UNIT 11 THE USE OF COMPUTERS IN EDUCATION

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11.1 INTRODUCTION
Computers have the potential to solve many educational problems. Now-a-days computers are in common use in various schools and colleges across the country.

In this unit an attempt has been made to trace the history of utility of computers in the field of education. The current uses of computers for administration and instruction have also been discussed. The instructional uses of computers have been further discussed. Lastly, the uses of computers in guidance and counselling, research, testing, computer conferencing and computers for disabled students have been discussed along with their miscellaneous uses. The various issues related to the use of computer in education have also been explored.

11.2 OBJECTIVES
After going through this unit, you should be able to:

- explain the history of uses of computers in the field of education;
- discuss the current uses of computers in administration;
11.3 HISTORY OF EDUCATIONAL USES OF COMPUTERS

The first use of computers in educational sector was seen in 1950 with a computer driven flight simulator used to train pilots of MIT, USA. The first attempt to use computers with school children was made in 1959 when the IBM team reported a program to teach binary arithmetic to New York Elementary School students via a "typewriter inquiry station" connected to an IBM 650 computer.

In 1960 the University of Illinois and Control Data Corporation started a project PLATO (Programmed Logic for Automatic Teacher Operations) which was extensively used throughout the United States. PLATO had a number of adult education applications. Presently it is used to teach basic reading skills to inadequately educated adults. PLATO is also being used for training of pilots by American Airlines. It is used successfully in various fields now-a-days. A library of many courses and lessons has been developed for PLATO covering numerous areas at all educational levels. The teaching mode is question and answer, with the computer setting the questions and the student responding by touching appropriate parts of screen or pressing requested buttons on the keyboard. Since 1982 PLATO's courseware could be used on floppy discs suitable for running on standalone microcomputers.

Another educational use of computers was evidenced by the development of LOGO language during 1970s by Papert and his colleagues at the Massachusetts Institute of Technology (MIT) in USA. LOGO helps in developing computer programs and also trains persons to think analytically and logically.

The period from 1960 to 1980 was identified by time-sharing activities offered by universities and instructional computing projects which were developed on large scale mainframe systems. In the 1980s "Microcomputer revolution" ushered in, as many microcomputers were purchased for schools.

The 90's saw the proliferation of personal computers and the use of computer base training programs. Internet came in a big way and it is affecting all spheres of life. It is also making possible for the people sitting on a distance to communicate. Discussion groups, real time chatting, e-mail, telnet are some of the features of Internet which are very much useful in the field of education. Most of the institutions have put their details and journals on websites so that anyone can access this information any time from anywhere in the world.

Check Your Progress

Notes:
1. Write your answers to the space given below.
2. Compare your answers with those given at the end of the unit.
3. Trace the history of using computers in education.

2. Discuss the uses of Internet briefly.

3. Fill in the blanks:
(a) The full form of PLATO is ____________________________
(b) LOGO was developed by ____________________________
(c) LOGO is ____________________________ to a wide age range.
11.4 CURRENT USES OF COMPUTERS IN EDUCATION

Computers are used successfully not only in the classroom of schools and colleges but also in the offices.

11.4.1 Administrative Uses

Many educational institutions computerize nearly all their operations from mailing labels to staff payroll. Computerization of administrative functions is given below:

i) Office Applications

In the offices, computers are used in filing, typing/word processing, preparing mailing lists for dispatch and making labels of addresses.

ii) Library Applications

In the library computers are used for retrieval of bibliographic information, cataloguing, circulation, purchasing of books, journals etc., searching books, and charging fines from students. Also databases can be prepared of the different users of library.

iii) Financial Applications

Computers are used for making budgets, auditing, accounts receivable/payable, general ledger, purchase order generation, salary schedule analysis and maintenance of students' fees records, etc.

iv) Student Applications

Computers are used to make time-table for students, report cards, grade information, maintenance of attendance, students health and demographic records, result processing, fees statements, railway concessions cards, bio-data of students etc.

v) Personnel Applications

Computers are used to prepare payrolls of workers, maintenance of personnel records staff assignments, leave records of teachers, health records, tax information, and reporting, issuing circular to teaching and non-teaching staff, maintaining bio-data of teachers and non-teaching staff.

vi) Research and Planning Applications

Computers are used in various research and planning applications such as bus routing, test item analysis, project planning and evaluation, budget forecasting, feasibility of opening new courses etc. in well equipped modern educational institutions like IGNOU most of these functions are performed through computers.

11.4.2 Instructional Uses

Before the advent of microcomputers, in 1960s and 1970s, when computer uses were limited, instructional uses were generally classified as CAI (Computer Aided Instruction) or CMI (Computer Managed Instruction). In CAI students received some kind of direct instruction via a computer screen. Drill and practice, tutorial and simulation programs fall under this category. Now-a-days multimedia presentations, CBTs (Computer Based Training), Internet are widely used in the field of education.

CAI (Computer Aided Instruction)

CAI consists of text material, test questions requiring student responses, additional backup instructional material and analysis of progress. The advantages of CAI are that it can be used at any time. Students at CAI terminals can proceed through lessons at their own rate. Each terminal can evaluate specific lessons, independently of the others. Individualised instruction is good for the slow learner as well as bright students. The student-machine interaction is challenging and stimulating for students. Generally students and teachers have different cultural backgrounds, hence there is more resistance and hostility but in the case of CAI, computer being a machine there are no such chances. In CAI if students cannot understand the main text, they are given access to alternative explanations. Moreover, the students are provided with immediate feedback. CAI lessons require less student time as compared to the traditional
lesson. The computer can employ various teaching techniques which may be otherwise difficult to use in a classroom. CAI offers drill and practice at a pace that can be controlled by the learner.

The third major format of CAI is simulation, which is a model or an approximation of a real life situation. Simulations are most beneficial when the required apparatus is not available because it is too expensive, too dangerous or too complex for student use.

**CMI (Computer Managed Instruction)**

CMI is used to enhance learning by providing automated management of elements of the student's learning environment. CMI systems help teachers in their task of controlling and managing the content, pace, sequence and method of learning of the students in their charge. CMI systems provide facilities which are organized around three major sets of functions:

- The computer can gather data about students, and it generates and marks objective tests being used for diagnostic or assessment purposes, to accept the results of tests marked subjectively by teachers and to analyze the performance of these tests.
- The computer provides feedback to individual student on test performance and acting on decision rules provided by the course developer, to route the student through an individualized curriculum.
- The computer stores and updates records of each student's performance on the course and report in summary form on the general progress of students to the teacher or trainer, course developer or administrator.

**11.5 USES OF COMPUTER IN GUIDANCE**

Computers can aid human counsellors to some extent in a number of ways, which are discussed below:

a) Computer can perform clerical functions related to counselling such as keeping track of clients appointments, calculating costs for services, maintaining accounts and inventories of psychological tests, storing records of clients backgrounds and counselling sessions.

b) Computer can help in collecting information about a client either through direct interview by the counsellor or computer can conduct the interview through typed questionnaire
on the screen. Computers can also help in test administration if the test is fed in the computer.

c) Computer helps in giving information to the students e.g. the results of intelligence, aptitude, interest test etc. Computers are used for providing educational and vocational guidance. Computers help students to find information on jobs of potential interest to them as careers and to match their characteristics with the requirements of various career areas. Computers can also help in giving information about clients to other professionals, especially during a referral service.

d) The decision-making process involves two steps — generating alternative solutions to a problem, then determining which of the alternatives will be best. Computer can help in the decision-making process as it can contain cluster of important characteristics of the student and his/her environment and types of treatment. The program inside the computer determines what information about clients is significant and how this information is related to treatment. It is important here that the program offers a true picture of the relationship between the data about the client and the treatment. There may be some technical problems in substituting computers for counsellors in making decisions but they are likely to be solvable in the future.

11.6 COMPUTER MANAGED TESTING

Computers are used in the preparation, administration and scoring of tests. Various items of the test are collected and pooled. These item pools are stored as computer files. With the help of computers items pools are managed and updated. Whenever needed they can be retrieved. Computers are used for preparing tests.

Tests can be conveniently administered by a computer. During the testing sequence a decision algorithm is used repeatedly which decides the sequence of questions to be asked and the point at which to stop the test.

Computers are used to process test data. Numerous scores can be computed. Consequently detailed and individualized feedback may be provided. Teachers can also get individual results detailing e.g. which students have mastered which objective.

11.7 COMPUTERS IN RESEARCH

Computers may be used in research projects for collecting and recording data. With the help of INTERNET facility, it is possible to obtain bibliographic evidences from all over the world, details of research studies and their findings. Now researchers can undertake analysis of data (e.g. multiple regression analysis) involving large amount of calculation. Similarly, procedures which required simple data manipulation carried out repetitively a number of times (e.g. cluster analysis) are now available to the educational researchers, provided appropriate programs are available. Now it has become possible to compute the results for large and complex sets of data. On one hand good research has been strengthened by the new facilities while on the other hand poorly conceived researchers have also drawn strength from the easily available computer program packages.

11.8 OTHER USES OF COMPUTERS

The latest uses of computers include telecommunication links. Computers are connected to online databases on educational topics and current news. School link with each other school to exchange information and engage in joint learning projects. Through computer conferencing students and teachers can have discussion on important issues. With the help of video discs and compact disk read only memory (CD-ROM) computers can be used to structure lessons and obtain useful information on any topic. Now-a-days the CDs accomodate all the topics starting from History to Science for kids to adults.

LAN (Local Area Network) can be used for sending and receiving messages via mail (electronic mail). Different work documents related to the schools may be shared, evaluated and annotated with the help of WAN (Wide Area Network) educational information may be shared and
exchanged, within a wide area such as a country, a continent or even the entire globe.

Internet is a set of networks inter-connected by internetworking units, networked remote sites can take full advantage of centralised database. It is also used for sending and receiving messages and exchanging information.

Check Your Progress

1. What is your answer in the space given below.
2. Compare your answers with those given at the end of the unit.
3. How Computers can be used in overselling?
4. Can a computer replace a treasurer? Give reasons for your answer.
5. Describe how testing can be managed through computers.
6. List the three main categories of carrying out education.

11.9 THE ISSUES OF USING COMPUTER IN EDUCATION

The society is moving fast from the industrial age towards the information age. Though the total transformation is yet to occur, the major product of our society today is indeed information. The impact of computers can be seen in many fields like industry, hospitals, banks, agriculture, weather forecasting, politics, commerce, education, etc.

11.9.1 Ethics

Since the computers are used widely in different fields, some important areas of difficulty in ethical and legal behaviour have also come. These problems will be discussed under two categories namely copy right and hacking.

11.9.2 Copy Right

The cost of software development is very high. The software producers expect a profit, from their venture. Copy right law is the mechanism for protecting the right to profit from sale of one's products. We have seen that people make photocopies of the books and copies of films and thus violate the law. Similarly in the area of computer software, students and even teachers make illegal copies of software for their own use. This practice of software privacy is very common. Teachers must try to deal with this issue. Few casual software pirates should be prosecuted so that others may not dare to do this.

Potential software pirates must understand that their actions are in fact Larceny (Larceny — Criminal taking away of one's possessions for personal use). Through illegal copying of software they are denying compensation to the developer of that software. Students should be gently introduced to the ethical issues involved in software copying. Specially in the case of
applications software such as word processors and databases, the problem is more serious. Approximately according to a survey report four illegal copies will ultimately exist for every copy sold. There should be no place for pirated software in schools and colleges.

Some ways must be found out to meet the legitimate concerns of educators over the cost of the multiple software copies required to remain within the law. But more concern over the school or college budget does not justify piracy. The ultimate result of software piracy will be counterproductive for all. Software developers must get proper incentive and profit otherwise the entire motivation will disappear. Again the education will suffer the most if new softwares are not produced.

11.9.3 Hacking

A hacker generally is a person who is totally involved in working with a computer, often to the virtual exclusion of other activities. They are very skilled programmers. They have telecommunication access to computers around the world and they find ways around the security checks of systems so that they can just 'browse' through the computer's files. They must change or destroy important data in the computers. Hence the issue of unauthorized entry to a computer system must be seriously taken into consideration by the school and college authorities.

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**Check Your Progress**

Notes: A. Write your answers in the space given below.
B. Compare your answers with those given at the end of the unit.
C. List the effects of software piracy.

1. List the problems of software developers.

2. How the issue of computer software piracy be resolved?

3. How the hackers are handled?

4. Discuss the issue of personal privacy in your own words.

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11.10 EXCESSIVE RELIANCE ON COMPUTERS

Another issue is the ultimate effect of our increasing personal dependence on computers in daily life. Many teachers are seriously concerned about the excessive use of computers in
mathematics, written communication and computer infallibility. These have been discussed below:

### 11.10.1 Mathematics

With the introduction of calculators and computers in the educational scenarios, there were cries of anguish from many teachers that students would no longer really learn arithmetic. But even today the mathematics teachers have not given up the expectation that students should still learn basic arithmetic facts and processes. Rather calculators are being employed to achieve goals previously unattainable or that had to be delayed. One optimistic view is that we have not given up the principles of the field, only the drudgery of routine operations.

Computers can also be used for more sophisticated calculations, and the errors will be known to the users and the answers will be estimated correctly. If the calculations are done manually it takes a lot of time, but if they are done in sophisticated manner with computers — what is wrong in this? It is expected that by doing so the underlying concepts may be more clearly understood.

An example may be taken of doctoral students when using statistical formulae to analyze their data, they spent a lot of time. They could not use advanced techniques of statistics because of the drudgery of long calculations. But now with the help of computers, doctoral student can apply more sophisticated techniques. Statistics classes in education can now focus on conceptual understanding of procedures and their proper application, since time need not be devoted to learning the raw mechanics. This is a positive impact of the computer on curriculum.

### 11.10.2 Written Communication

The impact of word processors and spelling checker programmes on students writing ability should also be taken seriously. If the computers will correct their spelling errors, why should students bother about learning to spell. Though there are many benefits of computerized writing, but a computer may not be available to the students all the times. If students do not know other ways to write, then they can not cope up with extempore writing.

Another argument may be that today lap-top computers are available and are very popular, so one can have access to word processing at all times. Although writing with paper and pencil and writing with computers both are equally important but still it may be concluded that handwriting remains a viable element of the curriculum. Both the approaches can co-exist but the decision must be taken ‘when to use which approach’. Similarly computer/electronic dictionaries may be viewed as aids to poor typists, not a crutch for those who cannot spell. Spelling and grammar checkers can contribute greatly to better final products; mainly free of mechanical errors. They may over time help students improve their initial writing by indicating mistakes that would otherwise have been part of the submitted work. Teachers may provide incentives for less errors by using computers. Immediate feedback promotes learning better than red marks by the teachers on a paper.
11.11 **EQUITY**

Although till now the dark side of using computers has been discussed, but by and large it can be said that computers are beneficial. Equity issue may be discussed under three heads gender, socio-economic status, and disabled students. The most important question which deserve attention of the educators is "Are computers going to be available to everyone?"

11.11.1 **Gender**

The gender side of the issue involves from a perception that females are not involved to a considerable extent in computing today. In many computer classes of different schools and colleges, the number of girls is less as compared to the boys. Looking to the importance of computer and computer skills in the present and in the future this situation should be changed.

There can be many reasons for this gender gap. (i) Girls are less attracted to common video games which are the source of enthusiasm among boys (ii) The age at which computers are introduced in education is also important. If computers are introduced in schools in lower elementary classes, interest appears similar among boys and girls. If they are introduced at middle school level, girls appear to be more passive about their involvement. Another reason may be that computers are generally identified with mathematics and science rather than the whole curriculum. These two fields appear to be male dominated, hence a carry-over of attitude towards computers seems very natural.

This issue of male dominance may be solved if computers are really integrated into the curriculum at all levels. Educators must pay due importance to the issue of gender equity. So that girl students may also be attracted towards computers in large numbers.

11.11.2 **Socio-Economic Status**

The socio-economic aspect of equity is more difficult. In a poor and developing country like India, it is not possible to provide computers in all the schools. After all computers cost money. When it is not possible to provide even the basic facilities to all the primary schools of rural and urban areas than thinking of providing computers is a dream. The computer era may add more weight to the injustice of the situation, but definitely it is not the source of the problem.

There is also the issue of home access. The computers are generally available in the homes of the economically privileged children of higher class families and in well financed schools.

11.11.3 **Disabled Students**

With the help of computers, physically disabled and developmentally different students can compete with the normal students. As Fredman (1990) put it in a recent International Society for Technology in Education publication, "for students with physical and developmental handicaps, using the computer unlocks their potential. It is an enabling tool allowing them to function as other students function without the barriers that their handicaps impose".

Some of the operation systems like window 2000 have got a lot of features for accessibility. Some of the features are like narrator, magnifier, on screen keyboard. Narrator has to speak out what is being displayed on the screen. Magnifier magnifies the specific area of the screen.
11.12 CHANGING ROLES OF TEACHERS, STUDENTS AND PARENTS

The influx of computers into education has the potential to change the roles of teachers, students and parents. The changing roles of teachers, students and parents are discussed below:

Teachers

The major obstacle to infusion of computers into education is the aspect of teacher training. Teachers must be prepared to gain new knowledge and skills. One must also think seriously about the classroom role of teachers. Computers will enable the individualization of instruction. The role of the teacher will transfer from dispenser of knowledge to facilitator and guide throughout the learning process. Teachers will help students as how to use computers effectively.

In the future it may so happen that students know far more about computers than their teachers. So the teachers will have to accept the fact. Students’ self image will be developed positively. All teachers will need to be computer competent.

Another related issue is that how to educate teachers in the practical use of the computer as an important education tool? The solution for this problem is that computer education should become part of teacher training curriculum. Those teachers who are already in service, for them Refresher Courses may be organized in computer education. Although this will take time and is already meeting resistance from those who are not acquainted with the educational potential of computers. Support materials may be developed for teachers, and students’ progress must be monitored and evaluated.

Students

In the present information age the exponential growth of knowledge and information makes it impossible for students to learn each and everything they will need in their future lives. Hence the role of students should also change. Students must learn how to obtain and manipulate the information, they need from various available resources.
Today's younger students are growing up with computers as a natural part of their lives in good schools. They do not consider them as unusual but very normal tool for daily living. They are becoming good problem solvers and developing thinking skills. These skills are necessary for the information age.

But on the other hand educators are equally concerned about the development of interpersonal and social skills to cope up with human concerns. However, sophisticated the students may become in using computers for the mechanical side of life, they must also be developed to become a complete human being.

Parents

In the past, the responsibility of educating children was borne by the schools and the parents used to provide encouragement and some help in home work. But now this traditional role of parents has changed. If the educators want that the computers should become an effective partner in the educational process then the children's parents should also be made acquainted with the computers. Though educating parents for computers is more difficult than educating teachers, schools should play a positive role in developing computer competence among parents through adult education programs. Computers in the home may raise new fears of educational equality (this issue has been dealt previously). The gap between parents having computers and not having computers will widen further. This issue may be resolved by adding to computer education programs for parents, the opportunity to borrow computers for home use. This idea should be seriously considered. The parents who belong to low socio-economic status and are either illiterate or less educated, can be made aware of the use of computers in education.

There are numerous benefits of using computers in education. But the entire course of using computers in education should be closely scrutinized. There are different issues like privacy, equity, excessive reliance on computers etc. which should be seriously considered. But the educators have an important role to play in this direction. Teachers, parents and students must be motivated for using computers, so that they can be prepared for future life.

11.13 COMPUTER CONFERENCING

The central concept is that of a shared electronic "space" functioning as a meeting place (conference table or seminar room) for a dispersed student group and their tutor. Generally the conference members exchange their (electronic) comments and responses on a selected discussion theme over a period of time. Here the tutor facilitates discussion. The main aim of computer conferencing is to simulate the variety of interactions which are generally found in a face-to-face learning classrooms. Computer conferencing may support different types of learners like open university students, the international business clientele of new technology and business management courses etc.

In computer conferencing information can be transmitted from a single source to a large
number of recipients. A large number of people can simultaneously contribute their innovative views in a conference context. It is useful for distributing and collecting assignments, advising and posting simple questions for answers. It encourages student to student dialogue by means of class discussion and web conferencing. The topics for discussion are generally student sponsored, social and collaborative. The students can communicate with their peers and instructor without leaving their homes. Computer conferencing is good for vocal students as well as for those students rarely speak in a face-to-face classroom.

Computer conferencing is helping in moving towards a global community. It provides an excellent gateway for international understanding and cooperation and for widening one’s prospectives on the world. It helps in linking mind to mind without physical barriers.

Check Your Progress

Notes: 

a) Write your answers in the space given below.

b) Compare your answers with those given at the end of the unit.

26. List down the characteristics of computer conferencing.


27. List the uses of computer conferencing.


11.14 LET US SUM UP

It can be concluded that computers are used successfully both for administrative and instructional purposes. They are used in counselling, testing. They are equally useful for normal, physically disabled and developmentally different students. Computers are useful in conducting researches. There are many more uses of computers like computer conferencing, local area network, wide area network, internet facility etc. There are certain issues related to ethics, excessive reliance on computer, changing role of teachers, parents and students.

11.15 UNIT-END EXERCISES

1. Conduct a case study of any educational institution which is using computers for administrative functions.

2. Discuss the instructional uses of computers.

3. Survey five educational institutions which are using computers for instructional purposes.
   Prepare a report as to how they are using computers for instructional purposes.

4. Discuss how computer conferencing can be performed.

5. Survey the variables of computer education which are affecting the world of work.

6. Report a case of privacy invasion due to use of computer.

7. Find out the copyright act and how software piracy can be prevented.

8. Make a survey of 2 students, 2 teachers and 2 parents with an objective to show how computers have changed their roles?

9. Make a survey of 2 disabled students with an objective to show their problems related to computer accessibility?
11.16 ANSWERS TO CHECK YOUR PROGRESS

1. The computer was used first time in educational sector in 1950 to train pilots and in 1959 by IBM to teach binary arithmetic to elementary school students in the USA.

2. Uses of internet: Communication or access to information and live interactions through chat groups, e-mails, telnet, etc.

3. (a) Programmed Logic for Automatic Teacher Operations.
    (b) Papert and his colleagues
    (c) Accessible.

4. Office applications, in libraries, in finance, personnel and research and planning aspects in educational institutions.

5. CAI, CBTs and internet are some of the applications of computers utilised in the field of education.

6. a) True
    b) False
    c) True
    d) True
    e) False

7. In guidance, computers could be used for – recording and updating of information and other data in details related to students, careers, etc.; – collecting information about a client and in the decision-making process.

8. No, computer cannot replace a counsellor but it can be a very faithful and resourceful assistance to him/her due to its potentialities of performing tasks with cent-percent accuracy without tiring and immediately.

9. Test can be conveniently administered by a computer. During the testing sequence a decision algorithm is used repeatedly which decides the sequence of questions to be asked and the point at which to stop it. It could also be used to process, computer, analyse and interpret results for feedback.

10. Collection, recording/computing, analysis and interpretation of data.

11. Effects of piracy: denying compensation right to the owner of the software and sometimes transmit virus in the computers.

12. Piracy of software, hacking and decimal of copy rights to the software owner/developer.

13. Users should not purchase pirated software, promote purchase of original softwares and inform persons involved with sale of pirated computer softwares to concerned authorities.

14. They may change or destruct important data in the computers.

15. There is no model answer. Here you may discuss about the e-mail if security or privacy is not ensured and its consequences.

16. Yes, it can replace manual calculations due to its features to work with speed, accuracy and readiness to work at any time, place and duration.

17. The spelling and grammar check programmes definitely contribute significantly to better final products, mainly free of mechanical errors. They may overtime help students improve their writing skills thus ensure better performance.

18. Students may not put more efforts to improve their manual and intellectual skills that computers can do for them.

19. Gender, socio-economic status, disability (select any two).

20. Introduction of computers from the pre-and primary schools and some incentives should be given to girls for joining computers.

21. Promote automation of office-work in all schools and provide grants-in-aids for computer education in schools catering to low SES students and located in rural and remote areas.

22. Lack of disabled friendly computer equipment as well as softwares.
23. As it could make teachers more resourceful in teaching-learning process and also for his/her professional and information updation.

24. Computer is a dynamic medium as it is storehouse of information, provides interactivity, promote individualised learning.

25. Computer access and use could be a boon or bane. Thus role of parents is to guide children to see, discriminate and decide the use of appropriate software and information for their all-round development.

26. Characteristics: It requires sharing of electronic “space” as a meeting place, all participating members should have access to this space and it can provide interactivity in simulated face-to-face contexts like classroom teaching.

27. Uses of computer conferencing are:
   - information can be transmitted from a single class to a large number of students.
   - a large number of students can simultaneously contribute their innovative ideas in a theme,
   - useful for distributing and collecting assignment, advising and posting simple questions to answers,
   - encourages student to student dialogues or promotes peer learning.
   - reduces physical barriers.

11.17 SUGGESTED READINGS


