UNIT 12 COMPUTER ASSISTED LEARNING

Notes

STRUCTURE

12.0 INTRODUCTION

Recall what you do while you are teaching in a class. You prepare a plan for the class, arrange all the materials required to conduct different activities in the class, engage the students while you are teaching, explaining, demonstrating, asking questions, answering students' queries, conducting group activities, evaluating students' performance and many other activities related to the classroom teaching. Teaching-learning is a very complex process demanding a lot of efforts and responsibilities from the teacher. Therefore, it is not surprising that even the best teacher, sometimes fails to deliver as per his/her expectations.

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However, the conventional teaching methodology has undergone tremendous change under the impact of the use of technology and in particular the use of computers in the teaching-learning process. There is a radical transformation in the teachers' roles in the classroom. The learning process especially the classroom learning is becoming more and more learner-centred where the onus of learning is more on the student (learner). The role of teacher has now changed from knowledge transmitter to knowledge mentor and facilitator of learning in the classroom. All you have to do as a mentor or facilitator of learning is to guide the student to access the various sources of experiences and information which would be used by them for learning. In this context, the role of the computer is vital for accessing and collaborating information from different sources and manipulating and processing for learning. Therefore, as a teacher, you have to develop the skills of using a computer in the classroom and acquire the basic knowledge about computer. In this unit, the fundamental ideas about computer and its basic operations applied in different modes of computer assisted learning are discussed. You will need at least 8 study hours for completing this unit and understanding the concepts embedded in it.

12.1 LEARNING OBJECTIVES

After completing this unit, you will be able to:

- identify different components of a computer.

- develop the skills to operate the computer.

- recognise the role of computers in the classroom.

- collect and disseminate information using the Internet.

- use different modes of Computer Assisted Learning.

12.2 THE COMPUTER

In today's world computers are all pervasive…we see them in shops, railway station, banks and offices. The use computers are different in different places. It is used for carrying out complicated mathematical and statistical calculations, preparing bills, and maintaining accounts in offices and shops, booking reservations in trains and airlines, in medical tests and surgeries, in storing and transmitting information in all fields of human knowledge. Computers have been widely preferred in different sectors because of its unique characteristics like speed, accuracy and efficiency. It has also found a place in education, particularly in the classroom. As a teacher you need to be fully aware of its functioning and use it in the classroom for the advantage of your students' learning.

12.2.1 What is a Computer?

A Computer is an electronic device that takes raw data as inputs from the user, processes these data under the control of a set of instruction (called programme), gives the result (output) and saves output for future purposes (storage). It can process both numerical and non-numerical (arithmetic and logical) calculations.

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Fig- 12.1 Personal Computer

A computer as shown in Fig. 12.1 which performs the following five major operations or functions irrespective of their size and make.

1)   It accepts data or instructions by way of input,

2)   It stores data,

3)   It can process data as required by the user,

4)   It gives results in the form of output, and

5)   It controls all operations inside a computer.

Let us discuss each of these operations.

1.   *Input:* This is the process of entering data and programs into the computer system. You should know that computer is an electronic machine like any other machine which takes raw data as inputs and performs some processing giving out processed data. Figure 12.2 depicts the operation of Computer.

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PROGRAM & DATA → INPUT UNIT → STORAGE UNIT → OUTPUT UNIT → RESULTS

CONTROL UNIT

CENTRAL PROCESSING UNIT
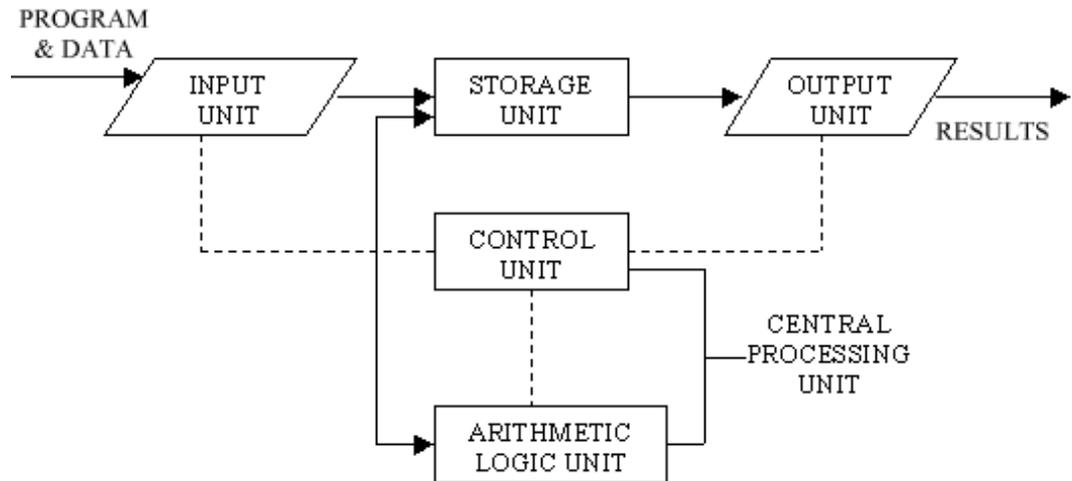
ARITHMETIC LOGIC UNIT

Figure-12.2 Operation of a Computer

2. *Storage:* The process of saving data and instructions permanently is known as storage. Data has to be fed into the system and stored in the system before the actual processing of those data starts. The data is stored in the storage unit for processing at a later period as and when required. After the data are processed, the output can also be stored for future use. Even in between the processing of data, some intermediary data can also be saved in the storage unit. This is a unique advantage of the computer not available in other common machines. This storage unit or the primary storage of the computer system is designed to do the above functions. It provides space for storing data and instructions.

3. *Processing:* The task of performing operations like arithmetic and logical operations is called processing. The Central Processing Unit (CPU) of the computer takes data and instructions from the storage unit and makes all sorts of calculations based on the instructions given and the type of data provided. The processed data are then sent back to the storage unit.

4. *Output:* This is the process of producing results after processing the data for getting useful information. The output produced by the computer after processing is also stored inside the computer for further processing before being given in a readable form.

5. *Control:* Controlling of all operations like input, processing and output are performed by control unit. It takes care of step by step processing of all operations inside the computer

E1. Why computer is known as data processor?

E2. What will be the problems, if storage system will not be there in the computer?

12.2.2 Functional Units

In order to carry out the operations mentioned in the previous section, the computer allocates the task between its various functional units. The computer system is divided into three separate units for its operation. They are i) arithmetic logical unit, ii) control unit, and iii) central processing unit.

i)   *Arithmetic Logical Unit (ALU)*

After you enter data through the input device it is stored in the primary storage unit. The actual processing of the data and instruction are performed by Arithmetic Logical Unit (ALU). The major operations performed by the ALU are addition, subtraction, multiplication, division, logic and comparison. Data is transferred to ALU from the storage unit when required. After processing the output is returned back to the storage unit for further processing or getting stored.

ii)   *Control Unit (CU)*

The next component of computer is the Control Unit, which acts like the supervisor seeing that things are done in proper fashion. The control unit determines the sequence in which computer programs and instructions are executed. Things like processing of programs stored in the main memory, interpretation of the instructions and issuing of signals for other units of the computer to execute them. It also acts as a switch board operator when several users access the computer simultaneously. Thus, it coordinates the activities of computer's peripheral equipment as they perform the input and output. It is the manager of all operations mentioned in the previous section.

iii)   *Central Processing Unit (CPU)*

The ALU and the CU of a computer system are jointly known as the central processing unit. You may call CPU as the brain of any computer system that takes all major decisions, makes all sorts of calculations and directs different parts of the computer functions by activating and controlling the operations. The CPU (Central Processing Unit) is the device that interprets and executes instructions.

E3.   Choose the correct answer:

(i)   The task of performing arithmetic and logical operations is called

(A) ALU,   (B) CPU,   (C) PC,   (D) Processing

(ii)   The ALU and CU is jointly known as

(A) RAM,   (B) ROM,   (C) CPU, (D) none of the above

(iii)   The process of producing results from the data for getting useful information is called

(A) Output, (B) Input,   (C) Processing (D). storage

12.2.3 Major Components of The Computer

All the components of the computer can be categorised into two broad groups i.e. hardware and software.

A hard ware component of the computer refers to the internal and the peripheral devices that we can touch i.e. all physical parts of the computer. Software on the other hand refers to the set of computer programs, procedures that describe how they are to be used. That means soft wares are set of programs which gives "intelligence" to the computer.

The hardware are the parts of computer itself including the Central Processing Unit (CPU) and related microchips and micro-circuit, keyboard, monitor, mouse, drives (floppy, CD, DVD, and Optical). Other extra parts called peripheral components or devices include printers, modems, digital cameras and cards (sound, colour, and video) etc. The components of a computer can be in four categories:

(i)   Input devices (ii) CPU (iii) Storage devices and (iv) Output devices.

1.   *Input Devices:* A computer is only useful when it is able to communicate with the external environment. When you work with the computer you feed your data and instructions through some devices to the computer. These devices are called Input devices. The major input devices are Mouse and Key Board. Input devices are necessary to convert our information or data in to a form which can be understood by the computer. A good input device should provide timely, accurate and useful data to the main memory of the computer for processing. The most useful input devices are the following.

-   *Keyboard: -* This is the standard input device attached to all computers. The layout of keyboard is just like the traditional typewriter. It also contains some extra command keys and function keys. It contains a total of 101 to 104 keys. A typical keyboard used in a computer is shown in Fig. 12.3. You have to press correct combination of keys to input data. The computer can recognize the electrical signals corresponding to the correct key combination and processing is done accordingly.

-   *Mouse:* Mouse is an input device shown in Fig. 12.3 that is used with your personal computer. It rolls on a small ball and has two or three buttons on the top. When you roll the mouse across a flat surface the screen censors the mouse in the direction of mouse movement. The cursor moves very fast with a mouse giving you more freedom to work in any direction.

Fig 12.3 Key Board and Mouse

2. ***Central Processing Unit (CPU):*** The main unit inside the computer is the Central Processing Unit (CPU). This unit is responsible for all events inside the computer. It controls all internal and external devices, performs arithmetic and logic operations. Figure 12.4 shows the CPU device.


Fig.12.4 CPU Devices

3. ***Storage Devices:*** The CPU contains the basic instructions needed to operate the computer, but it does not have the capability to store the programmes or large sets of data permanently. Just like the human brain the computer has an in-built memory where it can store large amount of data which helps in processing arithmetic and logical operations and also holds programmes and the data being manipulated. This area is called memory or storage. Data can be also stored in secondary storage devices such as pen drives, which can be kept outside your computer and can be carried to other computers. Computer has two sets of memory, which are primary memory like RAM (Random Access Memory/Read-Write Memory), ROM (Read-only-memory) and secondary memory like Hard Disk (Local Disk), Optical Disks: CD-R, CD-RW, DVD-R, DVD-RW, Pen drive, Zip drive and Memory Cards.

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E4. State the names of the components of the computer as shown in the figure below against the numbers indicated.
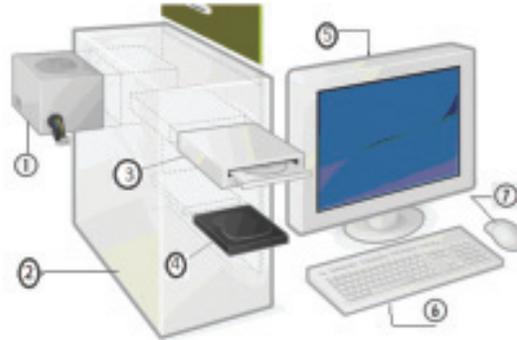
12.2.4 Types of Computer

You might have seen computers used in bank, railway station, and library and in other places. The memory, size and efficiency of these computers are different from each other. Computers can be classified on the basis of its working principles, size and brand. Different categories of computers which can be used in the classroom learning process are as follows.

a) *Microcomputer:* Microcomputer is at the lowest end of the computer range in terms of speed and storage capacity. Its CPU is a microprocessor. The first microcomputers were built of 8-bit microprocessor chips. The most common application of personal computers (PC) is in this category. The PC supports a number of input and output devices. An improvement of 8-bit chip is 16-bit and 32-bit chips. Examples of microcomputer are IBM PC, PC-AT.

b) *Mini Computer*: This is designed to support more than one user at a time. It possesses large storage capacity and operates at a higher speed. The mini computer is used in multi-user system in which various users can work at the same time. This type of computer is generally used for processing large volume of data in an organisation. They are also used as servers in Local Area Networks (LAN).

c) *Main frames:* These types of computers are generally larger in terms of memory than the mini computers. They operate at very high speed, have very large storage capacity and can handle the work load of many users. They are generally used in centralised databases in big organisations like banking, insurance, defence and other such sectors.

d) *Supercomputer:* They are the fastest and most expensive machines. They have high processing speed compared to other computers. They have also

multiprocessing technique. One of the ways in which supercomputers are built is by interconnecting hundreds of microprocessors. Supercomputers are mainly being used for weather forecasting, biomedical research, remote sensing, aircraft design and other areas of science and technology.

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E5. The computer that you often see being used by others or you use for your own work comes under which type of category?

E6. In classroom learning which type of computer you need to use?

✖ ACTIVITY-1

Find a computer and observe the different parts. Identify the keys on the key board and try to operate the system with the help of a computer knowing person.

12.2.5 Using the Computer

You have to work with the computer to use it properly. In order to use a computer you need to do the following by sitting with a computer :

- *Starting the computer:*

    1. Switch ON the Power Supply,

    2. Switch ON the CPU and,

    3. To Switch ON the Screen (Monitor).

- *Shutting down (Turning off) the Computer*

    Before shutting down the Computer, close all programmes you are working as shown on the screen (monitor) at first. Then,

    1. Click on Start button.

    2. Click on Shutdown (Turn off Computer).

    Then, on the monitor screen you find the following options (As shown in the pictures below):

    - Standby

    - Shutdown (Turn Off)

    - Restart

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Note: The options will be different from one system to another.

3.   Choose 2nd option (i.e. Shutdown/Turn Off).

4.   Click on OK.

Then, wait until the message "It's now safe to turn off your Computer".

5.   Then, Switch Off the screen.

6.   Switch Off the CPU.

7.   At last, Switch Off the power supply.

• *Working with Microsoft Word:* There are several ways you can create new documents, open existing documents and save documents in word.

  - *Create a New Document*

There are three different ways you can create a new document.

  ▪ Click the new document button on the menu bar

  ▪ Choose File/New from the menu bar

  ▪ Press Ctrl+N

  - *Open an Existing Document*

Similarly there are three different ways you can open an existing document

  ▪ Click the open file button on the menu bar

  ▪ Choose File/Open from the menu bar

  ▪ Press CTRL+O on the key board

  - *Renaming Document*

To rename the word document while using the programme,

  ▪ Select file/open and find the file you want to rename.

  ▪ Right-click on the document name with the mouse and select "Rename" from the shortcut menu.

- Type the new name for the file and
- Press the Enter key.

- *Save a Document*

Three different ways you can save your file.

- Click the save button on the menu bar
- Select file/save from the menu bar
- Press Ctrl+S on the key board.

- *Close a Document*

In order to close the current document, you have to select file/close or click the close icon if it is visible on the standard toolbar.

- **Working with Power Point Presentation(PPT)**

In the classroom, you are familiar with the use of different charts, graphs, models and different instruments for making your classroom interesting and reducing learning difficulties among the learners. Now teaching through Power point presentation is taking an important role in the classroom and you must have basic ideas to develop power point slides and how to use it in the classroom.

a) *Starting the Microsoft Power point*

In order to use the Microsoft power point, first you have to click Start option in your computer than click Microsoft office. Here you will get different options like word, excel, power point etc. You have to just click in the power point option. If power point is already open or the box does not appear, than you have to select File/New from the menu bar.

b) *Working with slides:*

- Insert a new slide
- In the outline window, select the slide you want the new slide to appear after by clicking the slide's number.
- Select the Insert/New slide from the menu bar or click the new slide button on the standard toolbar.

Choose the page layout from the window and press OK.

Applying a Design Template

✖ ACTIVITY-2

Now use a computer to
(a) Prepare a word file and save it in your name.
(b) Rename three different word file with three different names.

To add a design template or changing the existing one, select Format/Design template from the menu bar. Select the template and click Apply.

12.3 COMPUTERS AS A SOURCE OF LEARNING

You collect information on contents/concepts from different sources like text-books, reference materials, newspapers, television etc. You are mostly familiar with text-books, reference books and other print materials. In today's world you can get huge information from the World Wide Web (www) using the Internet. Let us understand about the Internet and the Web and how we can use them as sources of learning in the classroom.

12.3.1 The Internet and the Web

We generally consider the Internet and the World Wide Web (www) to be the same. They are closely related to each other and not exactly the same. There are differences.

- The internet is a decentralized global network of computers.

- The web is a collection of documents that you can access using the internet and web searching software. The web comprises of the vast content available over the internet.

Web sites reside on computers called Internet servers. When you are connected to the Internet, your web browser software can communicate with the Internet servers, ask them to send your computer a copy of the web page that you wanted to see. The Uniform Resource Locator (URL) you type or the hyperlink you click tells your computer which server to try to contact and which page you are asking for.

12.3.2 Internet based learning

Internet technology has made a great contribution to learning process in the classroom. You can use the Internet in your classroom mainly for three different purposes like:

- The internet as a technology of information;

- The internet as a technology of interaction;

- The internet as a technology of sociability.

The Internet as a technology of information allows you to bring large stock of data, references in any form (text, graphics, sound and visual). When you talk about internet as a technology of information, it has different purposes of use in learning like:

- Using the internet as an accessible library within which students browse different information more freely before or after the class;

- Using the internet to publish new kind of textbooks for students.

- Using the internet as the classroom with electronic white board and asynchronous discussion.

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Suppose you are going to teach about global warming in your class. You can suggest different websites to your students related to global warming like www.nrdc.org, www.globalchange.com, etc. before or during the class for better interaction. Here the Internet is used for the purpose of collection of information during learning.

The Internet serves as a good medium of interaction and sociability among the students and the teacher. Web 2.0 technologies like wiki, Blog, Face book etc. is used for the purpose of learning. Here the Internet helps in collaboration, maintaining standards, decentralisation, and openness and evolving content for learning. Again consider teaching the topic on global warming. Your students can collect different aspect of global warming from the Internet and share it through web 2.0 technology. Here the Internet is used as collection of information as well as for disseminating the knowledge between the students.

Accessing Information from Internet: You can find a piece of information easily from the Internet if you know the address of the web-site exactly. If you have no idea about the web site, you can still find the information/materials by opening the web page and typing www.google.co.in on the menu bar. Then you will find a rectangular space below the Google page. In this space you just type in the key word about the information and click enter on the key board. You will find different related topics in the page. You just need to double click on the topic in order to see the entire topic. Again if you want to save the file for using it on later, you just go to file/save as/ name the file/type where you want save/save. Now your file has been saved and you can retrieve later without connecting to the net.

⚒ ACTIVITY- 3

Collect the information on the topic like fraction from the Internet, save it in your computer and send this file to your friends.

12.4 COMPUTER ASSISTED LEARNING

The use of Teaching Learning Materials (TLMs) in the classroom not only helps in teaching but also to create interest and curiosity among the students to learn in the classroom. This has been discussed in Unit 6 in the Block 2 of this course. The use of a computer in teaching learning for accessing information and for

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making collaboration in the classroom has now taken an important role and is commonly known as Computer Assisted Learning (CAL). The purpose of CAL is to enrich the quality of learning. In this section let understand how a computer can be used in the classroom and the methods of Computer Assisted Learning (CAL) programme that you can use in your teaching learning process.

12.4.1 Modes of Computer Assisted Learning

According to the need and context of the classroom you can use computer in different modes. In the teacher centred classroom, instruction is structured and the learning is frame based. In this mode instructional material or programme is presented to the student frame by frame in a relatively fixed sequence without any remedial exercise. But with the developments in the computer technology you can present your teaching in the classroom in a number of flexible ways for meaningful learning to take place. The different modes of CAL programmes are as follows.

- **Drill and Practice Session**: This is the question-answer type program where the computer generates large numbers of exercises, evaluates responses, gives immediate feedback as to the correctness of the responses and sometimes hints on how to obtain the correct answers if the responses are incorrect. An example of a drill and practice program is, suppose you are going to teach the atomic number of elements and give an exercise to students for solving it. The atomic number is selected at random from a list by the program. If the student enters the correct element, the atomic number is removed from the list and another atomic number is presented by the computer. Atomic numbers which are not correctly identified does not get removed from the list so that eventually the student reprocesses the atomic numbers requiring the most practice. Properly written drill and practice programs help students commit to memory facts, rules and principles without which a deeper study of a subject is difficult.

- **Tutorial Mode***:* In this type of program, information and explanatory material is presented in small segments followed by questions. If the students respond incorrectly, feedback according to the nature of their mistake is given. If the answer is correct, another segment of the explanatory material is generated. On the basis of responses made by the students, the program decides how rapidly material should be generated and how much should be covered. In this mode, computer is used to simulate the most visible part of your activity-to transmit knowledge and check whether the knowledge has been correctly transmitted. Generally this mode can be used successfully to teach subjects that have a checklist structure (e.g. solving linear equation, simplex method to solve equation etc.).

- **Data Analysis***:* This type of CAL allows experimental data to be analysed and the result is printed out either in numerical or graphical form. A more

realistic approach to the study of certain topics is made possible with the appropriate program using either a built in set of data or, preferably, data collected and entered by the student. With one or more microcomputers in the laboratory, students can analyse and interpret their experimental data. Suppose in your class, you want to teach topics like central tendency, measures of variability, coefficient of correlation or graphical representation of frequency distribution the computer can be used for analysis, interpretation and representation of different data.

- **Simulation***:* Computerised simulations are models or imitations of processes. Simulations present life-like situations that allow students to learn through experience and to take risks without suffering the consequences of poor choices. The students can study the effect of changing various aspects by observing the outcome of each case so as to develop an appreciation and the scope and limitation of a system. One simulation programme can be thought of as the water supply system in a city. The different aspects of the system which includes collection and storing of water in a large scale; putting the water mass under treatment through the process of sedimentation, colorination, filtration etc.; transporting water mass through distribution pipes till it reaches for human use. The whole process can be put forth in a systemised way through the computer programming in a dynamic way through simulation to have better conceptual clarity. Simulation programs are suitable for mathematics, social science and science where complicated and difficult topics, experiments etc. which are too costly or dangerous or too time consuming to investigate or difficult to replicate the real system in classroom situation.

- **Modelling:** Modelling involves creating, adapting or choosing a theoretical model to correspond with a natural phenomenon or a manmade system. This type of program is encountered more often at the higher levels of education. An example of this type of program involves finding the relationship between different aspects to form a functional unified whole. For producing a working model through the process of simulations students are able to gain some insight into the concept of modelling and some training in inductive thinking. An example of model in a simulated condition can be cited for better understanding:

Simulation in general is to pretend that one deals with a real thing while really working with an imitation. In operations research the imitation is a computer model of the simulated reality. A flight simulator on a PC is also a computer model of some aspects of the flight: it shows on the screen the controls and what the "pilot" (the youngster who operates it) is supposed to see from the "cockpit" (his armchair).

Why to use models? To fly a simulator is safer and cheaper than the real

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airplane. For precisely this reason, models are used in industry commerce and military: it is very costly, dangerous and often impossible to make experiments with real systems. Provided that models are adequate descriptions of reality (they are valid), experimenting with them can save money, suffering and even time.

- **Information Storage and Retrieval***:* Information in various forms can be readily stored and retrieved with a computer. With a large data bank, the computer holds great potential for providing a rich information environment (data base) which can be accessed easily compared to books or microfiche. Information stored in the computer can be easily updated, expanded and enlarged upon. This type of CAL program allows students to study topics which require access to large data bases which cannot be easily handled manually. However, this type of program, which is not widely used in schools at the moment, may be commonplace later on. In education, we are inundated with information especially at the higher levels. Teachers may need to teach their students to interrogate an information retrieval system efficiently in the future.

E7. Match learning points from column A with the appropriate CAL modes from column B:

| A		B	
1.	Intensity of Earth quake	a.	Drill and Practice
2.	Forming groups according to socio-economic Status	b.	Simulation
3.	Problems on Fraction	c.	Modelling
4.	Information about Parts of body	d.	Data Analysis
		e.	Data Storage

12.4.2 Planning for Computer Assisted Learning

Even if you have basic knowledge on computer and computer assisted learning, without planning you cannot successfully use the computer assisted learning. Let us consider the following different aspects that you need to take care, when you are going to use a computer in the classroom.

- Stating the objectives: In this step, you just state the objectives of the course/topic/lesson i.e. the concepts that you are going to teach. As you know when you select a particular mode of computer assisted learning, you must know the nature of the content and whether available computer facilities are suitable for the purpose or not.

- Identifying the space and availability of computer: Before you use computer in the classroom, you have to consider the number of students in your classroom and the no of computers available. Accordingly the size of the classroom and the availability of computer, helps to plan for the sitting arrangement. The possible sitting arrangement can be done as shown in Fig 12.5.

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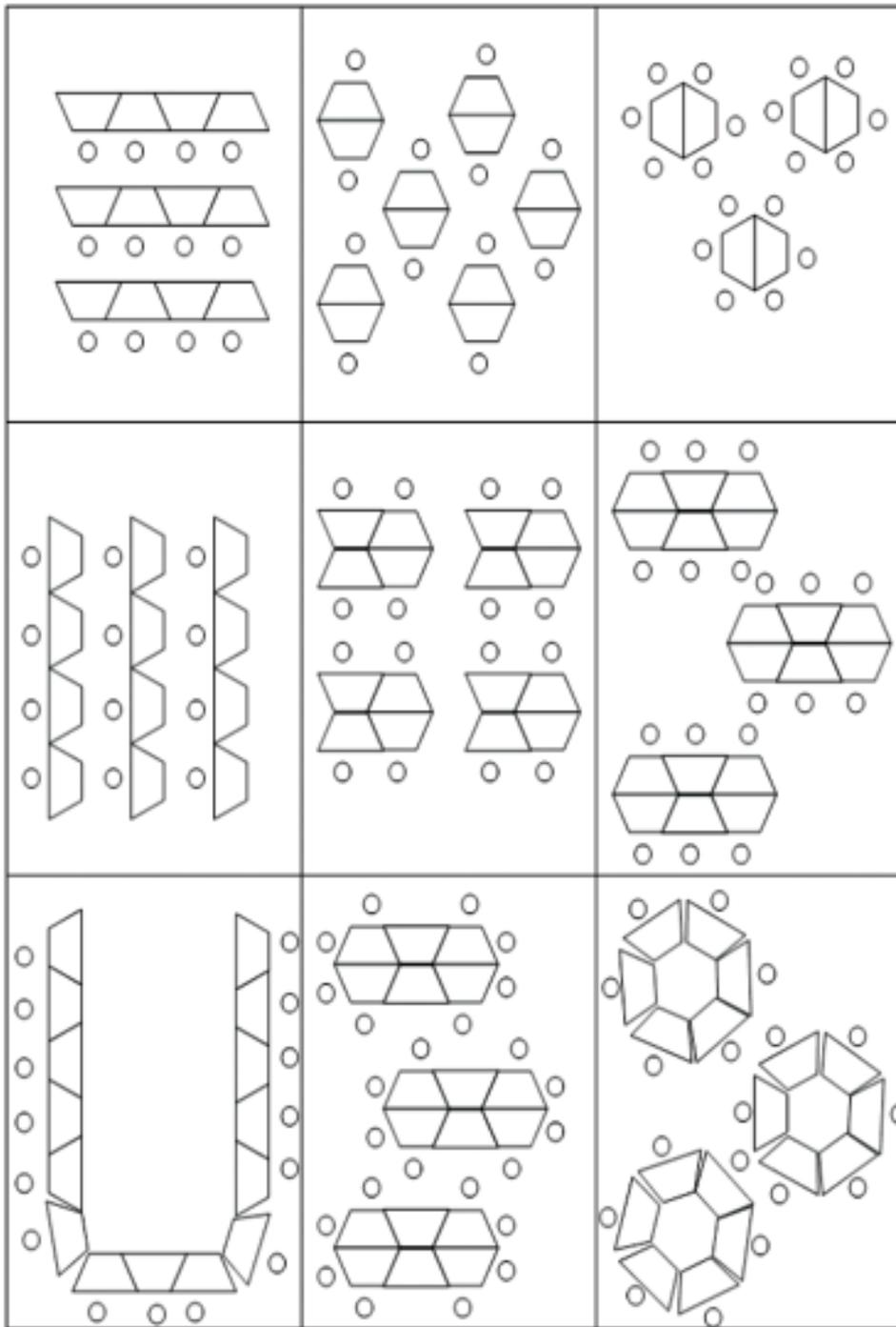
SITTING ARRANGEMENT OF COMPUTER ASSISTED LEARNING

- Selecting the modes of computer assisted learning*:* Based on the nature of the content, availability of tools of computer and the size of the classroom, you have to select a particular mode of computer assisted learning which will be suitable for facilitating learning.

- *Strategies for Implementation:* When you are going to implement a particular mode of computer assisted learning, you have to plan the strategies like-lecture strategy, collaborative strategy and self- regulatory strategy. In the *lecture strategy* the teacher uses the computer to present his/her teaching and there is no scope of students to use the computer. Here one computer can manage the class. In case of *collaborative strategy*, a group (4to5) of students are assigned to use one computer and teacher guides all the groups. In *self-regulatory* strategy, each one of the students use single computer including the teacher. Generally the self- regulatory strategy is better in the computer lab rather than inside the classroom.

12.5 LET US SUM UP

- Computer is an electronic device that takes raw data as inputs from the user, processes these data under a selected programme yielding the desired output which can be stored for future purposes.

- The computer system is divided into three separate units for its operation. They are:

  (i) arithmetic logical unit, (ii) control unit, and (iii) central processing unit

- All the components of the computer can be categorised into two broad groups i.e. hardware and software. A hard ware component of the computer refers to the internal and the peripheral devices whereas the software gives the intelligence to the computer.

- The computer can be classified on the basis of its working principles, size and brand. These are micro, mini, mainframe and the super computer.

- The Internet can be used in different purposes in the classroom like collecting information, interaction and for the social networking.

- Computer Assisted Learning (CAL) are used in different modes like- Drill and practice session, Tutorial, Data Analysis, Simulation, Modelling and the Information storage and retrieval.

- A proper planning is necessary for the computer assisted learning in the classroom.

12.6 MODEL ANSWERS TO CHECK YOUR PROGRESS

E1. Computer is called as data processor because it is mainly used for processing data for producing meaningful information

E2. If storage system will not be there in computer, than you cannot save the data for the further uses

E3. (i) A, (ii) C, (iii) A

E4. 1.RAM; 2- CPU, 3- CD disc; 4- floppy disc; 5- Monitor; 6- Key Board; and 7- mouse

E5. Microcomputer

E6. Microcomputer

E7. 1. b; 2. d; 3. a; 4. c

12.7 SUGGESTED READINGS AND REFERENCES

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2. Dean, C. and Whitlock, Q. (1988). A handbook of computer based technology. London: Kogan Page.

3. UNESCO (2002). UNESCO report: Information and communication technology in teacher education: A curriculum for schools and programme of teacher development. Paris: Division of Higher Education, UNESCO.

12.8 UNIT-END EXERCISES

1. Select a small unit from your subject. Try to develop different modes for CAL and discuss it with your friends.

2. Create a word file lesson plan from one of the topic and save the file in your topic name.

3. List out the input devices of the computer

4. What are the advantages of the Computer assisted learning in the classroom.