

4) Twelve teachers in all (8 in Aizawl and 4 in Kohima) had received CLASS training from the NCERT.

5) Only in Aizawl and Kohima, there were attempts by the SCERT or the State Directorate of Education to organise an orientation/training programme for the computer education teachers. It was found that the response to these programmes was poor on the part of the teachers, as it appeared that these programme needed to pose more challenge and interest for the personnel whom it was meant for. But, even such attempts were lacking in Guwahati and Shillong.

4.3.0. COMPUTER EDUCATION CURRICULUM FOLLOWED IN THE HIGH SCHOOLS

Objective (ii) of the study envisaged the study of the computer education curriculum followed in the high schools. The pooled data collected from the questionnaire to the computer education teachers are presented further. The details of presentation are made under sub-headings, namely, computer education syllabus, evaluation of computer education course, schedule of timing for computer education course, and other points related to the computer education course.

4.3.1.0. COMPUTER EDUCATION SYLLABUS

Computer Education syllabus occupies an important place in the Computer Education programme. It is, therefore, essential to provide an adequate coverage. As such, a wide coverage is put forward to the extent possible.

4.3.1.1. SYLLABUS FOLLOWED FOR THE COMPUTER EDUCATION COURSE

1) TYPE OF SYLLABUS FOLLOWED :

a) Guwahati

In all the ten schools of Guwahati, prescribed syllabus is followed for the Computer Education course. From the available responses it may be seen (Table 65) that in majority of the schools computer education teachers themselves framed the syllabus for teaching Computer Education to the students.

Table 65 Syllabus followed for the Computer Education course in Schools (Guwahati)

Sl. No.	Type of Syllabus	Number of Schools
1.	I.C.S.E. Syllabus	0
2.	C.B.S.E. Syllabus	1
3.	Self-made Syllabus	7
4.	Syllabus framed by Private Computer Institute	2
5.	CLASS Project Syllabus	0
	Total	10

b) Shillong

As in Guwahati, schools in Shillong also followed a prescribed syllabus of Computer Education. As can be seen in Table 66, in most of the schools the syllabus was either formed by the computer education teacher himself/herself or by the private computer institutes which had a contract with the schools in running the Computer Education programme. Only 2 schools did follow I.C.S.E. syllabus and only one school followed the C.B.S.E. syllabus. It was further revealed that students belonging to those schools, where I.C.S.E. syllabus was followed, appeared for I.C.S.E. final examination with 'Computer Studies' as one of the subjects.

Table 66 Syllabus followed for the Computer Education course in Schools (Shillong)

Sl. No.	Type of Syllabus	Number of Schools
1.	I.C.S.E. Syllabus	2
2.	C.B.S.E. Syllabus	1
3.	CLASS Project Syllabus	0
4.	Self-made Syllabus	5
5.	Syllabus framed by Private Computer Institutes	6
	Total	14

c) Aizawl

In Aizawl all the schools were under the CLASS project. As such, the syllabus prescribed by the NCERT for Computer Education course were followed in all these schools. Table 67 shows the details.

Table 67 Syllabus followed for the Computer Education course in Schools (Aizawl)

Sl. No.	Type of Syllabus	Number of Schools
1.	I.C.S.E. Syllabus	0
2.	C.B.S.E. Syllabus	0
3.	CLASS Project Syllabus	4

Table 67 (Contd.)

Sl. No.	Type of Syllabus	Number of Schools
4.	Self-made Syllabus	0
5.	Syllabus framed by Private Computer Institutes	0

d) Kohima

Prescribed syllabus was followed in all the schools of Kohima and the details of which is presented in Table 68. The 2 schools which were covered under the CLASS project followed the corresponding syllabus, 2 schools followed syllabus prepared by the teacher himself/herself, and the other 2 schools followed the syllabus offered by the private computer institutes with which they had contracts.

Table 68 Syllabus followed for the Computer Education course in Schools (Kohima)

Sl. No.	Type of Syllabus	Number of Schools
1.	I.C.S.E. Syllabus	0
2.	C.B.S.E. Syllabus	0
3.	CLASS Project Syllabus	2
4.	Self-made Syllabus	2
5.	Syllabus framed by Private Computer Institutes	2
	Total	6

Summing up,

It was noticed that there was no uniformity in the syllabus followed by the schools. In all, 5 different types of syllabi were followed in the schools of Guwahati, Shillong, Aizawl, and Kohima. They were, I.C.S.E. syllabus; C.B.S.E. syllabus ; CLASS Project syllabus ; teacher-made syllabus ; and syllabus framed by the private computer institutes with which some of the schools had a contract. The number of schools falling under each of these categories are shown in Table 69.

Table 69 Syllabus followed for the Computer Education course in Schools

Sl. No.	Type of Syllabus	Number of Schools
1.	I.C.S.E. Syllabus	2
2.	C.B.S.E. Syllabus	2
3.	CLASS Project Syllabus	6
4.	Self-made Syllabus	14
5.	Syllabus framed by Private Computer Institutes	10
	Total	34

2) OBJECTIVES AS EXPRESSED BY THE COMPUTER EDUCATION TEACHERS :

Since, the syllabus followed by the computer education teachers varied to a great extent, and as many teachers framed their own syllabi, information was obtained as to the objectives they kept in mind for teaching the course. These objectives were pooled in a meaningful way. They could be stated as follows :

(i) To develop computer awareness among the students ;

(ii) To prepare students for future ;

(iii) To develop basic concepts in Computer Education among students ;

(iv) To develop ability to solve problems systematically, logically and efficiently.

3) STUDY MATERIALS FOR COMPUTER EDUCATION COURSE :

a) Guwahati

In fifty percent of the schools in Guwahati, students did follow a prescribed textbook for the Computer Education course. Out of the 10 schools, only in 3 schools, textbooks were provided by the private computer institutes, who themselves had prepared these textbooks. In 2 schools, books on computers were recommended by the schools. Notes were provided by the teachers to the students in the remaining 5 schools.

Only in 6 out of these 10 schools, books on Computer Education were available in the school library. But, in one of these schools, only teachers had an access to these books.

b) Shillong

In about 86 percent (that is 12 out of 14) high schools, prescribed textbook was followed by the students. In 10 out of these 12 schools, textbooks were provided by the private computer institutes who ran the course in the school.

Only in 8 out of the 14 schools, books on Computer Education were available in the school library, and these were made available to both the teachers and students.

c) Aizawl

NCERT supplied the textbook entitled "BBC Micro" to all the four schools of Aizawl. These books were placed in the library and were made available to both the teachers and students. Apart from the textbook, the teachers also prepared and provided notes to the students.

d) Kohima

In three out of 6 schools, students followed a prescribed textbook on Computer Education. In the remaining 3 schools students were provided with teacher-made notes.

Only in 4 out of the 6 schools, books on Computer Education were available in the school library and these were made available to both students and teachers.

Summing up,

It was found that a text book was prescribed and followed in 22 out of 34 schools.

Again in 22 out of 34 schools, books on Computer Education were available in the school library. These books were made available to both students and teachers in only 21 schools and in the rest only teachers had an access to the books.

4) LEARNING OF COMPUTER PROGRAMME AND LANGUAGES :

(i) Learning of Computer Programme :

a) Guwahati

Students in all the 10 schools were taught how to write a computer programme. But the class from which this is introduced varied among schools. Details about this are shown in Table 70.

Table 70 Computer programme for the students in schools (Guwahati)

Students learn to write computer programme from class	Number of Schools
III	1
IV	2
V	2
VI	3
VII	1
VIII	1

It was found that the programmes written by the students were generally shown to the teachers and then the same were fed in computer by students. On a number of occassions, students directly entered the data of the programme into the computer and confirmed the same.

b) Shillong

Students in all the 14 schools were taught how to write a computer programme. But the class from which this is introduced varied among schools. Details about this are presented in Table 71.

Table 71 Computer programme for the students in schools (Shillong)

Students learn to write computer programme from Class	Number of Schools
IV	3
V	3
VI	2
VII	2
VIII	4

To ensure the correctness of computer programme written by them, the students in all the schools fed the programme into the computer after getting it checked by the teachers.

c) Aizawl

Computer programme was not taught to the students belonging to the schools of Aizawl according to the available responses from the teachers.

d) Kohima

Students in 4 out of 6 schools were taught how to write a computer programme. But the class from which this is introduced varied among schools. Details about this are

presented in Table 72.

Table 72 Computer programme for the students in schools (Kohima)

Students learn to write computer programme from Class	Number of Schools
III	1
VI	2
VIII	1

It was observed that the programme written by the students were generally shown to the teachers and then the same were fed in computer by students.

To sum up, it was found that

Students in only 28 out of 34 schools were taught computer programming, the class from which this is done being varied. Table 73 depicts such variation.

Table 73 Computer programme for the students in schools

Students learn to computer programme from Class	Number of Schools				
	Guwahati	Shillong	Aizawl	Kohima	Total
III	1	-	-	1	2
IV	2	3	-	-	5
V	2	3	-	-	5
VI	3	2	-	2	7
VII	1	2	-	-	3
VIII	1	4	-	1	6
Total					28

It may be seen from the Table 73 that in most (about 71 percent) of these schools, students were acquainted with computer programming even before reaching the high school (that is Class VIII). In all the schools where computer programming was taught, the students were allowed to test the programme on the computer.

On a further look into the syllabus followed, it was noticed that in all the above 28 schools, Computer Arithmetic and Computer Logic were taught to the students.

(ii) Computer Languages -

a) Guwahati

Table 74 depicts the various computer languages learnt by the students in the schools of Guwahati. BASIC which is one of the computer languages is taught in all the schools. In about 80 percent (8 out of 10) of the schools, students had the facility to learn more computer languages in addition to BASIC.

Table 74 Computer Languages taught in the schools (Guwahati)

Computer Language	Number of Schools
Only BASIC	2
BASIC and WORDSTAR	1
BASIC and LOGO	2
BASIC, WORDSTAR and LOGO	3
BASIC, LOGO and DOS	1
BASIC, WORDSTAR, LOGO and dBASE III	1

b) Shillong

Like the schools of Guwahati, BASIC is taught in all the schools of Shillong. Only in fifty percent (7 out of 14) schools, students had the provision for learning two

or three computer languages as shown in Table 75.

Table 75 Computer Languages taught in the schools (Shillong)

Computer Language	Number of Schools
Only BASIC	7
BASIC and WORDSTAR	2
BASIC and LOGO	1
BASIC, WORDSTAR and LOGO	1
BASIC, WORDSTAR and dBASE III	1
BASIC, WORDSTAR, LOGO and DOS	2

c) Aizawl

BASIC was the only computer language taught in the schools of Aizawl. Additional languages were not taught.

d) Kohima

In the schools of Kohima, BASIC language was taught in all the 6 schools. Only in two schools, students had the scope for learning one more language besides BASIC as is depicted in Table 76.

Table 76 Computer Languages taught in the schools (Kohima)

Computer Language	Number of Schools
Only BASIC	4
BASIC and LOGO	2

To sum up,

It was found that all the schools taught the computer language BASIC. However, some schools taught other computer languages also, in addition to BASIC. A detailed picture of the number of schools teaching the different computer languages is shown in Table 77.

Table 77 Computer Languages taught in the schools

Computer Language	Number of Schools
Only BASIC	17
BASIC, WORDSTAR	3
BASIC and LOGO	5
BASIC, WORDSTAR and LOGO	4
BASIC, LOGO and DOS	1
BASIC, WORDSTAR and dBASE III	1
BASIC, WORDSTAR, LOGO and DOS	2
BASIC, WORDSTAR, LOGO and dBASE III	1
Total	34

It was also found that in 19 schools, provision was made for the students to play computer games. The split of such schools happened to be 9 in Guwahati, 4 in Kohima, 6 in Shillong and none in Aizawl.

5) COMPUTER EDUCATION CLASSES :

All the 34 schools located at various places, namely, Guwahati, Shillong, Aizawl and Kohima, had the facility of both theory and practical classes for the Computer Education course. But, in the schools under CLASS project (4 in Aizawl and 2 in Kohima), practical classes were restricted to only demonstration on computers by teachers alone.

4.3.1.2. EVALUATION OF COMPUTER EDUCATION COURSE

In all the schools included in the study at Guwahati, Shillong, Aizawl and Kohima, the performance of the students in the Computer Education course was evaluated, either through class tests or terminal tests and final examination at the end of each grade. Since the study was concentrating on the high schools, the data pertaining to this aspect were collected for Classes VIII, IX and X. Table 78 presents the same.

Table 78 Method of Evaluation of Computer Education course

Method of evaluation conducted for Classes VIII, IX, X	Number of Schools				
	Guwahati	Shillong	Aizawl	Kohima	Total
Class Test	-	-	4	2	6
Terminal and Final examinations (only theoretical)	7	8	-	-	15
Theoretical and Practical examinations	3	6	-	4	13

On further enquiry, it was found that in two schools in Shillong which followed the ICSE syllabus, the Class X final examination was that conducted by the ICSE authorities, New Delhi. This examination included both theory and practical components.

A teacher derives satisfaction if he/she finds the performance of the students in the tests/examinations as good. Table 79 presents the responses of the teachers expressing the extent of satisfaction derived after evaluating students' performance.

Table 79 Extent of satisfaction derived by the teachers after evaluating students' performance in Computer Education course

Amount of Satisfaction	Number of Respondents				
	Guwahati	Shillong	Aizawl	Kohima	Total
Very Great extent	6	16	-	-	22
Considerable extent	12	7	-	12	31
Less extent	-	1	10	2	13
No satisfaction	-	-	-	-	-
Total					66

Table 79 indicates that out of the total of 66 teachers studied, 22 (33.33 percent) expressed satisfaction to a 'Very Great extent', 31 (about 47 percent) expressed satisfaction to a 'Considerable extent' and 13 (little less than 20 percent) expressed satisfaction to a 'Less extent'.

In 28 out of 34 schools the students who opted for the Computer Education course were rewarded either by issuing a certificate or their marks being entered in the progress report. In some schools both certificate and marks were

awarded. The distribution of number of schools following the different practices of reward is shown in Table 80.

Table 80 Type of Reward Students receive at the end of Computer Education course

On completion of Computer Education Students were awarded with	Number of Schools				
	Guwahati	Shillong	Aizawl	Kohima	Total
A diploma	-	-	-	-	-
A certificate	5	2	-	4	11
Marks being entered in the progress report	3	8	-	-	11
Certificate and marks	2	4	-	-	6
Nothing	-	-	4	2	6
Total					34

It was found that the six schools (4 in Aizawl and 2 in Kohima) which did not have any mechanism of rewarding the students who underwent the Computer Education course were those who were under the CLASS project.

Not a single did undertake any follow-up of the students who had successfully completed the course.

4.3.1.3. SCHEDULE OF TIMING FOR COMPUTER EDUCATION COURSE

Referring to the heading "Computer Education Classes" under the caption 4.3.1.1., mention was made about the facility for both theoretical and practical classes for the Computer Education course in the schools under study. In this section, it is seen the manner in which these classes were scheduled.

As already indicated, except for the schools which followed the CLASS project (4 in Aizawl and 2 in Kohima), in the remaining 28 schools, facility for performing practical work on computer by students existed.

For the purpose of practical work, in all these schools the class was divided into small groups of students and by suitable time scheduling each group worked independently on the computer terminals.

On an average, each student in the schools of Guwahati could devote 40 minutes of time for practical work per week, whereas in the schools of Shillong the time alloted for each student was about 3 hours per week, and in case of the schools situated at Kohima the time was around one hour per week per student. In most of the schools practical work was arranged in the latter half of the day.

It was also found that during the academic year, theory and practical work were not divorced from each other but were held side by side in all the 28 schools where practical work was carried out by students. In the 6 schools (4 in Aizawl and 2 in Kohima) where CLASS project was in operation, demonstration on computers were interpersed with the theory classes. The data which were obtained in this regard are provided in Table 81.

Table 81 Theory and Practical work schedule during the Academic Year

Nature of Schedule	Number of Schools				
	Guwahati	Shilling	Aizawl	Kohima	Total
Practical work is carried out in the latter part of the year after completing the theory classes	-	-	-	-	-
Both theory and practical classes are held side by side right from the beginning of the year	10	14	-	4	28
The first one or two years are devoted to theory classes and the last year is entirely devoted to practical work	-	-	-	-	-
Demonstration on computers interspersed with theory classes	-	-	4	2	6

4.3.1.4. OTHER POINTS RELATED TO COMPUTER EDUCATION COURSE

Following are the points which were compiled by the responses of the teachers through the questionnaire.

1. INTEREST OF STUDENTS TOWARDS THE COURSE :

Majority of the teachers have felt that the interest of students towards Computer Education course is increasing. Table 82 shows the opinions of teachers in this regard.

Table 82 Teachers' opinions about the Trend of Interest among Students towards the Computer Education course

Trend	Number of Teachers				
	Guwahati	Shillong	Aizawl	Kohima	Total
Increasing rapidly	4	12	-	-	16
Increasing moderately	14	10	5	13	42
Decreasing slowly	-	-	-	-	-
Decreasing rapidly	-	-	2	-	2
Is same (neither increasing nor decreasing) since the course was introduced in the school	-	2	3	1	6
Total					66

Though the trend of interest is quite encouraging, the teachers' own judgement about the success of the course based on the performance of the students (as shown in Table 83) indicates an average note.

Table 83 Teachers' opinion about the Success of ongoing Computer Education course

Success rate	Number of teacher respondents				
	Guwahati	Shillong	Aizawl	Kohima	Total
Very high	5	3	-	-	8
High	5	10	-	3	18
Average	8	11	10	11	40
Low	-	-	-	-	-
Very low	-	-	-	-	-

2. INCLUSION OF THE COURSE IN THE HIGH SCHOOL CURRICULUM :

Except for one teacher from Aizawl, other 65 teachers expressed that the Computer Education course must be included in the high school curriculum as a compulsory subject.

About 59 percent of the teachers supported the recommendation of early introduction of Computer Assisted

Learning for various subjects like mathematics, science, etc. in the schools. Such teachers who were not in favour of the recommendation pointed out that the schools are inadequately equipped with limited resources and under such circumstances it is not worthwhile to launch Computer Assisted Learning technique for different subjects.

3. SATISFACTION OF TEACHERS ABOUT THE COMPUTER SETS INSTALLED :

About 61 percent of the teachers expressed satisfaction with the computer sets installed in their school. Those who expressed dissatisfaction attributed the reason for it to the less number of sets installed, limited scope of application of various languages, the computer-student ratio being high, or the capacity of computer(s) to store information being less.

4. REACTION OF PARENTS TOWARDS THE COURSE AS ENVISAGED BY TEACHERS :

According to the teachers, the reaction of most of the parents towards the Computer Education course indicate the following -

(i) Majority of the parents are very optimistic about the Computer Education course

(ii) Most of them are encouraging and motivating their children to acquire knowledge in Information

Technology

(iii) There is a positive approach on the part of the parents and hence the Computer Education course is strongly recommended by them

(iv) Great amount of satisfaction is expressed by the parents about the Computer Education course.

5. SUGGESTIONS BY TEACHERS FOR THE IMPROVEMENT OF THE COMPUTER EDUCATION COURSE :

On a majority, the following suggestions were put forth by teachers for the improvement of the course.

(i) Computer Education must be introduced as a compulsory subject in schools

(ii) Suitable Computer Education syllabus needs to be developed

(iii) Respective State Board of Secondary Education should treat the Computer Education course as one of the compulsory subjects and start conducting examinations for the same

(iv) To facilitate a proper ratio between computer and students, there is a need for more number of computer sets

(v) Books on Computer Education course are to be made available both for students and teachers

(vi) Training of teachers for the Computer Education course merits due attention

(vii) Activities like holding debates, quiz, seminars, in the field of Computer Education are required

(viii) Proper facilities have to be made by the schools for the maintenance of computers.

4.4.0. VIEWS OF TEACHERS ABOUT CERTAIN ASPECTS OF COMPUTER EDUCATION

The earlier captions 4.2.0. and 4.3.0. have tried to highlight the facilities available and the curriculum followed in the Computer Education course in the high schools covered. At certain points, it also highlighted the opinion of teachers on some aspects. In this caption an attempt is made in greater details to find out the views of teachers about certain aspects of Computer Education in general. The pooled data collected from the questionnaire to the computer education teachers (refer caption 3.3.1.) are presented further. Towards this effect the response of the teachers were grouped and analysed in a suitable manner. This is presented as further.

The responses on items with regard to what the teachers felt about students' learning or achievement are shown in Table 84.

Table 84 Views of Teachers about Students' Learning or Acievement

Sl. No.	Items	Number of Responses				
		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1.	Knowledge and Skills acquired by the learners will help them in this competitive world.	22 (33.33)	44 (66.67)	0 (00.00)	0 (00.00)	0 (00.00)
2.	Computer Education in schools assist in improving the overall level of student achievement.	15 (22.73)	43 (65.15)	4 (6.06)	4 (6.06)	0 (00.00)
3.	Computer Literacy aims to prepare the student's for work and living.	15 (22.73)	33 (50.00)	11 (16.67)	6 (9.09)	1 (1.51)
4.	Computer Education helps in increasing student's reasoning power.	29 (43.93)	33 (50.00)	2 (3.03)	2 (3.03)	0 (00.00)
5.	The purpose for teaching Computer Education programming to school students is to improve their problem solving and logical thinking skills.	27 (40.91)	37 (56.06)	2 (3.03)	0 (00.00)	0 (00.00)

Table 84 (Contd.)

Sl. No.	Items	Number of Responses				
		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
6.	Students who opted for Computer Education course are always curious in knowing more and more about computers.	31 (46.97)	26 (39.40)	8 (12.12)	1 (1.51)	0 (00.00)
7.	One of the aims of introducing Computer Education in schools is to provide the students with a basic knowledge of new information technologies, both to assist them in their studies and to make them aware of their technological environment.	42 (63.64)	22 (33.33)	2 (3.03)	0 (00.00)	0 (00.00)
8.	Students are highly influenced by their parents for undertaking the Computer Education course.	14 (21.21)	15 (22.73)	26 (39.40)	11 (16.66)	0 (00.00)

(Note :- Figures in the parantheses indicate percentages)

From the Table 84 it may be noted that majority of the teachers feel that Computer Education helps the students to achieve better in other subjects, and promotes reasoning power and problem solving abilities. It provides the students with the required knowledge and skills to keep them abreast with the technological developments and make them better equipped for their work life.

The next set of responses on items in relation to teachers' views about teaching-learning process in the class are shown in Table 85.

Table 85 Views of Teachers about Teaching-Learning process in the class

Sl. No.	Items	Number of Responses				
		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1.	Programming in Computer Education course can begin at high school stage itself.	15 (22.73)	32 (48.49)	3 (4.54)	14 (21.21)	2 (3.03)
2.	Students are very enthusiastic to learn in Computer Education classes.	19 (28.79)	39 (59.09)	4 (6.06)	4 (6.06)	0 (00.00)
3.	Motivation of the students towards Computer Education persists till the end of the academic year.	3 (1.54)	38 (57.57)	8 (12.12)	16 (24.24)	1 (1.51)
4.	Students face much difficulty in doing practical work on computers.	3 (4.54)	17 (25.76)	5 (7.57)	30 (45.45)	11 (16.68)
5.	To learn about Computer Literacy, students do not require to be well versed with fundamental operations of arithmetic.	3 (4.54)	41 (62.12)	4 (6.06)	13 (19.10)	5 (7.58)

Table 85 (Contd.)

Sl. No.	Items	Number of Responses				
		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
6.	During practical class, teacher's assistance is constantly required by the students.	15 (22.73)	36 (54.55)	1 (1.51)	14 (21.21)	0 (00.00)
7.	It is quite difficult to make the students understand some of the basic concepts of Computer Education.	1 (1.51)	27 (40.91)	7 (10.61)	21 (31.82)	10 (15.15)
8.	Each student gets enough instructional time during the course.	14 (21.21)	25 (37.88)	6 (9.09)	20 (30.31)	1 (1.51)
9.	Students are able to grasp a topic very rapidly very when practical demonstration is carried out during a Computer Education class.	21 (31.82)	29 (43.94)	8 (12.12)	8 (12.12)	0 (00.00)
10.	Computer Education course is suitable for above average students.	8 (12.12)	36 (54.54)	7 (10.61)	11 (16.67)	4 (6.06)
11.	Solving problems on a computer in a productive way requires two types of abilities, namely, mental and operational.	33 (50.00)	32 (48.49)	0 (00.00)	1 (1.51)	0 (00.00)

(Note : Figures in the parantheses indicate percentages)

The given Table 85 highlights certain interesting facts. Responses obtained from the teachers reveal that students were enthusiastic as well as motivated in learning about Computer Education in class. Further, most of the teachers viewed that no specialised knowledge of arithmetic is essential for learning about Computer Litracy. About fortyseven percent of the respondent teachers expressed that they felt no difficulty in making the students understand about the basic concepts of Computer Education, while about fortytwo percent do not feel so. But, majority of the teachers have indicated that students were able to understand the concepts of Computer Education course easily when practical demonstration was performed. Regarding the practical work by students, majority of the teachers feel that students do not find difficulty in carrying out practicals, though the students seek continuous assistance. Though majority of the teachers feel that Computer Education course is suitable for above average students, yet they have expressed that programming in Computer Education course may be introduced at high school stage itself.

Responses on items with regard to views of teachers about the available facilities in their respective schools are shown in Table 86.

Table 86 Views of Teachers about the Available Facilities for conducting Computer Education course

Sl. No.	Items	Number of Responses				
		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1.	In my school the balance between the number of students and the number of computer(s) is not adequate.	11 (16.67)	31 (46.97)	3 (4.54)	14 (21.21)	7 (10.61)
2.	More infra-structural/Physical facilities (like separate computer room, books on computers, computer sets) need to be provided by the school for Computer Education course.	29 (43.94)	31 (46.97)	4 (6.06)	2 (3.03)	0 (00.00)
3.	School Library needs to be strengthened by books on Computer Education.	30 (45.46)	32 (48.49)	3 (4.54)	1 (1.51)	0 (00.00)
4.	Computer Education Club must exist in Schools having Computer Education.	24 (36.36)	35 (53.03)	7 (10.61)	0 (00.00)	0 (00.00)

(Note :- Figures in the parantheses indicate percentages)

The responses indicate that majority of the teachers feel that the number of computers in the school for undertaking the Computer Education course is not adequate. Further, they have indicated the need for the improvement of other physical facilities like computer rooms and library facilities in relation to Computer Education course.

Responses on items related to the training of teachers of Computer Education are given in Table 87.

Table 87 Views of Teachers about the Training of Teachers of Computer Education

Sl. No.	Items	Number of Responses				
		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1.	Orientation courses (like training, short term course) in Computer Education are very essential for all the teachers in high schools.	25 (37.88)	32 (48.49)	6 (9.09)	2 (3.03)	1 (1.51)
2.	A multi-media training package on Computer Education is essential for teacher training in Computer Education.	27 (40.92)	32 (48.49)	3 (4.54)	3 (4.54)	1 (1.51)
3.	Every year the teachers teaching Computer Education at the school level must have the opportunity for attending short term courses specially designed for teaching in schools.	30 (45.46)	28 (42.42)	1 (1.51)	1 (1.51)	6 (9.10)

(Note :- Figures in the parantheses indicate percentages)

It may be noted that majority of the teachers feel the need for orientation courses in Computer Education, particularly designed for the teaching aspect in schools. They have also indicated the need for multi-media packages for teacher training in the field of Computer Education.

The responses on items with regard to what the teachers viewed about the social benefits of Computer Education on society is presented in Table 88.

Table 88 Views of Teachers about the Social Benefits of Computer Education

Sl. No.	Items	Number of Responses				
		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1.	The use of Computers in schools is directly related to the development of the types of skills needed for higher level of national economy.	13 (19.69)	34 (51.52)	12 (18.18)	7 (10.61)	0 (00.00)
2.	Knowhow of Computer Literacy at the school level will help in increasing the productivity of the nation.	14 (21.21)	38 (57.58)	11 (16.67)	3 (4.54)	0 (00.00)
3.	Computer Education has a lot of potential in country's development.	19 (28.79)	44 (66.67)	3 (4.54)	0 (00.00)	0 (00.00)
4.	Students are aware of ways in which the world is being changed by technology.	13 (19.69)	38 (57.58)	5 (7.58)	8 (12.12)	2 (3.03)
5.	The computer is becoming man's intellectual instrument and partner in nearly all spheres of human life	35 (53.03)	23 (34.85)	4 (6.06)	4 (6.06)	0 (00.00)

Table 88 (Contd.)

Sl. No.	Items	Number of Responses				
		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
	and activity.					
6.	Knowledge of Computers will assist in finding good jobs.	43 (65.16)	20 (30.30)	2 (3.03)	1 (1.51)	0 (00.00)

(Note :- Figures in the parantheses indicate percentages)

Looking at the responses in the Table 88, it may be observed that majority of teachers have felt that students are aware of the ways in which the world is being changed by technology. They have also felt that computers will play a great role in a number of areas of human activity and that Computer Education to the students go a long way in national development.

An overview of the analysis of the responses made by the teachers may be put forth as follows :

1) Majority of the teachers felt that reasoning power and overall achievement of the students improve through Computer Education. Knowledge and skills acquired from the Computer Education will certainly benefit the students in their work life.
2) Students seemed to be enthusiastic and motivated in learning Computer Education, as perceived by the teachers. It was found that teachers were able to understand the demands, weak points as well as strong points of the students to a great extent.
3) The need for the provision of adequate facilities for conducting Computer Education classes was felt by most of the teachers.
4) The need for holding orientation or training programmes on Computer Education was expressed by the teachers.

5) Most of the teachers agreed that Computer Education is sure to benefit the society in a number of ways and for this reason it is of utmost importance to provide this education right from the school level. Not only Computer Education will generate technological awareness among the students, but also will develop the mental as well as operational skills of the students.

4.5.0. VIEWS OF STUDENTS ABOUT CERTAIN ASPECTS OF THE COMPUTER EDUCATION COURSE

The responses of students (N = 1,142) ; Boys - 605, Girls - 537) on the questionnaire (see caption 3.3.2.) were analysed. The analysis has tried to highlight on

(i) their purpose of learning the Computer Education course ;

(ii) their views on certain aspects of the Computer Education course ;

(iii) their perception about the influence of Computer Education course on learning other school subjects;

(iv) their liking for working with computers at a later time ;

(v) their identification of the various uses of computers;

(vi) their interactions with the peer group.

The details of the findings are presented further keeping the same order as mentioned above.

4.5.1. PURPOSE OF LEARNING THE COMPUTER EDUCATION COURSE

Responses obtained from the students in relation to the purpose of learning Computer Education course is presented in Table 89.

Table 89 Purpose of learning Computer Education course according to the students

Purpose	Number of Responses				
	Guwahati	Shillong	Aizawl	Kohima	Total
To increase knowledge	360	345	103	219	1,027 (89.93)
To learn for the sake of learning	21	26	-	36	83 (7.26)
To fulfil parents' desire	6	12	-	-	18 (1.57)
To increase my status among friends	4	6	2	2	14 (1.24)

(Note :- Figures in the parantheses indicate percentages)

As may be seen, about 90 percent of students learn the course to increase their knowledge, about 7 percent of

students learn for the sake of learning, about 2 percent learn to fulfil their parents' desire, and about 1 percent learn the course to increase one's status among friends.

4.5.2.0. VIEWS ON CERTAIN ASPECTS OF THE COMPUTER EDUCATION COURSE

These views concern about the physical facilities available, syllabus followed, learning materials, schedule of timing, and examinations conducted. Each one of them is presented separately.

4.5.2.1. VIEWS ABOUT PHYSICAL FACILITIES

The students, on the whole, expressed satisfaction with regard to the facilities available to them in the Computer Education classes, though about 86 percent (out of 1,142) of them have expressed that more number of computer sets may be installed in the schools.

4.5.2.2. VIEWS ABOUT SYLLABUS FOLLOWED

Students from three schools (out of 34 schools) only have expressed that greater opportunities be provided to them to work on the computers so that they can practically try the theoretical knowledge they had acquired. It may be noticed that these schools happened to be working exclusively

under the CLASS project.

4.5.2.3. VIEWS ABOUT LEARNING MATERIALS

It may be noted that students were exposed to a variety of learning materials like text books, materials provided by the school, reference books and notes given by teachers. In all the schools students could buy the textbooks, if they wish. Only in four out of 34 schools, learning materials in the form of manuals, work books, and guide books, were provided to the students. In some schools reference books were available in the school library. But all the teachers provided notes for learning to the students.

Though they were exposed to a variety of learning materials, the students have indicated that they rely mostly on the notes given by teachers. Majority of students, particularly from Guwahati, Shillong, and Kohima, have expressed the need for books which are simple and easy to understand and illustrated through the diagrams.

4.5.2.4. VIEWS ABOUT THE SCHEDULE OF TIMING FOLLOWED

In a majority (25 out of 34) of schools, the number of theory and practical classes were found to be one each per week. In such schools, about 73 percent of the students

have expressed their dissatisfaction with regard to the existing schedule, particularly for the practical classes. Further, they have expressed the need to increase the number of practical classes to at least two.

4.5.2.5. VIEWS ABOUT THE EXAMINATIONS CONDUCTED

Majority of the schools conducted two or three examinations per year as can be seen from Table 90.

Table 90 Number of Examinations conducted in Computer Education course in Schools

Number of Examinations	Number of Schools				
	Guwahati	Shillong	Aizawl	Kohima	Total
1	-	-	1	1	2
2	7	7	-	1	15
3	2	6	3	4	15
4	1	1	-	-	2
Total	10	14	4	6	34

Majority (95 percent out of 1,142) of the students were found to be satisfied with the number of examinations conducted for the Computer Education course.

4.5.2.6. VIEWS ABOUT TEACHING OF THE COURSE

Majority (62 percent out of 1,142) of the students have expressed the need for teachers who are qualified and who can teach in a clear and interesting manner.

4.5.3. PERCEPTION ABOUT THE INFLUENCE OF COMPUTER EDUCATION COURSE ON LEARNING OTHER SCHOOL SUBJECTS

As many as 39 percent of the students have perceived that the Computer Education course helps them in learning other school subjects. Analysis also indicates their perception in relation to the specific school subjects as shown in Table 91.

Table 91 Subjects which get helped in their Learning as a result of Computer Education course (as perceived by the students)

Subjects	Number of Responses				
	Guwahati	Shillong	Aizawl	Kohima	Total
Mathematics	96	115	7	33	251 (56.53)
Science	26	38	-	21	85 (19.14)
English	28	11	-	-	39 (8.78)
Other Subjects	41	24	-	4	69 (15.55)

(Note :- Figures in the parantheses indicate percentages)

4.5.4. LIKING TO WORK COMPUTERS AT A LATER TIME

Table 92 shows the responses of students on three choices, namely ; 'Yes', 'Cannot Say', and 'No', to indicate their liking to work with computers at a later time.

Table 92 Students' Responses to indicate their liking to work with Computers at a later time

Like to work with Computers	Number of Responses				
	Guwahati	Shillong	Aizawl	Kohima	Total
Yes	245	192	28	52	517 (45.27)
Cannot Say	127	173	56	157	513 (44.92)
No	19	24	21	48	112 (9.81)

(Note :- Figures in the parantheses indicate percentages)

It may be seen that about 45 percent like and an almost equal percent of students undecided on the issue. Only about 10 percent do not like to work on computers later in their lives.

4.5.5. IDENTIFICATION OF THE VARIOUS USES OF COMPUTERS

A variety of uses of computers were pointed out by the students. The list of uses as pointed out by the students from the four places are highlighted in a compact form.

The areas in which computers are used according to the students of Guwahati are - Scientific work, Business, Filing, Data Processing, Entertainment, Medical, Engineering, Bank, School, Railways, Education, Industry, Booking, Stocks, Storage, Media, Law and Order, Airports, Hospitals, Accounts, Transport, Trade and Commerce, Research, Communication, Police, Space, Agriculture, Criminal detection, Management, and Home.

According to the students of Shillong the areas are - Research work, Engineering, Medical, Railways, Hospital, Satellite Communication, Entertainment, Airways, Shops, Industries, Accounting, Resturants, Offfices, Banks, Market place, Storage, Mass Media, Income Tax, University, and Receptions.

According to the students of Aizawl areas pointed are - Office work, Shops, Banks, Home and School.

According to the students of Kohima the areas are - Calculations, Filing, Videogames, Solving mathematical problems, Storage of data, Games, Drawing, Studying, Working, Entertainment, Education, Medical, Transport, Business, Railways, Communication, Industries, and Shops.

From the above mentioned uses of computer expressed by students, it may be observed that the number of areas pointed by them varies according to places as stated below.

Place	Number of Areas in which computers are used according to the Students
Guwahati	29
Shillong	20
Aizawl	5
Kohima	18

The implication of this is that Guwahati being the linking city for all the North Eastern States, the place is growing and developing in every field of human activity quite rapidly and this is one of the vital reasons that students from this place could identify quite a number of important areas where computers are used. Since Shillong is nearer to Guwahati and also the place is one of the important educational centres in the North Eastern Region, students from this place could identify a number of important areas where computers are put into use but, the number of areas pointed out by the students from this place are less compared to the areas pointed by the students from Guwahati. Though Kohima and Aizawl are capital towns of two States, the places are a bit isolated

It may be concluded from the Table 93 that a majority (87 percent out of 1,142) of the students do interact with their peers on different aspects of computers.

4.6.0. PERFORMANCE OF STUDENTS IN THE COMPUTER EDUCATION COURSE

As was already mentioned in caption 3.3.0. (para 4), and 3.2.0. (Table 15(a)), the performance of students studying under the Indian Certificate of School Education (ICSE) syllabus from two schools of Shillong only provided the data for consideration under this objective.

The performance on both theory and practical aspects were considered. A copy of the theory question paper for the year 1993 is provided in **Appendix 8.** Also, the ICSE syllabus for Computer Studies is attached for reference vide **Appendix 9**).

The marks obtained by students (N = 55) on the above examination is provided in Table 94.

Table 94 Marks obtained by the Students in Computer Studies in the ICSE examination (N = 55)

Sl. No. of the Student	Marks obtained	Sl. No. of the Student	Marks obtained	Sl. No. of the Student	Marks obtained
1.	88	19.	88	37.	86
2.	83	20.	92	38.	78
3.	72	21.	64	39.	60
4.	80	22.	69	40.	72
5.	80	23.	76	41.	60
6.	90	24.	62	42.	66
7.	92	25.	88	43.	66
8.	60	26.	86	44.	62
9.	74	27.	69	45.	60
10.	66	28.	86	46.	60
11.	86	29.	66	47.	76
12.	86	30.	86	48.	86
13.	83	31.	95	49.	66
14.	69	32.	90	50.	69
15.	90	33.	64	51.	86
16.	62	34.	72	52.	74
17.	66	35.	62	53.	72
18.	60	36.	72	54.	54
				55.	83

Analysis of the data showed the following :

1. The lowest marks obtained in 54 and the maximum marks obtained is 95. Thus the range of scores happens to be 41.

2. The mean and standard deviation of the scores are calculated as follows

Scores	f	fX	d = M - X	d^2	fd^2
54	1	54	- 20.73	429.7329	429.7329
60	6	360	- 14.73	216.9729	1,301.8374
62	4	248	- 12.73	162.0529	648.2116
64	2	128	- 10.73	115.1329	230.2658
66	6	396	- 8.73	76.2129	457.2774
69	4	276	- 5.73	32.8329	131.3316
72	5	360	- 2.73	7.4529	37.2645
74	2	148	- 0.73	0.5329	1.0658
76	2	152	1.27	1.6129	3.2258
78	1	78	3.27	10.6929	10.6929
80	2	160	5.27	27.7729	55.5458
83	3	249	8.27	68.3929	205.1787
86	8	688	11.27	127.0129	1,016.1032
88	3	264	13.27	176.0929	528.2787
90	3	270	15.27	233.1729	699.5187
92	2	184	17.27	298.2529	596.5058
95	1	95	20.27	410.8729	410.8729
Total	55	4110			6,762.9095

$$\text{Mean } (X) = \frac{\Sigma f X}{N}$$

$$= \frac{4110}{55}$$

$$= 74.727$$

$$= \mathbf{74.73}$$

$$\text{Standard Deviation (S.D.)} = \sqrt{\frac{\Sigma f d^2}{N}}$$

$$= \sqrt{\frac{6762.9095}{55}}$$

$$= \sqrt{122.962}$$

$$= \mathbf{11.09}$$

Thus, the mean and standard deviation of the scores are found to be **74.73** and **11.09** respectively.

4.7.0. RELATIONSHIP BETWEEN THE PERFORMANCE OF STUDENTS IN THE COMPUTER EDUCATION COURSE AND THEIR PERFORMANCE IN OTHER SCHOOL SUBJECTS

In caption 4.6.0. an analysis of the performance of students in the Computer Education course was presented. Under this caption an attempt is being made to find out whether

there exists any relationship between the performance of students in the Computer Education course and in other school subjects, namely,

(a) English

(b) Second Language

(c) History, Civics, Geography (All these three are considered under one paper in the examinations)

(d) Mathematics

(e) Science

The marks obtained by the sample of 55 students (refer caption 3.2.0. Table 15a) in "Computer Studies" and in other school subjects is presented in **Appendix 10.** Correlation between the performance of students on various subjects were calculated. The details of these calculations are presented hereby.

(a) Relationship between Computer Studies and English

The relationship between the two subjects Computer Studies and English was found out by calculating the product-moment coefficient of correlation between the scores obtained by the sample of students in the two subjects. The calculations are as follows :

Computer Studies (X)	**English (Y_1)**
$\Sigma X = 4,110$	$\Sigma Y_1 = 4,241$
$\Sigma X^2 = 31,3,892$	$\Sigma Y_1^2 = 33,3,503$

$$\Sigma XY_1 = 32,0,708$$

$$N = 55$$

$$r = \frac{N \Sigma XY_1 - (\Sigma X)(\Sigma Y_1)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y_1^2 - (\Sigma Y_1)^2]}}$$

$$= \frac{(55)(320708) - (4110)(4241)}{\sqrt{[(55)(313892) - (4110)^2][(55)(333503) - (4241)^2]}}$$

$$= \frac{17638940 - 17430510}{\sqrt{(17264060 - 16892100)(18342665 - 17986081)}}$$

$$= \frac{208430}{\sqrt{(371960)(356584)}}$$

$$= \frac{208430}{(609.885)(597.146)}$$

$$r = 0.572$$

$$\mathbf{r = 0.57}$$

Referring to Table 25 in Garrett (1981), it is found that the obtained value of **r = 0.57** is significant at 0.01 level.

(b) Relationship between Computer Studies and Second Language

The relationship between these two subjects Computer Studies and Second Language was found out by calculating the product-moment coefficient of correlation between the scores obtained by the sample of students in the two subjects. The calculations are as follows :

Computer Studies (X)	**Second Language (Y_2)**
$\Sigma X = 4,110$	$\Sigma Y_2 = 3700$
$\Sigma X^2 = 31,3\ 892$	$\Sigma Y_2^2 = 257,540$

$$\Sigma XY_2 = 278,994$$

$$N = 55$$

$$r = \frac{N\Sigma XY_2 - (\Sigma X)(\Sigma Y_2)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y_2^2 - (\Sigma Y_2)^2]}}$$

$$= \frac{(55)(278994) - (4110)(3700)}{\sqrt{[(55)(313892) - (4110)^2][(55)(257540) - (3700)^2]}}$$

$$= \frac{15344670 - 15207000}{\sqrt{(17264060 - 16892100)(14164700 - 13690000)}}$$

$$= \frac{137670}{\sqrt{(371960)(474700)}}$$

$$= \frac{137670}{(609.885)(688.984)}$$

$$\mathbf{r = 0.327}$$

r = 0.33

Referring to Table 25 in Garrett (1981), it is found that the obtained value of **r = 0.33** is significant at 0.05 level.

(c) Relationship between Computer Studies and History, Civics, Geography

In this case also, the relationship between the Computer Studies and History, Civics, Geography (taken together) was found out by calculating the product-moment coefficient of correlation between the scores obtained by the sample of students on the two. The calculations are as follows :

Computer Studies (X)	**History,Civics,Geography (Y_3)**
ΣX = 4110	ΣY_3 = 4291
ΣX^2 = 313,892	ΣY_3^2 = 343,261
	ΣXY_3 = 324801
	N = 55

$$r = \frac{N\Sigma XY_3 - (\Sigma X)(\Sigma Y_3)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y_3^2 - (\Sigma Y_3)^2]}}$$

$$= \frac{(55)(324801) - (4110)(4291)}{\sqrt{[(55)(313892) - (4110)^2][(55)(343261) - (4291)^2]}}$$

$$= \frac{17864055 - 17636010}{\sqrt{(17264060 - 16892100)(18879355 - 18412681)}}$$

$$r = \frac{228045}{\sqrt{(371960)(466674)}}$$

$$= \frac{228045}{\sqrt{(609.885)(683.135)}}$$

$$r = 0.547$$

$$\mathbf{r = 0.55}$$

Referring to Table 25 in Garrett (1981), it is found that the obtained value of **r = 0.55** is significant at 0.01 level.

(d) Relationship between Computer Studies and Mathematics

Here too, the relationship between the two subjects Computer Studies and Mathematics was found out by calculating the product-moment coefficient of correlation between the scores obtained by the sample of students in the two subjects. The calculations are as follows :

Computer Studies (X)	**Mathematics (Y_4)**
$\Sigma X = 4110$	$\Sigma Y_4 = 4385$
$\Sigma X^2 = 313892$	$\Sigma Y_4^2 = 360819$

$$\Sigma XY_4 = 333914$$

$$N = 55$$

$$r = \frac{N\Sigma XY_4 - (\Sigma X)(\Sigma Y_4)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y_4{}^2 - (\Sigma Y_4)^2]}}$$

$$= \frac{(55)(333914) - (4110)(4385)}{\sqrt{[(55)(313892) - (4110)^2][(55)(360819) - (4385)^2]}}$$

$$= \frac{18365270 - 18022350}{\sqrt{(17264060 - 16892100)(19845045 - 19228225)}}$$

$$= \frac{342920}{\sqrt{(371960)(616820)}}$$

$$= \frac{342920}{(785.378)(609.885)}$$

$$= 0.715$$

$$\mathbf{r = 0.72}$$

Referring to Table 25 in Garrett (1981), it is found that the obtained value of **r = 0.72** is significant at 0.01 level.

(e) Relationship between Computer Studies and Science

The relationship between the two subjects Computer Studies and Science was found out by calculating the product-moment coefficient of correlation between the scores obtained by the sample of students in the two subjects.The calculations are as follows :

Computer Studies (X)	Science (Y_5)
$\Sigma X = 4110$	$\Sigma Y_5 = 3828$
$\Sigma X^2 = 313892$	$\Sigma Y_5^2 = 280834$

$$\Sigma XY_5 = 293765$$

$$N = 55$$

$$r = \frac{N\Sigma XY_5 - (\Sigma X)(\Sigma Y_5)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y_5^2 - (\Sigma Y_5)^2]}}$$

$$= \frac{(55)(293765) - (4110)(3828)}{\sqrt{[(55)(313892) - (4110)^2][(55)(280834) - (3828)^2]}}$$

$$= \frac{16157075 - 15733080}{\sqrt{(17264060 - 16892100)(15445870 - 14653584)}}$$

$$= \frac{423995}{\sqrt{(371960)(792286)}}$$

$$= \frac{423995}{(609.885)(890.104)}$$

$$= 0.781$$

$$\mathbf{r = 0.78}$$

Referring to Table 25 in Garrett (1981), it is found that the obtained value of **r = 0.78** is significant at 0.01 level.

Table 95 provides a summary of the values of coefficients of correlation obtained.

Table 95 Values of Coefficient of Correlation between Computer Studies and other School Subjects

Sl. No.	Pairs of Subjects	Values of r obtained	Level of Signi-ficance
1.	Computer Studies and English	0.57	xx
2.	Computer Studies and Second Language	0.33	x
3.	Computer Studies and History, Civics, Geography	0.55	xx
4.	Computer Studies and Mathematics	0.72	xx
5.	Computer Studies and Science	0.78	xx

(Note :- x - 0.05 level ; xx - 0.01 level)

To get a better understanding of the situation, the coefficient of correlation between the pairs of school subjects (excluding Computer Studies) were calculated.

(f) Relationship between English and Second Language

The relationship between the two subjects English and Second Language was found out by calculating the product-moment coefficient of correlation between the scores

obtained by the sample of students in the two subjects. The calculations are as follows :

English (Y_1)	**Second Language (Y_2)**
$\Sigma Y_1 = 4241$	$\Sigma Y_2 = 3700$
$\Sigma Y_1^2 = 333503$	$\Sigma Y_2^2 = 257540$

$$\Sigma Y_1 Y_2 = 287115$$

$$N = 55$$

$$r = \frac{N\Sigma Y_1 Y_2 - (\Sigma Y_1)(\Sigma Y_2)}{\sqrt{[N\Sigma Y_1^2 - (\Sigma Y_1)^2][N\Sigma Y_2^2 - (\Sigma Y_2)^2]}}$$

$$= \frac{(55)(287115) - (4241)(3700)}{\sqrt{[(55)(333503) - (4241)^2][(55)(257540) - (3700)^2]}}$$

$$= \frac{15791325 - 15691700}{\sqrt{[(18342665 - 17986081)][(14164700 - 13690000)]}}$$

$$= \frac{99625}{\sqrt{(356584)(474700)}}$$

$$= \frac{99625}{(597.146)(688.984)}$$

$$= 0.242$$

$$\mathbf{r = 0.24}$$

Referring to Table 25 in Garrett (1981), it is found that the obtained value of **r = 0.24** is not significant at 0.05 level.

(g) Relationship between English and History, Civics, Geography

The relationship between the two subjects English and History, Civics, Geography was found out by calculating the product-moment coefficient of correlation between the scores obtained by the sample of students in the two subjects. The calculations are as follows :

English (Y_1)	**History,Civics,Geography (Y_3)**
$\Sigma Y_1 = 4241$	$\Sigma Y_3 = 4291$
$\Sigma Y_1^2 = 333503$	$\Sigma Y_3^2 = 343261$

$$\Sigma Y_1 Y_3 = 335460$$

$$N = 55$$

$$r = \frac{N\Sigma Y_1 Y_3 - (\Sigma Y_1)(\Sigma Y_3)}{\sqrt{[N(\Sigma Y_1^2) - (\Sigma Y_1)^2][N\Sigma Y_3^2 - (\Sigma Y_3)^2]}}$$

$$= \frac{(55)(335460) - (4241)(4291)}{\sqrt{[(55)(333503) - (4241)^2][(55)(343261) - (4291)^2]}}$$

$$= \frac{18450300 - 18198131}{\sqrt{[(18342665 - 17986081)][(18879355 - 18412681)]}}$$

$$r = \frac{252169}{\sqrt{(356584)(466674)}}$$

$$= \frac{252169}{(597.146)(683.135)}$$

$$= 0.618$$

$$\mathbf{r = 0.62}$$

Referring to Table 25 in Garrett ((1981), it is found that the obtained value of **r = 0.62** is significant at 0.01 level.

(h) Relationship between English and Mathematics

The relationship between the two subjects English and Mathematics was found out by calculating the product-moment coefficient of correlation between the scores obtained by the sample of students in the two subjects. The calculations are as follows :

English (Y_1)	**Mathematics (Y_4)**
$\Sigma Y_1 = 4241$	$\Sigma Y_4 = 4385$
$\Sigma Y_1^2 = 333503$	$\Sigma Y_4^2 = 360819$

$$\Sigma Y_1 Y_4 = 342422$$

$$N = 55$$

$$r = \frac{N\Sigma Y_1 Y_4 - (\Sigma Y_1)(\Sigma Y_4)}{\sqrt{[N\Sigma Y_1^2 - (\Sigma Y_1)^2][N\Sigma Y_4^2 - (\Sigma Y_4)^2]}}$$

$$= \frac{(55)(342422) - (4241)(4385)}{\sqrt{[(55)(333503) - (4241)^2][(55)(360819) - (4385)^2]}}$$

$$= \frac{18833210 - 18596785}{\sqrt{(18342665 - 17986081)(19845045 - 19228225)}}$$

$$= \frac{236425}{\sqrt{(356584)(616820)}}$$

$$= \frac{236425}{(597.146)(785.378)}$$

$$= 0.504$$

$$\mathbf{r = 0.50}$$

Referring to Table 25 in Garrett (1981), it is found that the obtained value of **r = 0.50** is significant at 0.01 level.

(i) Relationship between English and Science

The relationship between the two subjects English and Science was found out by calculating the product-moment coefficient of correlation between the scores obtained by the sample of students in the two subjects. The calculations are as follows :

English (Y_1)		Science (Y_5)
ΣY_1	= 4241	ΣY_5 = 3828
ΣY_1^2	= 333503	ΣY_5^2 = 280834

$$\Sigma Y_1 Y_5 = 303207$$

$$N = 55$$

$$r = \frac{N\Sigma Y_1 Y_5 - (\Sigma Y_1)(\Sigma Y_5)}{\sqrt{[N\Sigma Y_1^2 - (\Sigma Y_1)^2][N\Sigma Y_5^2 - (\Sigma Y_5)^2]}}$$

$$= \frac{(55)(303207) - (4241)(3828)}{\sqrt{[(55)(333503) - (4241)^2][(55)(280834) - (3828)^2]}}$$

$$= \frac{16676385 - 16234548}{\sqrt{(18342665 - 17986081)(15445870 - 14653584)}}$$

$$= \frac{441837}{\sqrt{(356584)(792286)}}$$

$$= \frac{441837}{(597.146)(890.104)}$$

$$= 0.831$$

$$\mathbf{r = 0.83}$$

Referring to Table 25 in Garrett (1981), it is found that the obtained value of **r = 0.83** is significant at 0.01 level.

(j) Relationship between Second Language and History, Civics, Geography

The relationship between the two subjects Second Language and History, Civics, Geography was found out by calculating the product-moment coefficient of correlation between the scores obtained by the sample of students in the two subjects. The calculations are as follows :

Second Language (Y_2)	**History, Civics, Geography (Y_3)**
$\Sigma Y_2 = 3700$	$\Sigma Y_3 = 4291$
$\Sigma Y_2^2 = 257540$	$\Sigma Y_3^2 = 343261$

$$\Sigma Y_2 Y_3 = 291389$$

$$N = 55$$

$$r = \frac{N(\Sigma Y_2 Y_3) - (\Sigma Y_2)(\Sigma Y_3)}{\sqrt{[N\Sigma Y_2^2 - (\Sigma Y_2)^2][N\Sigma Y_3^2 - (\Sigma Y_3)^2]}}$$

$$= \frac{(55)(291389) - (3700)(4291)}{\sqrt{[(55)(257540) - (3700)^2][(55)(343261) - (4291)^2]}}$$

$$= \frac{16026395 - 15876700}{\sqrt{(14164700 - 13690000)(18879355 - 18412681)}}$$

$$= \frac{149695}{\sqrt{(474700)(466674)}}$$

$$r = \frac{149695}{(688.98)(683.135)}$$

$$= 0.318$$

$$\mathbf{r = 0.32}$$

Referring to Table 25 in Garrett (1981), it is found that the obtained value of **r = 0.32** is significant at 0.05 level.

(k) Relationship between Second Language and Mathematics

The relationship between the two subjects Second Language and Mathematics was found out by calculating the product-moment coefficient of correlation between the scores obtained by the sample of students in the two subjects. The calculations are as follows :

Second Language (Y_2)	**Mathhematics (Y_4)**
$\Sigma Y_2 = 3700$	$\Sigma Y_4 = 4385$
$\Sigma Y_2^2 = 257540$	$\Sigma Y_4^2 = 360819$

$$\Sigma Y_2 Y_4 = 298981$$

$$N = 55$$

$$r = \frac{N\Sigma Y_2 Y_4 - (\Sigma Y_2)(\Sigma Y_4)}{\sqrt{[N\Sigma Y_2^2 - (\Sigma Y_2)^2][N\Sigma Y_4^2 - (\Sigma Y_4)^2]}}$$

$$= \frac{(55)(298981) - (3700)(4385)}{\sqrt{[(55)(257540) - (3700)^2][(55)(360819) - (4385)^2]}}$$

$$r = \frac{16443955 - 16224500}{\sqrt{(14164700 - 13690000)(19845045 - 19228225)}}$$

$$= \frac{219455}{\sqrt{(474700)(616820)}}$$

$$= \frac{219455}{(688.98)(785.37)}$$

$$= 0.405$$

$$\mathbf{r = 0.41}$$

Referring to Table 25 in Garrett (1981), it is found that the obtained value of $\mathbf{r = 0.41}$ is significant at 0.01 level.

(I) Relationship between Second Language and Science

The relationship between the two subjects Second Language and Science was found out by calculating the product-moment coefficient of correlation between the scores obtained by the sample of students in the two subjects. The calculations are as follows :

Second Language (Y_2)		**Science (Y_5)**	
ΣY_2	= 3700	ΣY_5	= 3828
ΣY_2^2	= 257540	ΣY_5^2	= 280834

$$\Sigma Y_2Y_5 = 261110$$

$$N = 55$$

$$r = \frac{N\Sigma Y_2Y_5 - (\Sigma Y_2)(\Sigma Y_5)}{\sqrt{[N\Sigma Y_2^2 - (\Sigma Y_2)^2]\,[N\Sigma Y_5^2 - (\Sigma Y_5)^2]}}$$

$$= \frac{(55)(261110) - (3700)(3828)}{\sqrt{[(55)(257540) - (3700)^2]\,[(55)(280834) - (3828)^2]}}$$

$$= \frac{14361050 - 14163600}{\sqrt{(14164700 - 13690000)(15445870 - 14653584)}}$$

$$= \frac{197450}{\sqrt{(474700)(792286)}}$$

$$= \frac{197450}{(688.98)(890.104)}$$

$$= 0.321$$

r = 0.32

Referring to table 25 in Garrett (1981), it is found that the obtained value of **r = 0.32** is significant at 0.05 level.

(m) Relationship between Mathematics and Science

The relationship between the two subjects Mathematics and Science was found out by calculating the

product-moment coefficient of correlation between the scores obtained by the sample of students in the two subjects. The calculations are as follows :

Mathematics (Y_4)	**Science (Y_5)**
$\Sigma Y_4 = 4385$	$\Sigma Y_5 = 3828$
$\Sigma Y_4^2 = 360819$	$\Sigma Y_5^2 = 280834$

$$\Sigma Y_4 Y_5 = 315661$$

$$N = 55$$

$$r = \frac{N\Sigma Y_4 Y_5 - (\Sigma Y_4)(\Sigma Y_5)}{\sqrt{[N\Sigma Y_4^2 - (\Sigma Y_4)^2][N\Sigma Y_5^2 - (\Sigma Y_5)^2]}}$$

$$= \frac{(55)(315661) - (4385)(3828)}{\sqrt{[(55)(360819) - (4385)^2][(55)(280834) - (3828)^2]}}$$

$$= \frac{17361355 - 16785780}{\sqrt{(19845045 - 19228225)(15445870 - 14653584)}}$$

$$= \frac{575575}{\sqrt{(616820)(792286)}}$$

$$= \frac{575575}{(785.378)(890.104)}$$

$$= 0.823$$

$$\mathbf{r = 0.82}$$

Referring to Table 25 in Garrett (1981), it is found that the obtained value of **r = 0.82** is significant at 0.01 level.

(n) Relationship between History, Civics, Geography and Mathematics

The relationship between the two subjects History, Civics, Geography and Mathematics was found out by calculating the product-moment coefficient of correlation between the scores obtained by the sample of students in the two subjects. The calculations are as follows :

History, Civics, Geography (Y_3)	**Mathematics (Y_4)**
$\Sigma Y_3 = 4291$	$\Sigma Y_4 = 4385$
$\Sigma Y_3^2 = 343261$	$\Sigma Y_4^2 = 360819$

$$\Sigma Y_3 Y_4 = 350132$$

$$N = 55$$

$$r = \frac{N\Sigma Y_3 Y_4 - (\Sigma Y_3)(\Sigma Y_4)}{\sqrt{[N\Sigma Y_3^2 - (\Sigma Y_3)^2]\ [N\Sigma Y_4^2 - (\Sigma Y_4)^2]}}$$

$$= \frac{(55)(350132) - (4291)(4385)}{\sqrt{[(55)(343261) - (4291)^2]\ [(55)(360819) - (4385)^2]}}$$

$$= \frac{19257260 - 18816035}{\sqrt{[(18879355 - 18412681)\ (19845045 - 19228225)]}}$$

$$r = \frac{441225}{\sqrt{(466674)(616820)}}$$

$$= \frac{441225}{(683.135)(785.378)}$$

$$= 0.822$$

$$\mathbf{r = 0.82}$$

Referring to Table 25 in Garrett (1981), it is found that the obtained value of **r = 0.82** is signnificant at 0.01 level.

(o) Relationship between History, Civics, Geography and Science

The relationship between the two subjects History, Civics, Geography and Science was found out by calculating the product-moment coefficient of correlation between the scores obtained by the sample of students in the two subjects. The calculations are as follows :

History, Civics, Geography (Y_3)		**Science (Y_5)**
$\Sigma Y_3 = 4291$		$\Sigma Y_5 = 3828$
$\Sigma Y_3^2 = 343261$		$\Sigma Y_5^2 = 280834$

$$\Sigma Y_3 Y_5 = 307214$$

$$N = 55$$

$$r = \frac{N\Sigma Y_3 Y_5 - \Sigma Y_3 \Sigma}{\sqrt{[N\Sigma Y_3^2 - (\Sigma Y_3)^2][N\Sigma Y_5^2 - (\Sigma Y_5)^2]}}$$

$$= \frac{(55)(307214) - (4291)(3828)}{\sqrt{[(55)(343261) - (4291)^2][(55)(280834) - (3828)^2]}}$$

$$= \frac{16896770 - 16425948}{\sqrt{(18879355 - 18412681)(15445870 - 14653584)}}$$

$$= \frac{470822}{\sqrt{(466674)(792286)}}$$

$$= \frac{470822}{(683.135)(890.104)}$$

$$= 0.77$$

r = 0.77

Referring to Table 25 in Garrett (1981), it is found that the obtained value of **r = 0.77** is significant at 0.01 level.

The coefficients of correlation obtained between the pairs of subjects including Computer Studies are presented in Table 96.

Table 96 Values of Coefficient of Correlation between Different Subjects

Subject	English	Second Language	History, Civics, Geography	Mathematics	Science	Computer Studies
English	-	0.24^{x}	0.62^{xx}	0.50^{xx}	0.83^{xx}	0.57^{xx}
Second Language		-	0.32^{x}	0.41^{xx}	0.32^{x}	0.33^{xx}
History, Civics, Geography			-	0.82^{xx}	0.77^{xx}	0.55^{xx}
Mathematics				-	0.82^{xx}	0.72^{xx}
Science					-	0.78^{xx}
Computer Studies						-

(Note :- x - Significant at 0.05 level

xx - Significant at 0.01 level)

4.8.0. ATTITUDE OF STUDENTS TOWARDS COMPUTER EDUCATION COURSE

In order to find out the attitude of students towards Computer Education course, the final form of the Attitude Scale (see caption 3.3.3.0.) was administered to the sample of 1142 students drawn from 34 schools. These schools were from Guwahati (N = 10), Shillong (N = 14), Aizawl (N = 4) and kohima (N = 6). The sample included a total of 537 girls and 605 boys (for details of the sample, see Table 35 under caption 4.2.1.). The responses of the students on the Attitude Scale were scored according to the scoring key. The raw scores thus obtained are given in **Appendix 7** . Mean and Standard deviation of these scores were calculated and they were found to be :

Mean = **134.57**

Standard Deviation (SD) = **20.52**

Since the Attitude Scale has 46 statements, and a score of 2 on each statement indicates a neutral attitude as each score could range between zero and 4, the above statistics suggest that the students have a favourable attitude towards Computer Education course.

4.8.1. ATTITUDE TOWARDS COMPUTER EDUCATION COURSE AMONG STUDENTS OF DIFFERENT PLACES STUDIED

To test whether there existed among students any difference in attitude towards Computer Education course, the following hypothesis was formulated :

"There is no significant difference among students of the four places (Guwahati, Shillong, Aizawl and Kohima) in their attitude towards Computer Education course".

To test this hypothesis F-test was employed. The details of the analysis are as follows.

Particulars	Guwahati	Shillong	Aizawl	Kohima
Sum of Scores (ΣX)	52808	53858	13356	33661
Sum of Squares of Scores (ΣX^2)	7315228	7632544	1726502	4488361
Mean	135.06	138.45	127.20	130.98
SD	21.64	21.26	16.22	17.59
N	391	389	105	257

Total (N) = 391 + 389 + 105 + 257 = 1142

Grand Sum of Scores = 52808 + 53858 + 13356 + 33661 = 153683

Step 1 : Correction Term :

$$= \frac{(153683)^2}{1142}$$

$$= \mathbf{20681667.67}$$

Step 2 : Total Sum of Squares :

$$= 7315228 + 7632544 + 1726502 + 4488361 - 20681667.67$$

$$= \mathbf{480967.33}$$

Step 3 : Sum of Squares between Means :

$$= \frac{(52808)^2}{391} + \frac{(53858)^2}{389} + \frac{(13356)^2}{105} + \frac{(33661)^2}{257} - 20681667.67$$

$$= 7132186.35 + 7456771.62 + 1698883.20 + 4408805.14 - 20681667.67$$

$$= \mathbf{14978.64}$$

Step 4 : Within Sum of Squares :

$$= 480967.33 - 14978.64$$

$$= \mathbf{465988.69}$$

Table 97 presents the Summary of ANOVA for Attitude Scores of students from Guwahati, Shillong, Aizawl and Kohima.

Table 97 Summary of ANOVA for Attitude Scores of Students from Guwahati, Shillong, Aizawl and Kohima

Source of Variation	df	Sum of Squares	Mean Squares (MS)	F
Between	3	14978.64	4992.88	12.19
Within	1138	465988.69	409.48	
Total	1141	480967.33		

The obtained value of F is significant at 0.01 level. Since the obtained value of F was significant, 't' tests were carried out to find out which of the pairs differed significantly.

(i) 't' TEST BETWEEN GUWAHATI AND SHILLONG STUDENTS :

Guwahati	**Shillong**
$N_1 = 391$	$N_2 = 389$
$M_1 = 135.06$	$M_2 = 138.45$
$SD_1 = 21.64$	$SD_2 = 21.26$

$$SE_{Difference} = \sqrt{\frac{(21.64)^2}{391} + \frac{(21.26)^2}{389}}$$

$$SE_{Difference} = \sqrt{1.19 + 1.16}$$

$$= \sqrt{2.35}$$

$$= 1.53$$

$$t = \frac{138.45 - 135.06}{1.53}$$

$$= \frac{3.39}{1.53}$$

$$= 2.21$$

$$\mathbf{t = 2.21}$$

Thus, it is seen that there is a significant difference in the attitude towards Computer Education course between the students of Guwahati, and Shillong, the latter having a higher mean score.

(ii) 't' TEST BETWEEN GUWAHATI AND AIZAWL STUDENTS :

Guwahati	**Aizawl**
$N_1 = 391$	$N_2 = 105$
$M_1 = 135.06$	$M_2 = 127.20$
$SD_1 = 21.64$	$SD_2 = 16.22$

$$SE_{Difference} = \sqrt{\frac{(21.64)^2}{391} + \frac{(16.22)^2}{105}}$$

$$= \sqrt{1.19 + 2.51}$$

$$= \sqrt{3.70}$$

$$= 1.92$$

$$t = \frac{135.06 - 127.20}{1.92}$$

$$= \frac{7.86}{1.92}$$

$$t = \mathbf{4.09}$$

Thus, it is seen that there is a significant difference in the attitude towards Computer Education course between the students of Guwahati, and Aizawl, the former having a higher mean score.

(iii) 't' TEST BETWEEN GUWAHATI AND KOHIMA STUDENTS :

Guwahati	**Kohima**
$N_1 = 391$	$N_2 = 257$
$M_1 = 135.06$	$M_2 = 130.98$
$SD_1 = 21.64$	$SD_2 = 17.59$

$$SE_{Difference} = \sqrt{\frac{(21.64)^2}{391} + \frac{(17.59)^2}{257}}$$

$$= \sqrt{1.19 + 1.20}$$

$$= \sqrt{2.39}$$

$$= 1.54$$

$$t = \frac{135.06 - 130.98}{1.54}$$

$$= \frac{4.08}{1.54}$$

$$= 2.65$$

$$\mathbf{t = 2.65}$$

Thus, it is seen that there is a significant difference in the attitude towards Computer Education course between the students of Guwahati, and Aizawl, the former having a higher mean score.

(iv) 't' TEST BETWEEN SHILLONG AND AIZAWL STUDENTS :

Shillong	**Aizawl**
$N_1 = 389$	$N_2 = 105$
$M_1 = 138.45$	$M_2 = 127.20$
$SD_1 = 21.26$	$SD_2 = 16.22$

$$SE_{Difference} = \sqrt{\frac{(21.26)^2}{389} + \frac{(16.22)^2}{105}}$$

$$= \sqrt{1.16 + 2.51}$$

$$= \sqrt{3.67}$$

$$= 1.91$$

$$t = \frac{138.45 - 127.20}{1.91}$$

$$= \frac{11.25}{1.91}$$

$$t = \mathbf{5.89}$$

Thus, it is seen that there is a significant difference in the attitude towards Computer Education course between the students of Shillong and Aizawl, the former having a higher mean score.

(v) 't' TEST BETWEEN SHILLONG AND KOHIMA STUDENTS :

Shillong	**Kohima**
$N_1 = 389$	$N_2 = 257$
$M_1 = 138.45$	$M_2 = 130.98$
$SD_1 = 21.26$	$SD_2 = 17.59$

$$SE_{Difference} = \sqrt{\frac{(21.26)^2}{389} + \frac{(17.59)^2}{257}}$$

$$= \sqrt{1.16 + 1.20}$$

$$= \sqrt{2.36}$$

$$= 1.53$$

$$t = \frac{138.45 - 130.98}{1.53}$$

$$= \frac{7.47}{1.53}$$

$$t = 4.88$$

Thus, it is seen that there is a significant difference in the attitude towards Computer Education course between the students of Shillong and Kohima, the former having a higher mean score.

(vi) 't' TEST BETWEEN AIZAWL AND KOHIMA STUDENTS :

Aizawl	**Kohima**
$N_1 = 105$	$N_2 = 257$
$M_1 = 127.20$	$M_2 = 130.98$
$SD_1 = 16.22$	$SD_2 = 17.59$

$$SE_{Difference} = \sqrt{\frac{(16.22)^2}{105} + \frac{(17.59)^2}{257}}$$

$$= \sqrt{2.51 + 1.20}$$

$$= \sqrt{3.71}$$

$$= 1.92$$

$$t = \frac{130.98 - 127.20}{1.92}$$

$$= \frac{3.78}{1.92}$$

$$t = \mathbf{1.97}$$

Thus, it is seen that there is a significant difference in the attitude towards Computer Education course between the students of Aizawl and Kohima, the latter having a higher mean score.

4.8.2. ATTITUDE TOWARDS COMPUTER EDUCATION COURSE BETWEEN BOYS AND GIRLS

To test whether there existed between boys and girls any difference in attitude towards Computer Education course, the following hypothesis was formulated :

"There is no significant difference between boys and girls in their attitude towards Computer

Education course"

The above hypothesis was tested by using 't' test.

Boys	**Girls**
$N_1 = 605$	$N_2 = 537$
$M_1 = 135.35$	$M_2 = 133.69$
$SD_1 = 20.29$	$SD_2 = 20.74$

$$SE_{Difference} = \sqrt{\frac{(20.29)^2}{605} + \frac{(20.74)^2}{537}}$$

$$= \sqrt{0.68 + 0.80}$$

$$= \sqrt{1.48}$$

$$= 1.21$$

$$t = \frac{135.35 - 133.69}{1.21}$$

$$= \frac{1.66}{1.21}$$

$$= 1.37$$

$$\mathbf{t = 1.37}$$

The obtained value of **t = 1.37** is not significant.

Therefore, there is no significant difference between the mean scores of boys and girls.

On summarising, it is found as follows :

1) On the whole, the students have a favourable attitude towards Computer Education course.
2) There exists a significant difference among students of the four places (Guwahati, Shillong, Aizawl and Kohima) in their attitude towards Computer Education course. It is further found that the differences in attitude scores of different places significantly follows this order namely :

   Shillong > Guwahati > Kohima > Aizawl

3) There is no significant difference between boys and girls in their attitude towards Computer Education course.

4.10.0. FINDINGS

Before presenting the findings, it may be noted that

(i) Amongst the four places, namely, Guwahati, Shillong,

Aizawl and Kohima, Computer Education course was first introduced in 1986 and this was in Shillong.

(ii) Out of a total of 34 schools, 6 schools introduced Computer Education course under the CLASS project, 9 schools started the course on their own and the rest 19 schools launched with the help of private computer institutes on a contract basis. All the 34 schools were English medium schools.

(iii) Majority (about 38 percent) of the schools imparted Computer Education course right from Class IV onwards.

Following are the findings which are summed up according to the objectives of the study :

1. Facilities available for Computer Education course in High Schools

(i) All the 34 schools possessed computer sets. There were a total of 226 computer sets and 443 number of software programmes possessed by the schools. Only 8 out of 34 schools were required to spend certain amount of money on maintenance of computers and the amount varied

from Rs.3,000 to Rs.7,000 per computer set.

(ii) In the schools of Guwahati, the brand of computers available were BBC-Micro, SCL, IBM-PC, Dolphine, Usha Telematics ; in the schools of Shillong brands available were IBM-PC, PC-XT, BBC-Micro ; in the schools of Aizawl the only brand available was BBC-Micro ; and in the schools of Kohima only two types of brands were available namely, IBM-PC and BBC-Micro.

Most of the teachers expressed satisfaction with the computer sets installed in their schools.

(iii) In all the 34 schools, facilities available in computers were Printers, Keyboard, Visual Display Unit and Floppy Disks which were common. Only in certain schools (13 out of 34 schools) additional facilities, such as, cassette, Mouse Joystick were available.

(iv) A total of 443 software programmes were available in the 34 schools. Highest number of software programmes were found in the schools of Shillong.

(v) Some of the computer education teachers from the schools of Guwahati and Shillong have developed software programmes.

(vi) The computer : student (of Class X only) ratio in the schools of Guwahati, Shillong, Aizawl and Kohima were 1 : 5, 1 : 4, 1 : 8, and 1 : 6 respectively.

(vii) Out of the total of 34 schools, only 10 schools purchased computer sets from their respective school funds, another 6 schools received computer sets as gift from NCERT-CMC, New Delhi, and in the remaining 18 schools, private computer institutes installed the necessary equipments.

(viii) In 13 schools, Principal of the respective school made the choice of the brand of computers installed in the schools and all the Principals possessed general administrative experience only. The selection of the brand of computers provided by the NCERT and the CMC to 6 schools was made by the concerned authority, that is, the NCERT and the CMC.

(ix) Service facilities were available for schools of Guwahati and Shillong at their respective cities only. But, the schools at Aizawl and Kohima had to depend on the servicing facilities at Silchar and Guwahati respectively. In most of the cases, these schools were required to take the computer sets to the servicing centres.

(x) In most of the schools (32 out of 34) a separate computer room was there for holding the Computer Education classes. In the remaining 2 schools the computer sets were brought to their regular classroom.

(xi) Only 6 out of 10 schools of Guwahati were found to have air conditioning facility in computer rooms. Such facility did not exist in any other schools of Shillong, Aizawl or Kohima.

(xii) The irregular power supply seemed to be a great hurdle in the efficient running of practical classes on computers. This problem seemed to be of a serious nature particularly in Aizawl, and to a certain extent in Kohima and Guwahati.

(xiii) In relation to the available facilities, the enrolment status was considered. It was observed that in all the four places there was a steady increase in the enrolment of students for the Computer Education course. Except in 2 schools, none of the schools had any screening procedure for admitting the students to the Computer Education course.

(xiv) Except for a few, the teachers of Computer Education course were graduates which included two B.E. degree (in Computer Science) holders. But, all the teachers were certificate/diploma/degree holders in Computer Science, and had some experience as computer education teachers.

(xv) Only in Aizawl and Kohima, there were attempts by the SCERT or the State Directorate of Education to organise orientation/training programmes for the computer education teachers. It was found that the response to these programmes was poor on the part of the teachers, as it appeared that these programmes needed to pose more challenge and interest for the personnel whom it was meant for. But, even such attempts were lacking in

Guwahati and Shillong.

2. Computer Education Curriculum followed in the High Schools

(i) The study revealed that there was no uniformity in the syllabus followed by the schools. In all, 5 different types of syllabi were in operation, these being ICSE syllabus, CBSE syllabus, CLASS Project syllabus, Teacher-made syllabus, and syllabus framed by the Private Computer Institutes with which some of the schools had a contract.

(ii) The teachers had the following objectives while teaching the Computer Education course - to develop computer awareness among the students ; to prepare students for future ; to develop basic concepts in Computer Education among students ; and to develop ability to solve problems systematically, logically and effectively.

(iii) Only in 28 out of 34 schools, students were taught computer programming, the class from which this was done being varied. In about 71 percent of these 28 schools, students were acquainted with computer programming even

before reaching the high school (that is Class VIII). In all the 28 schools where computer programming was taught, the students were allowed to test the programme on the computer. Also, Computer Arithmetic and Computer Logic were taught to the students. In these 28 schools, for practical work, the class was divided into small groups of students and by suitable time scheduling each group worked independently on the computer terminals. In the other 6 schools teachers demonstrated the working on the computers.

(iv) It was found that all the schools taught the computer language BASIC. Alongwith it other computer languages, such as, WORDSTAR, LOGO, DOS or dBASE III were taught in about 50 percent of the schools.

(v) Almost all the teachers expressed that the Computer Education course must be included in the high school curriculum as a compulsory subject. Majority of the teachers were in favour of early introduction of Computer Assisted Learning for different subjects in the schools.

(vi) All the schools had some scheme of evaluation of the performance of the students on the Computer Education course. Most of the teachers expressed satisfaction on the performance of their students.

But not a single school did undertake any follow-up of the students who had successfully completed the course.

(vii) About 88 percent of the teachers (N = 66) opined that the enrolment of students in the Computer Education course was increasing. But, the teachers' own judgement about the success of the course based on the performance of the students indicated an average note.

3. Views of Teachers about certain Aspects of Computer Education

(i) Majority of the teachers perceived that Computer Education promotes in the students knowledge, skills, and reasoning power required in their later work life. They also perceived that the students are motivated and enthusiastic in learning how to work on computers.

(ii) Most of the teachers felt that Computer Education is sure to benefit the society in a number of ways and for this reason it is of utmost importance to provide this education right from the school level. Also, they felt the need for the provision of adequate facilities to promote this education.

(iii) Majority of the teachers felt that there is a need for training/orientation courses for better conducting of classes in Computer Education.

4. Views of Students about certain Aspects of the Computer Education course

(i) According to majority of the students, purpose of learning the Computer Education course is to improve their knowledge.

(ii) Students views on certain aspects of Computer Education course indicate,

(a) that they were satisfied with the facilities available in the Computer Education classes, though majority of them welcome more number of computer sets ;

(b) their satisfaction to a great extent of the syllabus followed ;

(c) that though they were exposed to a variety of learning materials, yet they rely mostly on the notes given by teachers ; also, that there is a need for books which are simple and easy to understand and which are illustrated through diagrams ;

(d) their dissatisfaction with regard to the existing schedule, particularly for the practical classes and the need to increase the number of practical classes ;

(e) their satisfaction with the number of examinations conducted for the Computer Education course ; and

(f) the need for teachers who are qualified and who can teach in a clear and interesting manner.

(iii) Only a section (about 39 percent) of the students perceived that the Computer Education course helps them in learning other school subjects.

(iv) About 45 percent of the students pointed out their liking to work with computers at a latter time.

(v) Surrounding environment has an influence in building awareness about computers among students.

(vi) Majority of the students did interact with their peers on different aspects of computers.

5. Performance of Students in the Computer Education course

Performance of students (N = 55) in the Indian Certificate of School Education (ICSE) examination for the year 1993 in the paper Computer Studies revealed that the lowest marks obtained was 54 and the highest marks obtained was 95 (maximum marks for the paper being 100), thus, the range of scores happened to be 41. The mean and standard deviation of the scores were found to be 74.73 and 11.19, respectively.

6. Relationship between the performance of Students in the Computer Education course and their performance in other School Subjects

(i) There exists a significant relationship (at 0.01 level) between the performance of

students in the Computer Studies and their performance in English.

(ii) There exists a significant relationship (at 0.05 level) between the performance of students in the Computer Studies and their performance in Second Language.

(iii) There exists a significant relationship (at 0.01 level) between the performance of students in the Computer Studies and their performance in History, Civics and Geography.

(iv) There exists a significant relationship (at 0.01 level) between the performance of students in the Computer Studies and their performance in Mathematics.

(v) There exists a significant relationship (at 0.01 level) between the performance of students in the Computer Studies and their performance in Science.

7. Attitude of Students towards Computer Education course

(i) On the whole, the students have a favourable attitude towards Computer Education course.

(ii) There exists a significant difference among students of the four places (Guwahati, Shillong, Aizawl and Kohima) in their attitude towards Computer Education course. It is further found that the differences in attitude scores of different places significantly follows this order namely ,

Shillong > Guwahati > Kohima > Aizawl

(iii) There is no significant difference between boys and girls in their attitude towards Computer Education course.

4.11.0. DISCUSSION

The present study which has covered the four capital cities of the North-Eastern part of India, namely,

Guwahati, Shillong, Kohima and Aizawl, has looked into the facilities available for running the Computer Education course in those high schools which claim to be offering the said course. The general picture one can draw is that of satisfaction with respect to the number of sets available, development and use of software programmes, computer-student ratio, availability of separate computer room and such other infra-structural facilities. But a note of caution is struck when it is found that in more than half of these schools, the computer sets are installed by private computer institutes which also operate on their own syllabus and taught by their own persons (which may or may not be suitable for the school children) who are posted in the schools as teachers. Such institutes may follow the ICSE or CBSE syllabus which are specifically developed for the school children. The void to some extent gets explicit when it is noted that a majority of teachers have expressed a need for training/orientation courses for conducting of classes in Computer Education in a better way.

Though the course is generally not compulsory in schools, it is found that there is a steady increase in the enrolment of students. The reasons could be many- novelty, aspirations of parents in placing their wards in

a better position in vocational avenues, sheer curiosity and interest on the part of students, and so on. But it is noted that almost all the schools had no screening procedure for admitting the students to the Computer Education course. It may be worthwhile if the students who show some promise in the field are selected and given greater attention.

Almost all the schools had their own evaluation procedures for the Computer Education course that they offered. Though majority of the teachers have expressed satisfaction about the performance of students in the Computer Education course that they had offered, it could not lead to further analysis due to their non-comparability. Only 2 schools which followed the Indian Certificate of School Education (ICSE) pattern of education, could be considered for studying the performance of students in the Computer Education course, as well as relating it with the performance of other school subjects. The study indicates a fairly good performance of the students on the course with the mean score being 74.73 (maximum marks that could be obtained being 100) and standard deviation being 11.19. It was also found that the performance of students in the Computer Studies having a significant relationship with their performance in each of the courses, namely - English; Second Language ; History, Civics, Geography ; Mathematics;

and Science. It may be claimed that the two schools are renowned in the entire State, and may be in the entire North-Eastern India. It may be expected that the Class X students of these schools are those selected ones whom the authorities are confident to show a good performance in the final examinations. Hence, it needs further research to corrobrate or otherwise of the obtained result.

The study observed among the students of all the four places under investigation a favourable attitude towards Computer Education course. This result, to some extent, falls in line with those of Hess and Tenezakia (1970), Atherton (19790, Lawton and Gerschener (1982), Vasic'Dragan (1987), all of whom found that the attitude of students towards Computer Education to be positive.

Going further, the study observed that there existed a significant difference among students of the four places (Guwahati, Shillong, Aizawl and Kohima) in their attitude towards Computer Education course. The order of this significant difference was

Shillong > Guwahati > Kohima > Aizawl

Several reasons could be thought out for this difference. Shillong is a well-known educational centre in the whole

of North-East India. Hence, one could expect a better quality of students, teachers, and in general, a better atmosphere for learning. These are some of the important factors underlying in the development of a better attitude among the students compared to the students of Guwahati, Kohima and Aizawl. Comparing Guwahati and Shillong, one more factor emerges out, that of the competency in the English language. Majority of the students belonging to Guwahati are not as well versed in English language as the students of Shillong, though all the schools covered were English medium schools. Guwahati, which is a much larger city than Kohima and Aizawl, is also a very importnt place in the North-East as it happens to be the link city between the North-East and the rest of the country. This greater exposure of the students of Guwahati than those of Kohima and Aizawl might be a factor which has contributed in the development of a higher attitude towards Computer Education course, among students. The attitude of students from kohima being higher than that of students from Aizawl may be because of the impact of the private computer education institutes. In majority of the schools in kohima the private computer education institutes imparted the instruction. These private institutions ought to show their competency and efficiency in running the course, and hence they might have entrusted the job in the

hands of better competent and qualified teachers. In contrast to this, in Aizawl, all the schools were under the CLASS project and the school teachers who got only the required training from the NCERT were taking care of the course. Also, to some extent the facilities available at Aizawl in running the course were much in want when compared to Kohima.

A look into the gender differences revealed no significant difference between boys and girls in their attitude towards Computer Education course. This result, to some extent, falls in line with those found by Eastman and Krendall (1987), Swadener and Hannafin (1987), Loyd and Loyd (1988), Richards, Johnson and Johnson (1986a), Richards, Johnson and Johnson (1986b), and Nelson (1988).

CHAPTER V

SUMMARY

SUMMARY

5.1. INTRODUCTION

The world of information is an intellectual wealth that mankind has accumulated throughout its existence in various forms - language, printing, mass media, computer, etc. The impact of computers is felt everywhere because of its speedy and efficient information processing ability. In this socially conscious and highly developed technological society, the role of computers is quite effective. Increasing amount of information in government, public and private establishments needs an adequate form of handling information. The problem of information handling system could be performed easily with the help of computers because of its ability to analyse information, to retain, up-date, reproduce and the ability of presenting the information in various forms. Computer saves labour, increases efficiency, minimises wastage and helps in bringing desired quality of output.

With the advent of electronics, computers, and micro-processors, the traditional concept of education is changing rapidly. Rapid development of technology is turning all

traditional disciplines into inter-disciplinary division. Computer is one such recent technology which has entered in every walk of human activity including education sector.

Education has a vital role to play in making full use of the potentialities and abilities of computers. People are to be made aware, knowledgeable, and specialised on this technology to make the society effective and productive. Education helps in bringing awareness, developing knowledge and becoming specialised in any field. Therefore, Computer Education is essential right from the school level. Children-computer interaction aims at familiarisation of the basic things of computer technology. There is a need to study the extent of interrelationship generated between children and computer.

Because of the immense utility and efficiency, computers have made great impact on the development of mankind all over the world, India being no exception. India is under the process of major social, economic and educational revolution with the introduction and adaptation of computers. The Indian computer industry is still in its developmental stage as compared to the developed countries, but progressing very fast. In India, there exists a wide

gap in relation to computer manpower demand versus supply. Thus, there is an urgent need for an effective programme of Computer Education for partial fulfillment of this demand.

Computer Education is considered as an object of instruction covering computer literacy and computer programming (which to some extent covers word processing).

In India, the application of computers in various fields are getting extended in a fast rate. This has resulted in an increasing demand for computer manpower. To meet this demand, attempts are made by both the Government and private organisations by imparting necessary Computer Education to people at different levels. The Computer Education is imparted both at the post school level as well as school level. Considering at the school level, two major schemes, namely, the CLASS Project and NVCES were taken up to promote Computer Education. Besides, there are a good number of private computer education institutes which are helping in promotion of Computer Education in schools by providing trained computer teachers and computer sets as necessary inputs.

In the North Eastern Region (NER) of India Computer Education is offered both by private computer institutes and by formal educational institutions. Though NER of India is not industrially advanced compared to the other parts, yet, the impact of computer is quite significant.

Introduction of Computer Education in schools in the NER of India in general and making it a compulsory aspect of curriculum by some in particular is a bold step. Realising the demand of Computer Education in the schools of NER of India and the non-existence of any indepth research work in this area, it becomes worthwhile to study certain aspects like the attitudee of students towards Computer Education, how the teachers and students view the programme, the performance of students in the course, and basic to all, the existing status of the operational aspects like the machines, teachers and curriculum. The present investigation is an attempt in this direction.

5.2.0. STATEMENT OF THE PROBLEM

The problem under investigation reads as **"A Study on the Computer Education in the High Schools of Selected States of North-East India".**

The study attempts to find out the facilities available for Computer Education course in high schools, Computer Education curriculum followed in the high schools, views of teachers about certain aspects of Computer Education, views of students about certain aspects of the Computer Education course, performance of students in the Computer Education course, relationship between the performance of students in the Computer Education course and their peerformance of students in the Computer Education course and their performance in other school subjects, and attitude of students towards Computer Education course.

The term **'computer education'** is considered as an object of instruction covering computer literacy and computer programming (which to some extent covers word processing).

The **'performance of students'** in this study refers to the marks obtained by the students in the 'Computer Studies' paper in their Class X examination.

The term **'attitude'** indicates the degree of positive or negative affect associated with some psychological object (here it being Computer Education). Operationally, the term refers to the score obtained by an

individual on the Attitude Scale developed by the investigator for the purpose of the present study.

5.3.0. OBJECTIVES

The following were the major objectives of the study :

i) To find out the facilities provided for the Computer Education course in high schools

ii) To study the Computer Education curriculum followed in the high schools

iii) To find out the views of teachers about certain aspects of Computer Education

iv) To find out the views of students about certain aspects of the Computer Education course

v) To find out the performance of students in the Computer Education course

vi) To find out the relationship between the performance of students in the Computer Education course and their performance in other school subjects

vii) To find out the attitude of students towards Computer Education course.

5.4.0. DELIMITATIONS OF THE STUDY

(a) The present study is confined to four States, namely, Assam, Meghalaya, Mizoram and Nagaland.

(b) Since introduction of computers is of recent times in the region, the study was restricted to only the capital towns of the four States, Guwahati, Shillong, Aizawl and kohima, respectively.

(c) Since, at present, the Indian Certificate of School Education (ICSE) system alone conducts the final examination in 'Computer Studies' for Class X, only such schools offering ICSE syllabus were considered for collecting data on the performance of students.

(d) As it was felt that to give any views or to develop any attitude, the school should have exposed the course to the students and teachers for a considerable time, the study included only those high schools which had introduced the course prior to 1991.

5.5.0. METHODOLOGY

The study is a piece of descriptive research. Details are as follows :

5.5.1.0. POPULATION AND SAMPLE

The population comprised of 37 high schools of which 12 were located in Guwahati, 15 in Shillong, 4 in Aizawl, and 6 in Kohima. Since the number of schools were not many, all these were taken as the sample of the study. Out of these 37 high schools, 3 high schools were randomly selected for the purpose of development of tools. The remaining 34 high schools formed the sample of schools for the purpose of collection of data for the study. Both at the stage of development of tools and at collection of data, all the Class X students and all the teachers teaching the Computer Education course were included as the sample at the different stages of the study.

Number of students and teachers involved in the Development of Tools stage were 182 and 8 respectively drawn from 3 high schools. Number of students and teachers involved in the Final Data Collection stage were 1,142 and 66 respectively from 34 high schools. The sample of students with reference to objectives (v) and (vi) happened to be the Class X students of those schools following Indian Certificate of School Education (ICSE) system. The number of such schools happened to be only 2 out of the 34 schools and the number of students in these 2 schools was 55.

5.5.2.0. TOOLS USED

The following tools were used to collect the data:

1. Questionnaire for the teachers (developed for the purpose of the study)

2. Questionnaire for the students (developed for the purpose of the study)

3. ICSE final examinations marks for Class X - to measure the performance of students in the 'Computer Studies' and their performance in other school subjects

4. Attitude Scale - to measure the attitude of students towards Computer Education course (developed for the purpose of the study).

5.5.2.1. DEVELOPMENT OF QUESTIONNAIRE FOR TEACHERS

It was felt that though all the computer education teachers in the schools could respond to the questionnaire, some information regarding the facilities offered for the course could be responded more precisely by the seniormost teacher as he is expected to be knowing greater details. Hence, these aspects were drawn up separately and added as a part of the questionnaire only to the seniormost teacher while the rest of the questionnaire was meant for all the computer education

teachers.

The questionnaire consisted of three sections -

Section A - General information about teacher

Section B - Information about the Computer Education course offered in the school

Section C - Views towards certain aspects of Computer Education.

An additional section (Section D) was added alongwith the three sections mentioned if the respondent was the seniormost computer education teacher of the school.

Section D - Specific information regarding the infra-structural facilities available in the school for running the Computer Education course.

Number of items included in each of the sections were 3 in Section A ; 27 in Section B ; 32 in Section C ; and 35 in Section D. In order to find out the suitability of the items, the draft form of the questionnaire thus developed was tried out on 8 computer education teachers from 3 randomly drawn schools. It was found that the draft

form of the questionnaire was suitable and could elicit the required information without any ambiguity or difficulty and hence it was accepted as the Final Form of the Questionnaire for Teachers.

5.5.2.2. DEVELOPMENT OF QUESTIONNAIRE FOR STUDENTS

The questionnaire for students was to elicit from students

(i) their purpose of learning the Computer Education course ;

(ii) their views on certain aspects of the Computer Education course ;

(iii) their perception about the influence of Computer Education course on learning other school subjects;

(iv) their liking for working with computers at a later time ;

(v) their identification of the various uses of computers;

(vi) their interactions with the peer group.

To find out whether the questionnaire was suitable for the students for whom it was developed, a try-out of the above draft form of questionnaire was carried out on

a sample consisting of 138 Class X students of two randomly drawn high schools.

It was found that the draft form of the questionnaire was suitable and could elicit the required information without any ambiguity or difficulty. Hence, the draft form was accepted as the Final Form of the Questionnaire for students.

5.5.2.3. SCHOOL FINAL EXAMINATIONS MARKS

With reference to the objectives (v) and (vi), the data required were the Class X final examination marks of the students under consideration in the ICSE examinations. They were obtained form the respective schools.

5.5.2.4. ATTITUDE SCALE

The Attitude Scale to find out the attitude of students towards Computer Education course was developed by the investigator. The development included pre-tryout, tryout and item analysis. The final form of the Attitude Scale consists of 46 statements (23 positive and 23 negative). The response is to be made on a 5-point scale, the points being 'Strongly Agree', 'Agree', 'Undecided',

'Disagree', and 'Strongly Disagree'.

The scoring scheme for the positive statements is 4, 3, 2, 1, 0 corresponding to the five points as stated already. Similarly, 0, 1, 2, 3, 4 are the scores for the corresponding points of the negative statements.

The content validity of the Attitude Scale was ensured through the steps taken for the development of items.

The odd-even reliability of the Attitude Scale was established and it was found to be 0.90.

5.5.3. DATA COLLECTION AND ANALYSIS

Data were collected by administering the tools mentioned above (refer caption 5.5.2.0.) to the sample of students and teachers (refer caption 5.5.1.0.). The data were analysed. Statistical techniques, namely, percentage, F-test, t-test, product moment correlation, were used wherever necessary.

5.6.0. SUMMARY OF THE RESULTS

Before presenting the results, it may be noted that

(i) Amongst the four places, namely, Guwahati, Shillong, Aizawl and Kohima, Computer Education course was first introduced in 1986 and this was in Shillong.

(ii) Out of a total of 34 schools, 6 schools introduced Computer Education course under the CLASS project, 9 schools started the course on their own and the rest 19 schools launched with the help of private computer institutes on a contract basis. All the 34 schools were English medium schools.

(iii) Majority (about 38 percent) of the schools imparted Computer Education course right from Class IV onwards.

Following are the results obtained in the study :

1. Facilities available for Computer Education course in High Schools

(i) All the 34 schools possessed computer sets. There were a total of 226 computer sets and 443 number of software programmes possessed by the schools. Only 8 out of 34 schools were required to spend certain amount

of money on maintenance of computers and the amount varied from Rs.3,000 to Rs.7,000 per computer set.

(ii) In the schools of Guwahati, the brand of computers available were BBC-Micro, SCL, IBM-PC, Dolphine, Usha Telematics ; in the schools of Shillong brands available were IBM-PC, PC-XT, BBC-Micro ; in the schools of Aizawl the only brand available was BBC-Micro ; and in the schools of Kohima only two types of brands were available namely, IBM-PC and BBC-Micro.

Most of the teachers expressed satisfaction with the computer sets installed in their schools.

(iii) In all the 34 schools, faciliities available in computers were Printers, Keyboard, Visual Display Unit and Floppy Disks which were common. Only in certain schools (13 out of 34 schools) additional facilities, such as, cassette, Mouse, Joystick were available.

(iv) A total of 443 software programmes were available in the 34 schools. Highest number of software programmes were found in the schools of Shillong.

(v) Some of the computer education teachers from the schools of Guwahati and Shillong have developed software programmes.

(vi) The computer : student (of Class X only) ratio in the schools of Guwahati, shillong, Aizawl and Kohima were 1 : 5, 1 :4, 1 : 8, and 1 : 6 respectively.

(vii) Out of the total of 34 schools, only 10 schools purchased computer sets from their respective school funds, another 6 schools received computer sets as gift from NCERT-CMC, New Delhi, and in the remaining 18 schools, private computer institutes installed the necessary equipments.

(viii) In 13 schools, Principal of the respective school made the choice of the brand of computers installed in the schools and all the Principals possessed general administrative experience only. The selection of the brand of computers provided by the NCERT and the CMC to 6 schools was made by the concerned authority, that is, the NCERT and the CMC.

(ix) Service facilities were available for schools of Guwahati and Shillong at their respective cities only. But, the schools at Aizawl and Kohima had to depend on the servicing facilities at Silchar and Guwahati respectively. In most of the cases, these schools were required to take the computer sets to the servicing centres.

(x) In most of the schools (32 out of 34) a separate computer room was there for holding the Computer Education classes. In the remaining 2 schools the computer sets were brought to their regular classroom.

(xi) Only 6 out of 10 schools of Guwahati were found to have air conditioning facility in computer rooms. Such facility did not exist in any other schools of Shillong, Aizawl and kohima.

(xii) The irregular power supply seemed to be a great hurdle in the efficient running of practical classes on computers. This problem seemed to be of a serious nature

particularly in Aizawl, and to a certain certain extent in Kohima and Guwahati.

(xiii) In relation to the available facilities, the enrolment status was considered. It was observed that in all the four places there was a steady increase in the enrolment of students for the Computer Education course. Except in 2 schools, none of the schools had any screening procedure for admitting the students to the Computer Education course.

(xiv) Except for a few, the teachers of Computer Education course were graduates which included two B.E. degree (in Computer Science) holders. But, all the teachers were certificate/diploma/degree holders in Computer Science, and had some experience as computer education teachers.

(xv) Only in Aizawl and Kohima, there were attempts by the SCERT or the State Directorate of Education to organise orientation/training programmes for the computer education teachers. It was found

that the response to these programmes was poor on the part of the teachers, as it appeared that these programmes needed to pose more challenge and interest for the personnel whom it was meant for. But, even such attempts were lacking in Guwahati and Shillong.

2. Computer Education Curriculum followed in the High Schools

(i) The study revealed that there was no uniformity in the syllabus followed by the schools. In all, 5 different types of syllabi were in operation, these being ICSE syllabus, CBSE syllabus, CLASS Project syllabus, Teacher-made syllabus, and syllabus framed by the Private Computer Institutes with which some of the schools had a contract.

(ii) The teachers had the following objectives while teaching the Computer Education course - to develop computer awareness among the students ; to prepare students for future; to develop basic concepts in Computer Education among students ; and to develop ability to solve problems systematically, logically and effectively.

(iii) Only in 28 out of 34 schools, students were taught computer programming, the class from which this was done being varied. In about 71 percent of these 28 schools, students were acquainted with computer programming even before reaching the high school (that is Class VIII). In all the 28 schools where computer programming was taught, the students were allowed to test the programme on the computer. Also, Computer Arithmetic and Computer Logic were taught to the students. In these 28 schools, for practical work, the class was divided into small groups of students and by suitable time scheduling each group worked independently on the computer terminals. In the other 6 schools teachers demonstrated the working on the computers.

(iv) It was found that all the schools taught the computer language BASIC. Alongwith it other computer languages, such as WORDSTAR, LOGO, DOS or dBASE III were taught in about 50 percent of the schools.

(v) Almost all the teachers expressed that the Computer Education course must be included in

the high school curriculum as a compulsory subject. Majority of the teachers were in favour of early introduction of Computer Assisted Learning for different subjects in the schools.

(vi) All the schools had some scheme of evaluation of the performance of the students on the Computer Education course. Most of the teachers expressed satisfaction on the performance of their students.

But not a single school did undertake any follow-up of the students who had successfully completed the course.

(vii) About 88 percent of the teachers (N = 66) opined that the enrolment of students in the Computer Education course was increasing. But, the teachers' own judgement about the success of the course based on the performance of the students indicated an average note.

3. Views of Teachers about certain Aspects of Computer Education

(i) Majority of the teachers perceived that Computer Education promotes in the students

knowledge, skills, and reasoning power required in their later work life. They also perceived that the students are motivated and enthusiastic in learning how to work on computers.

(ii) Most of the teachers felt that Computer Education is sure to benefit the society in a number of ways and for this reason it is of utmost importance to provide this education right from the school level. Also, they felt the need for the provision of adequate facilities to promote this education.

(iii) Majority of the teachers felt that there is a need for training/orientation courses for better conducting of classes in Computer Education.

4. Views of Students about certain Aspects of the Computer Education course

(i) According to majority of the students, purpose of learning the Computer Education course is to improve their knowledge.

(ii) Students views on certain aspects of Computer education course indicate,

(a) that they were satisfied with the facilities available in the Computer Education classes, though majority of them welcome more number of computer sets ;

(b) their satisfaction to a great extent of the syllabus followed ;

(c) that though they were exposed to a variety of learning materials, yet they rely mostly on the notes given by teachers ; also, that there is a need for books which are simple and easy to understand and which are illustrated through diagrams ;

(d) their dissatisfaction with regard to the existing schedule, particularly for the practical classes and the need to increase the number of practical classes ;

(e) their satisfaction with the number of examinations conducted for the Computer Education course ; and

(f) the need for teachers who are qualified and who can teach in a clear and interesting manner.

(iii) Only a section (about 39 percent) of

the students perceived that the Computer Education course helps them in learning other school subjects.

(iv) About 45 percent of the students pointed out their liking to work with computers at a latter time.

(v) Surrounding environment has an influence in building awareness about computers among students.

(vi) Majority of the students did interact with their peers on different aspects of computers.

5. Performance of Students in the Computer Education course

Performance of students (N = 55) in the Indian Certificate of School Education (ICSE) examination for the year 1993 in the paper Computer Studies revealed that the lowest marks obtained was 54 and the highest marks obtained was 95 (maximum marks for the paper being 100), thus, the range of scores happened to be 41. The mean and standard deviation of the scores were found to be 74.73 and 11.19, respectively.

6. Relationship between the performance of Students in the Computer Education course and their performance in other School Subjects

(i) There exists a significant relationship (at 0.01 level) between the performance of students in the Computer Studies and their performance in English.

(ii) There exists a significant relationship (at 0.05 level) between the performance of students in the Computer Studies and their performance in Second Language.

(iii) There exists a significant relationship (at 0.01 level) between the performance of students in the Computer Studies and their performance in History, Civics and Geography.

(iv) There exists a significant relationship (at 0.01 level) between the performance of students in the Computer Studies and their performance in Mathematics.

(v) There exists a significant relationship (at 0.01 level) between the performance of students in the Computer Studies and their performance in Science.

7. Attitude of Students towards Computer Education course

(i) On the whole, the students have a favourable attitude towards Computer Education course.

(ii) There exists a significant difference among students of the four places (Guwahati, Shillong, Aizawl and Kohima) in their attitude towards Computer Education course. It is further found that the differences in attitude scores of different places significantly follows this order namely ;

Shillong > Guwahati > Kohima > Aizawl

(iii) There is no significant difference between boys and girls in their attitude towards Computer Education course.

5.7.0. SUGGESTIONS FOR FURTHER RESEARCH

The following are the suggestions for further research that could be undertaken in this area :

i) An attitude scale may be developed for measuring the attitude of computer education teachers towards Computer Education.

ii) An indepth study may be carried out with regard to the performance of students in Computer Education course.

iii) A Standardised BASIC programme may be developed which could be used by all school students.

iv) A Software Programme may be developed for the use of teachers as a sort of Mannual for teaching the Computer Education course.

v) A study on Computer Education in schools in the other States of the North-East, that is, Arunachal Pradesh, Manipur, and Tripura, may be undertaken.

APPENDICES

APPENDIX - I

NUMBER OF STUDENTS AND TEACHERS INVOLVED IN THE FINAL DATA COLLECTION STAGE (SCHOOLWISE)

Sl. No.	Name of the School	Number of Students	Number of Teachers
1.	Holy Child, Guwahati	50	2
2.	St. Mary's, Guwahati	60	3
3.	Don Bosco, Guwahati	155	3
4.	Vidya Mandir, Guwahati	16	2
5.	D.A.V., Guwahati	20	2
6.	Army, Guwahati	37	2
7.	Mandakenee, Guwahati	10	1
8.	Disneyland, Guwahati	25	1
9.	Anand Academy, Guwahati	10	1
10.	Miles Bronson, Guwahati	8	1
	Total	391	18
11.	Pine Mount, Shillong	5	1
12.	Assam Rifles Public, Shillong	68	2
13.	St. Edmund's, Shillong	50	2
14.	St. Anthony's, Shillong	15	2
15.	St. Dominic, Shillong	15	2
16.	St. Peter's, Shillong	25	2
17.	B.K.Bajoria, Shillong	20	2
18.	East End Chambers, Shillong	25	2

Contd....

Appendix - 1 Contd.....

Sl. No.	Name of the School	Number of Students	Number of Teachers
19.	St. Xavier's Shillong	12	1
20.	Seven Set, Shillong	10	1
21.	All Saints', Shillong	11	1
22.	Mawprem Modern, Shillong	9	2
23.	Auxilium, Shillong	50	2
24.	Loretto, Shillong	74	2
	Total	389	24
25.	St. Paul's Aizawl	25	2
26.	Government Higher Secondary, Aizawl	50	3
27.	Republic, Aizawl	10	2
28.	Zelbawk, Aizawl	20	3
	Total	105	10
29.	Don Bosco, Kohima	55	3
30.	Little Flower, Kohima	76	3
31.	Minister Hill Baptist, Kohima	10	2
32.	Baptist English, Kohima	35	2
33.	Government Higher Secondary, Kohima	20	2
34.	Kohima English, Kohima	61	2
	Total	257	14
	GRAND TOTAL (Guwahati + Shillong + Aizawl + Kohima)	1142	66

APPENDIX - 2

QUESTIONNAIRE FOR TEACHERS

SECTION - A

1. Name of the School :-
2. Name of the Teacher :-
3. Educational Qualifications :-
   a) General -
   b) Technical (Computer) -

SECTION - B

Kindly provide necessary information with regard to Computer Education only for the following questions.

1(a) From which Class is the course offered ?

(b) Do you think that it is the right class to start the Computer Education course ?

( ) Yes ( ) No

If No, what according to you should be the class to start the course ?

2. Is a prescribed syllabus followed for the Computer Education course ?

( ) Yes ( ) No

If Yes, kindly tick the appropriate one.

( ) I.C.S.E. Syllabus

( ) C.B.S.E. Syllabus

( ) Self made

( ) Private Computer Institutes

Any other kindly specify.....

3. With what objectives do you teach the Computer Education course ? Kindly enumerate. (e.g., To develop computer awareness)

1.

2.

3.

4.

4. Do the students follow a prescribed textbook for the course ?

( ) Yes ( ) No

a) If Yes, kindly mention the title of the textbook which is used by the students of your school.

b) If No, (i) What type of reading materials do the students have ?

(ii) How are these reading materials provided to the students ?

5. Does the school have library facilities ?

( ) Yes ( ) No

If Yes, (i) Does your school library have books on computers ?

( ) Yes ( ) No

(ii) Books on computers are available to

( ) Students only

( ) Teachers only

( ) Both Students and Teachers

6. While teaching in the Class, what are the difficulties you have to face with regard to Computer Education Syllabus ?

( ) Syllabus needs revision

( ) Lack of computer text books

( ) Syllabus is vast

( ) Syllabus is not prescribed classwise

( ) No difficulty

Any other please specify .....

7. Computer Education in your school includes

( ) Theory classes only

( ) Both Theory and Practical Classes

8. If both theory and practical classes exist, how are theory and practical work scheduled ? Please indicate from the choices given below :

( ) Practical work is carried out in the latter part of the year after completing the theory classes

( ) Both theory and practical classes are held side by side right from the beginning of the year

( ) The first one or two years are devoted to theory classes and the last year is entirely devoted to practical work

Any other schedule, please indicate clearly .....

9. If Practical classes are included, do the students practice on a computer for their practical work ?

( ) Yes

( ) No, computer is handled by the teacher for demonstration

If Yes, (i) How many hours of practical work does each student put in per week ?

(ii) How is the practical class organised ?

a) Students are grouped. Each group consists of _____ number of students

b) Each student is provided _____ minutes, to perform the practicals

c) Number of groups per class _____

10. Do the students learn to write a computer programme ?

( ) Yes ( ) No

If Yes,

(i) From which Class onwards do they learn to write ?

(ii) How are the programmes checked for their correctness ?

11. Are Computer Arithmetic and Logic taught to the students ?

( ) Yes ( ) No

If Yes, to which level/standard of students are they taught ?

12. Which of the Computer Languages do the students learn ?

( ) BASIC ( ) WORDSTAR ( ) LOGO

Any other please indicate .....

13. Kindly indicate the main topics which are taught in

(i) Class VIII

a)

b)

c)

d)

e)

(ii) Class IX

a)

b)

c)

d)

e)

(iii) Class X

a)

b)

c)

d)

e)

14. Are the students taught any additional computer course(s) other than that prescribed in the syllabus ? If so, please give details.

15. How is the evaluation work of the course carried out ?

(i) For Class VIII -

(ii) For Class IX -

(iii) For Class X -

16. Does the course end with

( ) A Diploma

( ) A Certificate

( ) Marks being entered in the progress report

Any other please indicate .....

17. To what extent do you find satisfaction while evaluating the answer scripts (Computer Education paper only) of your school ?

( ) Very great extent

( ) Considerable extent

( ) Minimum extent

( ) No satisfaction

18.(i) What is the trend of interest of students for learning the course ?

( ) Increasing rapidly

( ) Increasing moderately

( ) Decreasing slowly

( ) Decreasing rapidly

( ) Is same (neither increasing nor decreasing), since the course was introduced in the school

(ii) If the trend is decreasing or remaining same, what plans are envisaged by you/the school for promotion of students' interest ?

19. Have you undertaken the follow-up of the students who have successfully completed the course ?

( ) Yes ( ) No

If Yes, what are your observations ?

20. What is your opinion about the desirability to use computer

(i) for interactive learning ?

(ii) as a teaching tool ?

21. Do you recommend early introduction of Computer Assisted Learning for various subjects like mathematics, science, etc. in the schools ?

22. Are you satisfied with the computer sets installed in the school ?

( ) Yes ( ) No

If No, please indicate the major reasons for your being not satisfied.

23. Apart from using the computer for their course, are the students provided to use the same for computer games ?

( ) Yes ( ) No

If Yes, does the school provide computer games ?

( ) Yes ( ) No

24. Do you suggest that the Computer Education course be made compulsory in the high schools ?

( ) Yes ( ) No

If No, what do you think should be the criteria for selecting students for the course ?

25. How do you rate the success of Computer Education course in your school ?

( ) Very High ( ) High ( ) Average

( ) Low ( ) Very Low

26. What do you feel is the reaction of most of the parents towards the Computer Education course ?

27. What suggestions do you offer to improve the Computer Education course in your school ?

SECTION - C

Following are some statements on different aspects of Computer Education in High Schools. Each statement is provided with choice of response as 'Strongly Agree', 'Agree', 'Undecided', 'Disagree' and 'Strongly Disagree'.

Kindly give your reaction to each of the statements by putting a tick '(✓)' mark under the appropriate choice.

Please indicate to your responses frankly.

Kindly answer all the Statements.

Sl. No.	STATEMENTS	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1.	Knowledge of Computers will assist in finding good jobs.					
2.	Skills and knowledge acquired by the learners will help them in this competitive world.					
3.	The use of computers in schools is directly related to the development of the types of skills needed for higher level of national economy.					

Sl. No.	STATEMENTS	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
4.	Knowhow of Computer Literacy at the school level will help in increasing the productivity of the nation.					
5.	Computer Education in schools assist in improving the overall level of student achievement.					
6.	Computer Literacy aims to prepare the students for work and living.					
7.	Computer Education helps in increasing students reasoning power.					
8.	Programming in Computer Education course can begin, at High School stage itself.					
9.	The purpose for teaching computer education programming to school students is to improve their problem solving and logical thinking skills.					
10.	Orientation courses (like training, short term course) in computer education are very essential for all the teachers in High Schools.					
11.	Students are very enthusiastic to learn in Computer Education classes.					
12.	Motivation of the students towards Computer Education persists till the end of the academic year.					

Sl. No.	STATEMENTS	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
13.	Students face much difficulty in doing practical work on computers.					
14.	To learn about Computer Literacy, students do not require to be well versed with fundamental opeartions of arithmetic.					
15.	During practical class, teacher's assistance is constantly required by the students.					
16.	Students who opted for Computer Education course are always curious in knowing more and more about computers.					
17.	It is quite difficult to make the the students understand some of the basic concepts of Computer Education.					
18.	Computer Education has a lot of potential in country's development.					
19.	Each student gets enough instructional time during the course.					
20.	Students are aware of ways in which the world is being changed by technology.					
21.	In my school the balance between the number of students and the number of computer(s) is not adequate.					

Sl. No.	STATEMENTS	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
22.	Students are able to grasp a topic very rapidly when practical demonstration is carried out during a Computer Education class.					
23.	Students are highly influenced by their parents for undertaking the computer education course.					
24.	More infrastructural/Physical facilities (like separate computer room, books on computers, computer sets) need to be provided by the school for Computer Education course.					
25.	Computer Education course is suitable for above average students.					
26.	School Library needs to be strengthened by books on Computer Education.					
27.	Computer Education Club must exist in schools having Computer Education.					
28.	A multi-media training package on Computer Education is essential for teacher training in Computer Education.					
29.	Solving problems on a computer in a productive way requires two types of ability, namely, mental and operational.					

Sl. No.	STATEMENTS	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
30.	The computer is becoming man's intellectual instrument and partner in nearly all spheres of human life and activity.					
31.	Every year the teachers teaching computer education at the school level must have the opportunity for attending short term courses specially designed for teaching in schools.					
32.	One of the aims of introducing computer education in schools is to provide the students with a basic knowledge of new information technologies, both to assist them in their studies and to make them aware of their technological environment.					

Contd.....

(FOR SENIORMOST TEACHERS ONLY)

SECTION - D

Kindly provide necessary information with regard to School and Computer Education only for the following questions.

1. School was established in the year .....
2. Classes from ..... to .....
3. Medium of Instruction .....
4. Total number of students in 1992 .....
5. Total number of Teachers in 1992 .....
6. Total number of students in Computer Education course in 1992 .....
7. Management of the Institution

   ( ) Government ( ) Private aided ( ) Private unaided
8. Type of Institution

   ( ) Boys ( ) Girls ( ) Co-educational
9. Computer Education course was introduced in the year .....
10. (i) Computer Education course was introduced

    ( ) completely by school on its own

    ( ) with the help of Computer Centres

    (ii) If the Computer Education course was introduced with the help of Computer Centres, kindly provide necessary information :

Kindly name the Computer Centre(s) with whom the arrangement being made by the school to impart Computer Education course till date.

Name of the Computer Centre	Period of contract
I	
II	
III	

11. For how many years is the course taught to the students?

12. Is it a part of the regular curriculum of the school ?

( ) Yes ( ) No

If No, how is the course linked up with the regular school work ?

13. How many periods of teaching in a week are provided for the computer education in your school ?

a) Theory :

b) Practical :

Are you satisfied with the time allotment made ?

( ) Yes ( ) No

If No, please give your comments.

14. How many students have completed the Computer Education course in your School ?

Year	Number of Students					
	Admitted			Completed		
	Class VIII	Class IX	Class X	Class VIII	Class IX	Class X
1985						
1986						
1987						
1988						
1989						
1990						
1991						
1992						

15. Is there any procedure followed for selecting students for Computer Education course ?

( ) Yes ( ) No

If Yes, please give the details of the procedure.

16. How many teachers are there in the School to teach Computer Education courses ?

Kindly provide their Educational qualifications in the format given :

Teacher	General Qualification (i)	Qualification with with regard to Computer (ii)	Institution's name from where qualified with respect to (ii)
1			
2			
3			
4			
5			

17. What is the experience of the teachers in teaching Computer Education to students ?

Teacher	Number of Years
1	
2	
3	
4	
5	

18. How many teachers have received Computer Literacy and Studies in Schools (CLASS) training from N.C.E.R.T. ?

19. As per your knowledge, was there any Computer teacher training conducted by the State Department of Education or S.C.E.R.T. ?

( ) Yes ( ) No

If Yes, kindly provide necessary information below :

(i) Name of the Programme :

(ii) Date and Year of programme conducted :

(iii) Duration of the programme :

(iv) Number of teachers from your school who attended the programme :

(v) Programme contents (in brief) :

20. Has your school developed any computer software ?

( ) Yes ( ) No

If Yes, kindly specify the same

a)

b)

c)

d)

e)

21. How many Computer sets does the school possess at present?

22. Kindly name the brand of Computer that is in your School

a)

b)

c)

d)

e)

23. Is/Are the Computer set(s) installed in your school

( ) Purchased from the school funds

( ) Received as gift

( ) Provided by private Computer Institutes

Any other information, please provide below

If it is provided by Private Computer Institutes, is it on a contract basis

( ) Yes ( ) No

a) If Yes, the contract is for how many years .....

b) Which year did the contract start .....

c) Under the contract what are the facilities provided to the School ?

( ) Computer Education Teachers

( ) Computers

( ) Study materials for the students

Any other please specify .....

24. Who made the choice of the brand(s) of Computer in your School ?

25. What is the experience in the field of Computer of the person or persons concerned who made the choice ?

26. While making the choice, were any consultations made with others ?

( ) Yes ( ) No

If Yes, with whom were they made ?

27.(a) What is the cost at the time of initial investment per set ?

27.(b) How much is spent at present for the maintenance of each set ?

28. Is there any Computer service centre in your town/city?

( ) Yes ( ) No

If No, from where do you get the servicing personnel?

29. What facilities are available in the Computers at your School ? Please tick them from the list provided below

( ) Printers ( ) Mouse ( ) Keyboard

( ) Joystick ( ) Cassettes ( ) Light Pen

( ) Visual Display Unit ( ) Floppy Disks

Any other please specify .....

30. Where from software is made available for use in the course ?

31. How many software programmes does the school possess?

32. Is there a separate room for holding computer classes?

33. Is the computer room air conditioned ?

( ) Yes ( ) No

34. How is the room maintained for a good operational condition of the Computer ?

35. Is the electric power supply appropriate during practical class hours ?

APPENDIX - 3

QUESTIONNAIRE FOR STUDENTS STUDYING COMPUTER EDUCATION COURSE IN SCHOOLS

1. Name of the School -
2. Name of the Student -
3. Sex - ( ) Male ( ) Female
4. How many theory classes for Computer Education do have in a week ?
5. How many practical classes for Computer Education course do you have in a week ?
6. How many examinations on Computer Education are conducted in your School per year ?
7. What type of materials do you use for learning during Computer Education course ? (please put a tick mark)

   a) Textbooks .....

   b) Learning materials provided by the school .....

   c) Books from the Library .....

   d) Notes given by teachers .....

   Any other please specify .....

8.(i) Does your School has Computer sets ?

   ( ) Yes ( ) No

(ii) Do you have a separate Computer Room for the teaching learning purpose ?

   ( ) Yes ( ) No

9. Do you think more number of Computer sets should be purchased in your School ?

( ) Yes, if possible

( ) We can manage with the available number of sets

( ) Not available

10. Are Computer books available in your School Library ?

( ) Yes, sufficient number of books

( ) Yes, but more books are required

( ) Not available

11. Do you learn the basic things about a keyboard (like, how many number of keys ?, how the keys function ?, etc.)

( ) Yes ( ) No

If Yes,

( ) Only Theoretically

( ) Both theoretically and practically

12. Do you learn the commands of BASIC languages in the class?

( ) Yes ( ) No

13. How does the Computer Teacher teaches you in the class?

( ) Provides only Notes

( ) Provides notes and explains

( ) Only explains

14. What is your purpose of learning Computer Education course ? (You can put tick mark in more than one statement)

( ) To increase knowledge

( ) To learn for the sake of learning

( ) To fulfil parents' desire

( ) To increase my status among friends

15. What are your opinions about the Syllabus followed in terms of

a) Theory ?

b) Practical ?

16. what are your opinions about the examinations conducted for the Computer Education course in your School ?

( ) Satisfied

( ) Number of examinations should be reduced

17. What are your suggestions regarding

a) Computer Education Syllabus -

b) Computer Education Classes -

c) Computer Education books/learning materials -

d) Computer sets -

e) Computer Teacher(s) -

f) Any other (covering Computer Education only) -

18. Do you discuss about Computers with your friends ?

( ) Yes ( ) No

If Yes, what are the things you discuss about Computers? (please put a tick mark).

Different type of Computers .....

Price of Computers .....

Functions of Computers .....

Any other aspect (please specify) .....

19. Would you like to work with Computers in future when you grow up ?

( ) Yes ( ) Can't say ( ) No

19. Would you like to work with Computers in future when you grow up ?

( ) Yes ( ) Can't say ( ) No

20. According to you what are the uses of computer ?

a)

b)

c)

d)

e)

21. Do you think that the Computer Education course is helping you in your learning other school subjects ?

( ) Yes ( ) No

22. Kindly name the subject(s) you think that help is being received from studying the Computer Education course.

a)

b)

c)

d)

e)

APPENDIX - 4

ATTITUDE SCALE (DRAFT FORM)

TO MEASURE ATTITUDE OF STUDENTS TOWARDS COMPUTER EDUCATION COURSE

1. Name of the School -
2. Name of the Student -
3. Sex - ( ) Male ( ) Female
4. Class -
5. Date -

Given below are some statements expressing opinions about Computer Education course.

Please read each statement carefully and indicate your agreement or disagreement with it by indicating with a check "(✓)" in the appropriate column. A check "(✓)" placed under the column of 'SA' indicates 'Strongly Agree' while if placed under the column 'A' would indicate 'Agree' similarly, checks in the other column 'U', 'D' and 'SD' would indicate an opinion of 'Undecided', 'Disagree' or 'Strongly Disagree', respectively. Please indicate your responses frankly.

Kindly answer all the statements.

Sl. No.	STATEMENTS	Strongly Agree (SA)	Agree (A)	Undecided (U)	Disagree (D)	Strongly Disagree (SD)
1.	Computer knowledge is helping me to be accurate in any form of activity.					
2.	I am finding various kinds of difficulties in understanding the fundamentals of computer course.					
3.	It gives me pleasure to work on my own with computer.					
4.	Computer is an ornamental device only which cannot satisfy students' desires.					
5.	I do not like to miss the computer class at any cost.					
6.	When computer class was started in our school I was very much interested but now it is boring.					
7.	Computer course helps to seek and cultivate new form of knowledge.					
8.	Computer Science as a subject must not be introduced in high schools.					
9.	I think computers are the best companions for all ages of students.					
10.	I do not think computers are suitable for school students as they need to be handled very carefully.					

Sl. No.	STATEMENTS	Strongly Agree (SA)	Agree (A)	Undecided (U)	Disagree (D)	Strongly Disagree (SD)
11.	Computer plays a very important role in teaching even in the schools.					
12.	I am against the use of computers as it will make us think like machines only.					
13.	As soon as I enter the computer class I think I have enetered in a new world where there is entertainment and also learning.					
14.	The computer course which is introduced in our school is not interesting.					
15.	After joining the computer class I came to realise the importance and need of sequential (step by step) thinking for any type of work.					
16.	Learning to work on computer is very essential for our career.					
17.	Computer has the capacity of solving problems easily, but in doing so, we are becoming idle.					
18.	During vacations I want to devote myself in carrying interesting practical work with computer.					
19.	I find learning about computer is unimportant when compared to learning of other subject.					

Sl. No.	STATEMENTS	Strongly Agree (SA)	Agree (A)	Undecided (U)	Disagree (D)	Strongly Disagree (SD)
20.	Computer is an interest arousing device.					
21.	It becomes very difficult for me to recall various symbols while operating a computer.					
22.	I like computer as it saves much time in solving problems.					
23.	I feel that when I am required to make decisions from a number of alternatives given in operating the computer, I find it difficult.					
24.	Computer is playing the role or transforming the action-minded people to idle-minded.					
25.	Learning about computers helps in thinking widely.					
26.	It is not desirable to have computer education course at school level.					
27.	The need for learning computers in schools will grow tremendously.					
28.	I do not like learning computer course because it will narrow-down knowledge.					

Sl. No.	STATEMENTS	Strongly Agree (SA)	Agree (A)	Undecided (U)	Disagree (D)	Strongly Disagree (SD)
29.	Learning about computers is useful for advancing self reliance.					
30.	I am unable to understand computer language.					
31.	Knowledge of computers is a must in these days.					
32.	Computers cannot help to solve personal life problems.					
33.	It is a must that every school possess computers.					
34.	I do not like to work on my own with a computer.					
35.	Computers help in solving a problem rapidly.					
36.	Learning about computers in schools is useless.					
37.	I am very pleased to say that our school has the facility for learning computers.					
38.	With the advent and use of computers by society, people may become less proficient in simple calculations.					
39.	On successful completion of a computer programming, I am motivated to do more programming.					

Sl. No.	STATEMENTS	Strongly Agree (SA)	Agree (A)	Undecided (U)	Disagree (D)	Strongly Disagree (SD)
40.	I feel that working on computer is very complicated.					
41.	It is not necessary for all to attend computer education course.					
42.	Computer Education is essential for school students.					
43.	It is quite interesting to know about how computers have developed.					
44.	I find it is difficult to learn things that are taught in the computer education course.					
45.	I think it sharpens one's thinking abilities by attending the computer education classes.					
46.	It is a confusing act to write computer programmes.					
47.	I find it very interesting to work on a computer.					
48.	I feel refreshed when I operate on computers.					
49.	I think computers are powerful tools to learn independently.					
50.	It is a waste of time to attend computer education courses as I feel they are useless.					

Sl. No.	STATEMENTS	Strongly Agree (SA)	Agree (A)	Undecided (U)	Disagree D)	Strongly Disagree (SD)
51.	It is not worth the efforts to attend computer education classes.					
52.	Though the terms computer education sound great, in reality it is a dull area of study.					

APPENDIX - 5

RAW SCORES OBTAINED ON THE DRAFT FORM OF THE ATTITUDE SCALE

(N = 138)

Sl. No.	Student Sl. No.	Total Score	Sl. No.	Student Sl. No.	Total Score	Sl. No.	Student Sl. No.	Total Score
1.	1	138	2.	2	152	3.	3	149
4.	4	151	5.	5	145	6.	6	138
7.	7	126	8.	8	162	9.	9	143
10.	10	161	11.	11	133	12.	12	98
13.	13	144	14.	14	124	15.	15	182
16.	16	162	17.	17	140	18.	18	130
19.	19	146	20.	20	143	21.	21	97
22.	22	174	23.	23	141	24.	24	117
25.	25	117	26.	26	186	27.	27	143
28.	28	158	29.	29	164	30.	30	145
31.	31	130	32.	32	148	33.	33	103
34.	34	152	35.	35	152	36.	36	180
37.	37	70	38.	38	151	39.	39	159
40.	40	175	41.	41	158	42.	42	155
43.	43	125	44.	44	116	45.	45	109
46.	46	156	47.	47	149	48.	48	171
49.	49	136	50.	50	155	51.	51	169

Sl. No.	Student Sl. No.	Total Score	Sl. No.	Student Sl. No.	Total Score	Sl. No.	Student Sl.No.	Total Score
52.	52	162	53.	53	147	54.	54	145
55.	55	152	56.	56	153	57.	57	138
58.	58	192	59.	59	168	60.	60	126
61.	61	119	62.	62	144	63.	63	168
64.	64	139	65.	65	93	66.	66	195
67.	67	129	68.	68	129	69.	69	157
70.	70	154	71.	71	167	72.	72	154
73.	73	153	74.	74	157	75.	75	108
76.	76	123	77.	77	113	78.	78	160
79.	79	165	80.	80	188	81.	81	161
82.	82	172	83.	83	159	84.	84	58
85.	85	109	86.	86	110	87.	87	181
88.	88	146	89.	89	178	90.	90	157
91.	91	185	92.	92	141	93.	93	149
94.	94	152	95.	95	184	96.	96	155
97.	97	146	98.	98	148	99.	99	76
100.	100	139	101.	101	174	102.	102	110
103.	103	172	104.	104	165	105.	105	104
106.	106	116	107.	107	125	108.	108	174
109.	109	116	110.	110	173	111.	111	136
112.	112	139	113.	113	145	114.	114	137

Sl. No.	Student Sl.No.	Total Score	Sl. No.	Student Sl.No.	Total Score	Sl. No.	Student Sl.No.	Total Score
115.	115	158	116.	116	122	117.	117	153
118.	118	151	119.	119	139	120.	120	141
121.	121	143	122.	122	157	123.	123	173
124.	124	155	125.	125	135	126.	126	180
127.	127	120	128.	128	140	129.	129	152
130.	130	138	131.	131	150	132.	132	149
133.	133	139	134.	134	138	135.	135	153
136.	136	160	137.	137	154	138.	138	156

APPENDIX - 6

ATTITUDE SCALE

(FINAL FORM)

TO MEASURE ATTITUDE OF STUDENTS TOWARDS COMPUTER EDUCATION COURSE

1. Name of the School -
2. Name of the Student -
3. Sex - ( ) Male ( ) Female
4. Class -
5. Date -

Given below are some statements expressing opinions about Computer Education course.

Please read each statement carefully and indicate your agreement or disagreement with it by indicating with a check "(✓)", in the appropriate column. Each statement is provided with a choice of response as 'Strongly Agree', 'Agree', 'Undecided', 'Disagree', and 'Strongly Disagree'.

Please indicate your responses frankly.

Kindly answer all the statements.

Sl. No.	STATEMENTS	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1.	Computer knowledge is helping me to be accurate in any form of activity.					
2.	I am finding various kinds of difficulties in understanding the fundamentals of computer course.					
3.	It gives me pleasure to work on my own with computer.					
4.	Computer is an ornamental device only which cannot satisfy students' desires.					
5.	I do not like to miss the computer class at any cost.					
6.	When computer class was started in our school I was very much interested but now it is boring.					
7.	Computer course helps to seek and cultivate new form of knowledge.					
8.	I think computers are the best companions for all ages of students.					
9.	I do not think computers are suitable for school students as they need to be handled very carefully.					
10.	Computer plays a very important role in teaching even in the schools.					
11.	I am against the use of computers as it will make us think like machines only.					
12.	As soon as I enter the computer class I think I have entered in a new world where there is entertainment and also learning.					

Sl. No.	STATEMENTS	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
13.	The computer course which is introduced in our school is not interesting.					
14.	After joining the computer class I came to realise the importance and need of sequential (step by step) thinking for any type of work.					
15.	Learning to work on computer is very essential for our career.					
16.	Computer has the capacity of solving problems easily, but in doing so, we are becoming idle.					
17.	During vacations, I want to devote myself in carrying interesting practical work with computer.					
18.	I find learning about computer is unimportant when compared to learning of other subject.					
19.	Computer is an interest arousing device.					
20.	It becomes very difficult for me to recall various symbols while operating a computer.					
21.	I feel that when I am required to make decisions from a number of alternatives given in operating the computer, I find it difficult.					

Sl. No.	STATEMENTS	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
22.	Computer is playing the role of transforming the action-minded people to idle-minded.					
23.	Learning about computers helps in thinking widely.					
24.	It is not desirable to have computer education course at the school level.					
25.	The need for learning computers in schools will grow tremendously.					
26.	I do not like learning computer course because it will narrow-down the knowledge.					
27.	Learning about computers is useful for advancing self-reliance.					
28.	I am unable to understand computer language.					
29.	I do not like to work on my own with a computer.					
30.	Computers help in solving a problem rapidly.					
31.	Learning about computers in schools is useless.					
32.	I am very pleased to say that our school has the facility for learning computers.					
33.	On successful completion of a computer programming, I am motivated to do more programming.					

Sl. No.	STATEMENTS	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
34.	I feel that working on computer is very complicated.					
35.	It is not necessary for all to attend computer education course.					
36.	Computer Education is essential for school students.					
37.	It is quite interesting to know about how computers have developed.					
38.	I find it is difficult to learn things that are taught in computer education course.					
39.	I think it sharpens one's thinking abilities by attending the computer education classes.					
40.	It is a confusing act to write computer programmes.					
41.	I find it very interesting to work on computers.					
42.	I feel refreshed when I operate on computers.					
43.	I think computers are powerful tools to learn independently.					
44.	It is a waste of time to attend computer education courses as I feel they are useless.					

Sl. No.	STATEMENTS	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
45.	It is not worth the efforts to attend computer education classes.					
46.	Though the terms computer education sound great, in reality it is a dull area of study.					

APPENDIX - 7

RAW SCORES OBTAINED ON THE FINAL FORM OF THE ATTITUDE SCALE

(N = 1142)

Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score
GUWAHATI :								
1.	F	161	2.	F	156	3.	F	154
4.	F	148	5.	F	149	6.	F	134
7.	F	154	8.	F	132	9.	F	135
10.	F	131	11.	F	156	12.	F	158
13.	F	151	14.	F	148	15.	F	150
16.	F	150	17.	F	154	18.	F	149
19.	F	147	20.	F	143	21.	F	145
22.	F	160	23.	F	122	24.	F	152
25.	F	147	26.	F	167	27.	F	151
28.	F	154	29.	F	151	30.	F	150
31.	F	158	32.	F	126	33.	F	154
34.	F	144	35.	F	135	36.	F	138
37.	F	148	38.	F	159	39.	F	128
40.	F	154	41.	F	156	42.	F	158
43.	F	131	44.	F	122	45.	F	150
46.	F	155	47.	F	164	48.	F	158
49.	F	146	50.	F	148	51.	F	151
52.	F	147	53.	F	162	54.	F	105

Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score
55.	F	101	56.	F	156	57.	F	142
58.	F	144	59.	F	149	60.	F	144
61.	F	146	62.	F	98	63.	F	146
64.	F	131	65.	F	114	66.	F	109
67.	F	134	68.	F	120	69.	F	142
70.	F	76	71.	F	76	72.	F	88
73.	F	137	74	F	135	75.	F	134
76.	F	130	77.	F	138	78.	F	131
79.	F	118	80.	F	64	81.	F	133
82.	F	114	83.	F	159	84.	F	167
85.	F	154	86.	F	153	87.	F	108
88.	F	102	89.	F	129	90.	F	137
91.	F	167	92.	F	159	93.	F	114
94.	F	136	95.	F	140	96.	F	105
97.	F	90	98.	F	82	99.	F	147
100.	F	122	101.	F	138	102.	F	124
103.	F	114	104.	F	131	105.	F	146
106.	F	111	107.	F	146	108.	F	144
109.	F	149	110.	F	144	111.	M	135
112.	M	129	113.	M	144	114.	M	131
115.	M	172	116.	M	154	117.	M	148
118.	M	141	119.	M	154	120.	M	145
121.	M	170	122.	M	160	123.	M	159
124.	M	130	125.	M	139	126.	M	152
127.	M	116	128.	M	135	129.	M	155

Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score
130.	M	149	131.	M	144	132.	M	172
133.	M	155	134.	M	138	135.	M	133
136.	M	144	137.	M	97	138.	M	99
139.	M	123	140.	M	100	141.	M	122
142.	M	118	143.	M	130	144.	M	126
145.	M	115	146.	M	142	147.	M	118
148.	M	159	149.	M	114	150.	M	103
151.	M	117	152.	M	117	153.	M	127
154.	M	141	155.	M	101	156.	M	119
157.	M	126	158.	M	162	159.	M	119
160.	M	111	161.	M	139	162.	M	116
163.	M	96	164.	M	146	165.	M	107
166.	M	88	167.	M	119	168.	M	105
169.	M	109	170.	M	170	171.	M	98
172.	M	136	173.	M	107	174.	M	86
175.	M	90	176.	M	97	177.	M	112
178.	M	101	179.	M	150	180.	M	143
181.	M	140	182.	M	141	183.	M	173
184.	M	142	185.	M	138	186.	M	142
187.	M	143	188.	M	130	189.	M	160
190.	M	166	191.	M	151	192.	M	159
193.	M	119	194.	M	154	195.	M	148
196.	M	140	197.	M	146	198.	M	126
199.	M	143	200.	M	116	201.	M	152
202.	M	139	203.	M	113	204.	M	163

Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score
205.	M	158	206.	M	172	207.	M	154
208.	M	158	209.	M	154	210.	M	155
211.	M	182	212.	M	151	213.	M	143
214.	M	136	215.	M	126	216.	M	153
217.	M	146	218.	M	168	219.	M	152
220.	M	140	221.	M	144	222.	M	131
223.	M	142	224.	M	149	225.	M	147
226.	M	148	227.	M	160	228.	M	164
229.	M	159	230.	M	179	231.	M	146
232.	M	128	233.	M	147	234.	M	135
235.	M	155	236.	M	143	237.	M	116
238.	M	145	239.	M	143	240.	M	138
241.	M	140	242.	M	127	243.	M	98
244.	M	103	245.	M	153	246.	M	151
247.	M	151	248.	M	121	249.	M	168
250.	M	163	251.	M	141	252.	M	144
253.	M	156	254.	M	146	255.	M	143
256.	M	147	257.	M	139	258.	M	157
259.	M	152	260.	M	150	261.	M	144
262.	M	149	263.	M	143	264.	M	178
265.	M	151	266.	M	122	267.	M	129
268.	M	110	269.	M	121	270.	M	135

Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score
271.	M	165	272.	M	124	273.	F	121
274.	F	123	275.	F	103	276.	F	122
277.	F	96	278.	F	122	279.	F	132
280.	F	153	281.	F	149	282.	F	154
283.	F	174	284.	F	173	285.	F	153
286.	F	137	287.	F	136	288.	F	154
289.	F	143	290.	F	141	291.	F	139
292.	F	127	293.	F	144	294.	F	144
295.	F	129	296.	M	139	297.	M	154
298.	M	108	299.	M	124	300.	M	100
301.	M	154	302.	M	118	303.	M	116
304.	M	126	305.	M	112	306.	M	145
307.	M	101	308.	M	111	309.	M	115
310.	M	111	311.	M	95	312.	M	142
313.	M	99	314.	M	127	315.	M	105
316.	M	95	317.	M	105	318.	M	129
319.	M	106	320.	M	121	321.	M	121
322.	M	103	323.	M	100	324.	M	118
325.	M	94	326.	M	103	327.	F	137
328.	F	108	329.	F	103	330.	F	81
331.	F	77	332.	F	91	333.	F	116
334.	F	70	335.	F	132	336.	F	84
337.	F	124	338.	F	116	339.	M	133
340.	M	125	341.	M	148	342.	M	126
343.	F	131	344.	F	107	345.	F	138

Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score
346.	F	118	347.	F	125	348.	F	133
349.	M	127	350.	M	142	351.	M	133
352.	M	120	353.	M	118	354.	M	131
355.	M	124	356.	M	107	357.	M	110
358.	M	146	359.	M	147	360.	M	139
361.	M	152	362.	F	149	363.	F	157
364.	F	139	365.	F	144	366.	F	160
367.	F	168	368.	F	132	369.	F	123
370.	F	148	371.	F	153	372.	F	133
373.	F	161	374.	F	108	375.	F	130
376.	F	150	377.	F	149	378.	F	138
379.	F	167	380.	M	157	381.	M	152
382.	M	156	383.	M	183	384.	M	144
385.	M	106	386.	M	121	387.	M	148
388.	M	139	389.	M	112	390.	F	144
391.	F	171						
SHILLONG :								
392.	F	117	393.	F	151	394.	F	125
395.	F	121	396.	F	141	397.	M	154
398.	M	131	399.	M	127	400.	M	142
401.	M	103	402.	M	116	403.	M	109
404.	M	108	405.	M	175	406.	M	116
407.	M	145	408.	M	150	409.	M	115

Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score
410.	M	147	411.	M	113	412.	M	126
413.	M	116	414.	M	122	415.	M	85
416.	M	107	417.	M	106	418.	M	157
419.	M	161	420.	M	140	421.	M	150
422.	M	109	423.	M	179	424.	M	143
425.	M	155	426.	M	127	427.	M	148
428.	M	96	429.	M	146	430.	M	160
431.	M	129	432.	M	114	433.	M	95
434.	M	125	435.	M	119	436.	M	115
437.	M	103	438.	M	127	439.	M	139
440.	M	126	441.	M	120	442.	M	133
443.	M	174	444.	M	149	445.	M	142
446.	M	120	447.	M	112	448.	M	116
449.	M	154	450.	M	140	451.	M	168
452.	M	137	453.	M	139	454.	M	122
455.	M	183	456.	M	149	457.	M	126
458.	M	97	459.	M	151	460.	M	136
461.	M	135	462.	M	114	463.	M	116
464.	M	149	465.	M	153	466.	M	140
467.	M	114	468.	M	163	469.	M	147
470.	M	101	471.	M	109	472.	M	155
473.	M	159	474.	M	143	475.	M	139

Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score
476.	M	159	477.	M	160	478.	M	151
479.	M	150	480.	M	148	481.	M	150
482.	M	154	483.	M	139	484.	M	146
485.	M	156	486.	M	160	487.	M	159
488.	M	160	489.	M	166	490.	M	156
491.	M	155	492.	M	158	493.	M	156
494.	M	159	495.	M	145	496.	M	161
497.	M	169	498.	M	163	499.	M	170
500.	M	162	501.	M	157	502.	M	164
503.	M	112	504.	M	151	505.	M	136
506.	M	151	507.	M	160	508.	M	141
509.	M	137	510.	M	137	511.	M	151
512.	M	152	513.	M	150	514.	M	153
515.	M	158	516.	M	157	517.	M	163
518.	M	151	519.	M	160	520.	M	158
521.	M	161	522.	M	151	523.	M	144
524.	M	162	525.	M	150	526.	M	142
527.	M	156	528.	M	166	529.	M	162
530.	M	151	531.	M	132	532.	M	139
533.	M	134	534.	M	140	535.	M	144
536.	M	154	537.	M	139	538.	M	136
539.	M	119	540.	M	146	541.	M	156
542.	M	139	543.	M	138	544.	M	124
545.	M	115	546.	M	92	547.	M	123
548.	M	131	549.	M	140	550.	M	123

Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score
551.	M	136	552.	M	119	553.	M	114
554.	M	175	555.	M	143	556.	M	136
557.	M	139	558.	M	145	559.	M	149
560.	M	166	561.	M	132	562.	M	146
563.	M	141	564.	M	153	565.	M	161
566.	M	145	567.	M	106	568.	M	98
569.	M	113	570.	M	131	571.	M	174
572.	M	114	573.	M	107	574.	M	144
575.	M	140	576.	M	136	577.	M	137
578.	F	106	579.	F	119	580.	F	114
581.	F	117	582.	F	129	583.	F	135
584.	F	124	585.	F	136	586.	F	130
587.	F	84	588.	F	164	589.	F	136
590.	M	105	591.	M	95	592.	M	123
593.	M	141	594.	M	124	595.	M	145
596.	M	114	597.	M	120	598.	M	98
599.	M	109	600.	M	80	601.	M	91
602.	M	114	603.	M	134	604.	F	104
605.	F	125	606.	F	155	607.	F	123
608.	F	118	609.	F	143	610.	F	138
611.	F	128	612.	F	130	613.	F	126
614.	F	142	615.	M	135	616.	M	128
617.	M	149	618.	M	136	619.	M	171
620.	M	136	621.	M	127	622.	M	126

Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score
623.	F	135	624.	F	130	625.	F	153
626.	F	158	627.	F	124	628.	F	127
629.	F	134	630.	F	110	631.	F	112
632.	F	148	633.	F	112	634.	M	102
635.	M	106	636.	M	145	637.	M	137
638.	M	151	639.	M	125	640.	M	157
641.	F	136	642.	F	169	643.	F	150
644.	F	153	645.	F	170	646.	F	128
647.	F	151	648.	F	151	649.	F	153
650.	F	163	651.	F	165	652.	F	163
653.	M	151	654.	M	161	655.	M	158
656.	M	162	657.	F	143	658.	F	136
659.	F	149	660.	F	155	661.	F	162
662.	F	156	663.	F	150	664.	F	153
665.	F	157	666.	F	148	667.	F	162
668.	F	153	669.	F	151	670.	F	154
671.	F	161	672.	F	159	673.	F	131
674.	F	145	675.	F	143	676.	F	132
677.	F	128	678.	F	126	679.	F	140
680.	F	146	681.	F	114	682.	F	134
683.	F	155	684.	F	145	685.	F	169
686.	F	158	687.	F	143	688.	F	142
689.	F	146	690.	F	175	691.	F	158
692.	F	158	693.	F	156	694.	F	153
695.	F	160	696.	F	158	697.	F	180

Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score
698.	F	156	699.	F	149	700.	F	154
701.	F	140	702.	F	167	703.	F	139
704.	F	154	705.	F	147	706.	F	172
707.	F	154	708.	F	104	709.	F	158
710.	F	102	711.	F	104	712.	F	71
713.	F	138	714.	F	140	715.	F	63
716.	F	122	717.	F	126	718.	F	110
719.	F	120	720.	F	130	721.	F	90
722.	F	84	723.	F	129	724.	F	98
725.	F	116	726.	F	149	727.	F	141
728.	F	148	729.	F	125	730.	F	102
731.	F	142	732.	F	141	733.	F	164
734.	F	146	735.	F	149	736.	F	167
737.	F	159	738.	F	164	739.	F	156
740.	F	144	741.	F	126	742.	F	135
743.	F	100	744.	F	151	745.	F	153
746.	F	176	747.	F	108	748.	F	122
749.	F	135	750.	F	77	751.	F	106
752.	F	106	753.	F	112	754.	F	162
755.	F	129	756.	F	156	757.	F	115
758.	F	144	759.	F	147	760.	F	142
761.	F	162	762.	F	83	763.	F	148

Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score
764.	F	152	765.	F	161	766.	F	107
767.	F	157	768.	F	141	769.	F	156
770.	F	158	771.	F	137	772.	F	143
773.	F	153	774.	F	145	775.	F	155
776.	F	157	777.	F	151	778.	F	171
779.	F	152	780.	F	157			
AIZAWL :								
781.	M	122	782.	M	124	783.	M	151
784.	M	153	785.	M	130	786.	M	151
787.	M	151	788.	M	119	789.	F	125
790.	F	132	791.	F	94	792.	F	132
793.	F	137	794.	F	145	795.	F	143
796.	F	148	797.	F	142	798.	F	149
799.	F	147	800.	F	131	801.	F	134
802.	F	135	803.	F	156	804.	F	124
805.	F	117	806.	F	125	807.	F	123
808.	F	116	809.	F	142	810.	F	109
811.	F	137	812.	F	118	813.	F	118
814.	F	141	815.	F	120	816.	F	127
817.	F	154	818.	F	141	819.	F	117
820.	F	141	821.	F	119	822.	F	120
823.	F	118	824.	F	157	825.	F	119
826.	F	112	827.	F	134	828.	F	129

Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score
829.	F	110	830.	F	108	831.	F	116
832.	M	116	833.	M	117	834.	M	113
835.	M	150	336.	M	134	837.	M	134
838.	M	113	839.	M	114	840.	M	108
841.	M	151	842.	M	153	843.	M	147
844.	M	156	845.	M	154	846.	M	136
847.	M	138	848.	M	143	849.	M	154
850.	M	163	851.	M	118	852.	M	108
853.	M	107	854.	M	93	855.	M	95
856.	M	94	857.	M	107	858.	M	101
859.	M	103	860.	M	114	861.	M	127
862.	F	130	863.	F	107	864.	F	116
865.	M	118	866.	F	125	867.	F	121
868.	F	127	869.	F	136	870.	F	113
871.	F	119	872.	F	115	873.	F	131
874.	F	120	875.	M	112	876.	M	126
877.	M	131	878.	M	136	879.	M	130
880.	M	139	881.	M	129	882.	M	114
883.	M	118	884.	M	115	885.	M	110
KOHIMA :								
886.	M	101	887.	M	134	888.	M	127
889.	M	77	890.	M	165	891.	M	136
892.	M	140	893.	M	128	894.	M	96

Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score
895.	M	135	896.	M	110	897.	M	151
898.	M	143	899.	M	141	900.	M	148
901.	M	148	902.	M	148	903.	M	155
904.	M	124	905.	M	149	906.	M	158
907.	M	161	908.	M	132	909.	M	138
910.	M	155	911.	M	126	912.	M	150
913.	M	142	914.	M	145	915.	M	145
916.	M	154	917.	M	147	918.	M	144
919.	M	153	920.	M	145	921.	M	148
922.	M	118	923.	M	135	924.	M	146
925.	M	162	926.	M	154	927.	M	150
928.	M	148	929.	M	140	930.	M	159
931.	M	157	932.	M	151	933.	M	152
934.	M	142	935.	M	151	936.	M	154
937.	M	158	938.	M	155	939.	M	139
940.	M	160	941.	F	119	942.	F	121
943.	F	105	944.	F	126	945.	F	130
946.	F	138	947.	F	124	948.	F	132
949.	F	118	950.	F	155	951.	F	123
952.	F	134	953.	F	118	954.	F	146
955.	F	128	956.	F	97	957.	F	116
958.	F	112	959.	F	151	960.	F	123
961.	F	130	962.	F	140	963.	F	137

Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score
964.	F	136	965.	F	134	966.	F	123
967.	F	128	968.	F	130	969.	F	112
970.	F	112	971.	F	101	972.	F	103
973.	F	115	974.	F	122	975.	F	155
976.	F	123	977.	F	87	978.	F	103
979.	F	126	980.	F	122	981.	F	129
982.	F	139	983.	F	122	984.	F	102
985.	F	105	986.	F	133	987.	F	154
988.	F	119	989.	F	122	990.	F	131
991.	F	119	992.	F	119	993.	F	112
994.	F	133	995.	F	152	996.	F	150
997.	F	135	998.	F	138	999.	F	144
1000.	F	140	1001.	F	127	1002.	F	102
1003.	F	98	1004.	F	119	1005.	F	122
1006.	F	126	1007.	F	144	1008.	F	96
1009.	F	107	1010.	F	144	1011.	F	138
1012.	F	150	1013.	F	156	1014.	F	152
1015.	F	154	1016.	F	153	1017.	F	125
1018.	F	150	1019.	F	135	1020.	F	125
1021.	M	139	1022.	M	150	1023.	M	139
1024.	M	145	1025.	M	142	1026.	M	130
1027.	M	127	1028.	M	132	1029.	M	117
1030.	M	127	1031.	M	134	1032.	M	102
1033.	M	127	1034.	M	127	1035.	M	70
1036.	M	124	1037.	M	139	1038.	M	137

Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score
1039.	M	135	1040.	M	134	1041.	M	129
1042.	M	130	1043.	M	130	1044.	F	118
1045.	F	115	1046.	F	113	1047.	F	127
1048.	F	131	1049.	F	109	1050.	F	108
1051.	F	133	1052.	F	129	1053.	F	128
1054.	F	119	1055.	F	128	1056.	F	70
1057.	F	105	1058.	F	147	1059.	F	137
1060.	F	126	1061.	F	123	1062.	F	148
1063.	M	140	1064.	M	139	1065.	M	132
1066.	M	138	1067.	M	132	1068.	M	138
1069.	M	133	1070.	M	118	1071.	M	135
1072.	M	125	1073.	F	146	1074.	F	125
1075.	F	141	1076.	F	143	1077.	F	139
1078.	F	148	1079.	F	146	1080.	F	141
1081.	F	141	1082.	F	114	1083.	F	110
1084.	F	72	1085.	F	123	1086.	F	117
1087.	F	122	1088.	F	120	1089.	F	111
1090.	F	147	1091.	F	143	1092.	F	127
1093.	F	131	1094.	F	164	1095.	F	119
1096.	F	124	1097.	F	114	1098.	F	143
1099.	F	138	1100.	F	142	1101.	F	136
1102.	F	128	1103.	F	121	1104.	F	119
1105.	M	119	1106.	M	122	1107.	M	144

Sl. No.	Sex: M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score	Sl. No.	Sex M/F	Attitude Score
1108.	M	129	1109.	M	96	1110.	M	122
1111.	M	120	1112.	M	134	1113.	M	158
1114.	M	114	1115.	M	114	1116.	M	104
1117.	M	122	1118.	M	144	1119.	M	134
1120.	M	121	1121.	M	132	1122.	M	75
1123.	M	142	1124.	M	128	1125.	M	155
1126.	M	145	1127.	M	146	1128.	M	138
1129.	M	131	1130.	M	143	1131.	M	133
1132.	M	151	1133.	M	135	1134.	M	125
1135.	F	101	1136.	F	114	1137.	F	110
1138.	F	110	1139.	F	137	1140.	F	164
1141.	F	132	1142.	F	143			

APPENDIX - 8

I.C.S.E. QUESTION PAPER ON "COMPUTER STUDIES", 1993

COMPUTER STUDIES

(Two Hours)

Answers to this paper must be written on the paper provided separately.
You will NOT be allowed to write during the first 15 minutes.
This time is to be spent in reading the question paper.
The time given at the head of this paper is the time allowed for writing the answers.

This paper is divided into two Sections.
You are to answer all questions in Section A, and any four questions in Section B.
The intended marks for questions or parts of questions are given in brackets ( )

Section A

Attempt all questions

Question 1

(a) Express the hexadecimal number 3AD5 in decimal system (2)

(b) If $x = 110110_2 - 100111_2$, then find x as a binary number (2)

(c) Convert the decimal number 6.75 into binary (2)

(d) If $y = 0.1_2 \times 0.1_2$, then how much is y in

i) decimal ? (2)

ii) binary ? (2)

(e) Simplify in Octal : $705_8 + 264_8$ (2)

Question 2

Answer the following questions : (5)

(a) Which generation computer started using COBOL ?

(b) Which generation computer stopped using valves, as the filament contained used to burn up quickly ?

(c) Which computer first started to use stored programs ?

(d) Into which generation computers are the micro - computers classified ?

(e) Which machine may be considered to be a prototype of modern computers ?

Question 3

Draw a flowchart for finding the sum of 1 + 5 + 9 ....+ 81 (1)

Question 4

(a) Draw a logic gate for NOR (2)

(b) Simplify the boolean function (C , D) (2)

(c) Draw the logic gate A, B + A (3)

Question 5

(a) Some of the following program lines have syntax error. Identify the error and write correctly :

```
10 READ A $, A, B $, B
20 PRINT A $, A
30 PRINT B $, B
40 SACHIN, RITA, 50, 60
```

(2)

(b) From the list of basic file names given below, identify the valid/invalid ones :

(i) SS ENTERPRISE

(ii) COBOLPROG

(iii) TOURISM 92

(iv) LIST OF 10 A (2)

(c) What will be the output of the following program for input value of X equal to (i) 2, (ii) 1, (iii) 3 ?

```
10 INPUT X
20 ON X GOTO 40, 60, 80
30 PRINT "TYPE 1 OR 2 OR 3"
35 STOP
40 PRINT "XXX = 1"
50 STOP
60 PRINT "XX = 4"
70 STOP
80 PRINT "X = 3"
90 STOP
```

(3)

(d) Write the following acronyms in the expanded form :

(i) CRT (2)

(ii) COBOL (2)

(e) Write a basic program segment within six lines illustrating the use of RESTORE statement. The output should indicate the distinction between the non-use and use of 'Restore' statements in the program. (6)

Question 6

(a) How many Kilobytes make one Megabytes ? (1)

(b) What is the main advantage of a random access file ? (1)

(c) What difference would a semicolon (;) and a comma (,) make in the PRINT statements of Basic Programs ? (1)

(d) State what is wrong in the following statement :

50 IF (A>E OR B>C) THEN 100 (3)

(e) Distinguish between

(i) WORD and BYTE

(ii) Time Sharing and Real Time PProcessing (4)

Section B

(Attempt any four questions)

Question 7

Write a basic program to find the output of the first twenty terms of the series 1, 1, 2, 3, 5, ... in which each term is the sum of the two previous terms (12)

Question 8

Write a basic program to prepare and print a frequency distribution table of the following data, into clauses or categories : 0 - 9, 10 - 19, 20 - 29, 30-39 and 40-49 :

35, 21, 11, 0, 5, 17, 12, 38, 47, 36,
9, 23, 4, 12, 8, 29, 32, 39, 4, 44

The output should state classes or categories and the corresponding frequencies in two columns (12)

Question 9

By using ON GOTO statement, write a menu-driven program in basic to compute addition or substraction or multiplication or division of any two numbers given as input. The program should indicate that division by zero is not allowed. (12)

Question 10

Write a basic program to compute the bank balance account for one month's transaction. The program should use the terms - Opening balance, Withdrawal (N), Deposit (I) and Closing balance, where N and I denote the number of withdrawals and deposits in a particular month. (12)

Question 11

Write a basic program to create a basic sequential file containing the names of probables who are likely to get Grade one in Computer Studies (12)

Question 12

The solution of two linear equations

$ax + by = c$

$px + qy = r$

is given as

$$x = \frac{cq - br}{aq - bp}, \quad y = \frac{ar - cp}{aq - bp}$$

Write a basic program, using User Defined functions and an appropriate REM statement, to find the solution of any pair of simultaneous equations (linear) for the given values of a, b, c, p, q and r
The program should print 'No solution' if
a.q - b.p = 0 (12)

Question 13

A dealer sells (i) Badminton rackets, (ii) Shuttle cocks in boxes containing ten each and (iii) Nets
Write a basic program to create a bill using the information given below :

INPUT : Date of purchase, Name of the buyer, Price of each item on that day, Quantities of each item

OUTPUT : Make up appropriate title. Include date and name of the buyer. There should be five columns with heading SL, NO., ITEM, PRICE, QUANTITY and AMOUNT. Add 8% sales tax and print the total amount to be paid (12)

****

APPENDIX - 9

COMPUTER STUDIES

I.C.S.E. SYLLABUS FOR COMPUTER EDUCATION COURSE AT THE SCHOOL LEVEL

Introduction :

(i) Computer Studies is an applied subject and the aim of this syllabus is to reinforce the practical aspect by dealing with the following questions :

1. How does a computer work ?
2. How is information stored ?
3. How do you get information into it ?
4. How do you get information out of it ?
5. How do I make it work for me ?
6. What do people do with computers ?

(ii) The syllabus is based on a teaching schedule of 3 periods per week for 30 weeks in each of the two years, Class IX and Class X at least two thirds of this time should be used for programming and real time experience.

Part 1 External Examination.

There will be one paper of 2 hours.

The paper will be divided into two Sections A and B.

Section A will consist of questions requiring only short answer and will cover the whole syllabus. There will be no choice of questions.

Section B will consist of traditional type questions. There will be a choice of questions and candidates will be required to answer four questions.

Note : The syllabus is intended to indicate the scope of the course and not to dictate the teacher's approach to the subject.

SYLLABUS	NOTES
1. History of Computers	Abacus, calculating devices, processing devices, early computers, various generations of computers
2. Binary State	Base two, base eight, base sixteen, arithmetic as required by a computer : bits, bytes, word ; role of the chip, materials used for chips.
3. Structure of the Computer (including information retrieval)	
a) Input Devices	Punched cards, console keyboards, bar codes, magnetic ink character readers (MICR)
b) Central Processing Unit (CPU)	Memory or immediate access store or working store, arithmetic/logic unit, control unit.

c) Output Devices	Visual display unit (VDU), including graphs, line printer, daisy-wheel printer, card punch
d) Auxiliary storage	Magnetic tapes, magnetic discs, optical disc, memory

Note :- (i) Candidates should know the location of each unit in a micro-computer and where possible in a mini-computer and main-frame

(ii) diagrams, models, photographs and other visual aids may be used

4. Flowcharts and simple four-line programmes	Symbols used in flowcharting relevant to a four-line programme : learning to make corrections in the programme.
5. Computer Logic	Boolean logic, truth tables, logic gates; logic circuit
6. Systems Software	Computer language, flowcharting and writing programmes in BASIC upto twelve lines
7. Data Processing	Distinction between information and data ; digital and analogue computer (diagrams, photographs and visits) ; input of data ; how the computer deals with data ; output of

data ; data storage ; batch processing ; on-line processing ; real time processing.

Part 2. To be assessed internally by the school

Practical or Project Work in Computer Studies

Use of computers and their applications :

(a) Word processing

(b) Application of computers to :

Learning and instruction, OR banks, OR household appliances, OR one commercial organisation, OR using laboratory data to verify a law, OR principle in science, OR other suitable projects

(A) Course Work

Candidates will be required to submit two reports, each of about 8 sides including diagrams, as follows :

(i) A short report on the design and preparation of a programme for a user. This should include :

(a) The user's specification ;

(b) A restatement of the problem from the programmer's point of view and the program specification ;

(c) Description of the algorithm ;

(d) The program (suitably annotated) ;

(e) Evaluation of computer results.

(ii) A short report on the testing of a file-handling program that has been designed by the candidate. This report should include :

(a) Specification of the program design ;

(b) Details of relevant files

(B) Finished Work : Candidates will be required to display the course work for assessment by the Visiting Examiner

(C) Assessment :

(1) The teacher and the Visiting Examiner will assess the course work of the candidates by creating three groups, isolating the best work and the worst work. The group of candidates in the middle will then be sub-divided into the best, middle and worst so as to form five groups.

(2) While placing the course work of candidates in various groups the following aspects should be taken into consideration :

Preparation and organisation

Research and methods adopted

Skills in work and presentation

Finished course work

Other aspects may also be considered depending on the nature of the coursework undertaken.

(3) Candidates in the five groups should be given marks in accordance with the table given below using the full range in each group as far as possible :

A between 41 and 50

B between 31 and 40

C between 21 and 30

D between 11 and 20

E between 0 and 10

****

APPENDIX - 10

MARKS OBTAINED BY THE STUDENTS IN THE I.C.S.E. EXAMINATION CONDUCTED IN 1993

Sl. No.	English	Second Language	History, Civics, Geography	Mathematics	Science	Computer Studies
1.	86	62	80	88	88	88
2.	88	62	66	66	66	83
3.	86	69	66	60	66	72
4.	83	72	64	78	66	80
5.	76	90	86	83	62	80
6.	92	78	94	98	96	90
7.	88	78	90	97	95	92
8.	78	58	80	62	66	60
9.	80	54	66	86	86	74
10.	78	44	74	50	50	66
11.	76	62	90	76	86	86
12.	80	78	94	97	92	86
13.	78	58	80	96	92	83
14.	64	60	76	88	74	69
15.	92	72	92	97	96	90
16.	86	40	69	72	54	62
17.	76	44	86	54	50	66
18.	76	72	88	74	69	60
19.	92	72	92	95	86	88

Sl. No.	English	Second Language	History, Civics, Geography	Mathematics	Science	Computer Studies
20.	62	72	83	86	83	92
21.	66	58	58	69	52	64
22.	83	58	90	80	69	69
23.	88	58	76	83	72	76
24.	69	78	69	76	58	62
25.	69	58	83	95	88	88
26.	83	69	74	99	86	86
27.	74	62	86	78	69	69
28.	94	88	80	98	94	86
29.	60	60	66	54	50	66
30.	88	76	90	92	69	86
31.	86	92	94	96	90	95
32.	86	86	92	99	95	90
33.	69	62	80	69	52	64
34.	62	76	62	76	48	72
35.	58	52	50	54	48	62
36.	74	69	83	94	72	72
37.	83	64	90	95	76	86
38.	69	52	76	86	60	78
39.	66	66	88	92	83	60
40.	69	72	74	88	60	72
41.	76	86	69	62	48	60
42.	78	69	76	86	52	66
43.	60	86	52	66	54	66

Sl. No.	English	Second Language	History, Civics, Geography	Mathematics	Science	Computer Studies
44.	69	60	52	60	52	62
45.	66	76	69	78	50	60
46.	76	90	88	69	66	60
47.	78	66	90	80	78	76
48.	86	90	88	78	74	86
49.	88	62	86	78	74	66
50.	69	50	66	60	52	69
51.	86	60	90	95	83	86
52.	74	52	69	69	58	74
53.	94	74	90	88	78	72
54.	40	54	46	52	30	54
55.	88	72	83	88	69	83

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