MBA 735:
FUNDAMENTALS OF ELECTRONIC LEARNING

NATIONAL OPEN UNIVERSITY OF NIGERIA

COURSE GUIDE

MBA 735
FUNDAMENTALS OF ELECTRONIC LEARNING

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Course Aims

This course is designed to introduce you to and give you the overview of E-Learning Programme. It is foundational to your understanding the entire concept of e-learning and its components and building blocks. It gives you the basic knowledge of other topics in the subject of e-learning

Course Objectives

At the end of this course, the students should be able to:

- Identify and know the concepts, principles and ideas of e-learning.
- Trace the origin of e-learning.
- To identify the characters and main features of e-learning.
- Know what constitutes the basic content of an e-learning programme.
- Know the different categories of e-learning.

1. Know specific tools and technologies applicable to forms of e-learning.

- To know the different types of communication technologies deployed in e-learning.
- Know how people learn in an electronic environment.
- Know the roles bandwidth, access and connectivity has to play in the effective implementation of e-learning.
- Know the software that drives e-learning.
- Know practical tips to adapt in teaching in an e-learning environment.
- Know the practical steps in implementing an e-learning programme, either in a school or a corporate organisation.
- To have a sound knowledge of how to conduct evaluation programme for an e-learning project.
- Understand the legal and copyright issues of e-learning, and how to obtain a copyright and how to guide against infringing on copyright
- Identify if e-learning, in concrete terms, plays significant positive impact on corporate organisations.

- Implement e-learning in corporate organisation
- To answer the question: Is there a future for e-learning?

Study Units

The study units for you in this course are fifteen and they are grouped into three modules, that is, five units in each module. These study units are as follows:

Module 1

Unit 1 Understanding E-Learning
Unit 2 Benefits and Applications of E-Learning
Unit 3 Categories of E-Learning
Unit 4 Information and Communications Technologies I
Unit 5 Information and Communications Technologies II

Module 2

Unit 1 Process and System of E-Learning
Unit 2 Connectivity and Bandwidth/Transmission
Unit 3 Strategies for Instructing and Learning
Unit 4 Implementation of E-Learning
Unit 5 Evaluation of E-Learning

Module 3

Unit 1 Instructional Development
Unit 2 Copyright and Core Values of E-Learning
Unit 3 Computer Insecurity
Unit 4 Computer Security

Assignment File

- The assignments represent 30% of the marks obtainable
- Examination constitutes 70% of the marks obtainable.

Course Code	MBA 735
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MODULE 1

UNIT 1 UNDERSTANDING E-LEARNING

CONTENTS

1.0 INTRODUCTION

The subject of Electronic Learning (E-Learning) has become pertinent in the dynamic world of today which is driven by information technology. An identified need to facilitate the process of learning in terms of efficiency, effectiveness and spread has led to the application of electronic technologies in training and education. No doubt, the concept of electronic learning has its attending challenges in terms of appeal and efficiency, but it has definite advantages that have endeared the education industry. Learning process now has a new “face” addressing varying target audience that hitherto would have been impossible.

Through e-learning, obtaining formal education for those who missed the opportunity at the earlier phase of their life has become easier because technology has cut down the time and space constraints in conventional open/distance learning education. Electronic learning will continually liberalise the education industry, narrowing the gap and

widening the scope. To combine work and education which used to be difficult and strenuous is much easier now with e-learning.

The global economy has not been left out of the positive impacts of e-learning especially in the corporate world where e-learning has reduced the cost of training of personnel. For example, IBM seeing the potentials in e-learning had a head start in adopting e-learning and is known to have already achieved annual savings of well over $200million. Market research analyst forecasts put the global e-learning market at $23billion in 2004 and growing up to $33billion in 2005.

What about the future of e-learning? It remains bright because the industry that drives the concept of, that is, information technology is ever dynamic to birth positive changes.

The overall goal of e-learning is to serve learners who cannot or will not attend traditional classes by using electronic information technologies.

2.0 OBJECTIVES

At the end of this unit, you are expected to:

- identify the principles and ideas behind e-learning
- define and know the meaning of e-learning
- identify the similarities and differences between e-learning and other forms of learning like distance learning, web learning, flexible learning, etc.
- know related terms of e-learning
- recount the assumptions and misconceptions to e-learning
- trace the origin of e-learning.

3.0 MAIN CONTENT

3.1 Concepts

The basic concept of e-learning presupposes that electronic driven technologies can be used to facilitate and enhance learning process. For example, with the development of Internet technology in the 1980s and specifically, the World Wide Web in 1991, there was a surge of interest in the possibility of electronic learning being taken to a higher level. Initially distance learning was used to supplement existing classroom instruction but over time, electronic online classes are becoming primary form of interaction and information. For example, 50% of “Fortune 100”companies in the world rely on web conferencing for their staff training. These types of programme can provide adults with a second chance in an adult, basic, vocational, high school, college or continuing education, reaching those disadvantaged by limited time, distance or

physical disability, or updates the knowledge base of workers at their places of work.

Secondly, the concept requires that learners take control of their learning, setting their own goals and determining which learning method to be used (Stephen Brookfield, 1987).

Thirdly, e-learning is part of the more encompassing concept of Distance Learning, that is, the concept of providing students who are separated by distance and time, witnessed by students using electronic technologies.

Fourthly, e-learning cuts across numerous fields of thought and practice. In other words, it is a multi-disciplinary concept encompassing an array of academics, training and education, learning and knowledge, technology and investigation of individual markets segment.

From fig. 1:1, we can see that the trio of training, education and learning form one arm of the dual nature of concept of e-learning. These three that are the learning arm of e-learning are essentially the process of acquiring skill and knowledge either formally or informally. On the other hand, the trio of information, technology and knowledge management forms the other arm of e-learning that is all about technologies that will facilitate the learning arm of the concept.

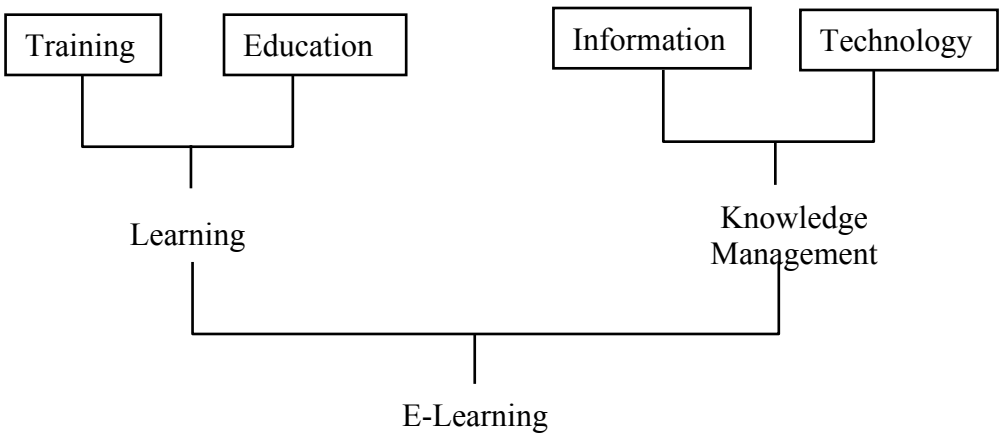


Figure 1.1: Merging Language and Fields of Interest

Fifthly, from the analysis of figure 1.1, you can see that the concept of e-learning can be seen from two major perspectives-*technology* and *learning* (knowledge). While greater emphasis is put into the technology aspect of e-learning, less effort seems to be put into the "learning process" which happens to be the main purpose and end product of e-learning.

From a business perspective, an aggressive and conservative forecast of business opportunities indicates that learning is expected to be a major

product and services for many years to come, and e-learning will be deployed for this purpose.

Finally, as a fairly new field of study, the key concepts of e-learning and its understanding are still emerging. Therefore, any study of the effectiveness and efficiency of e-learning has to involve multiple issues like:

- Role of e-learning in knowledge and learning.
- Contributions of e-learning to competent performance.
- Its relationship to organisational transformation.
- Strategies of including e-learning into other forms of electronic interactions.

3.2 Definitions

As a newly emerging concept, several definitions from different perspectives are advanced for electronic learning, more so a concept driven by a field of study such as information technology.

From the beginning, e-learning was defined in relation to technology. In fact, as early as the 1980s, it was used mostly to mean learning delivered using any electronic means, especially computers. The United States Commission on Technology and Adult Learning defined e-learning as instructional content or learning experiences delivered or enabled by electronic technology (2001:4). On its part, the United Kingdom Department for Education and Skills in 2003 states that "if someone is learning in a way that uses information and communication technologies (ICT) they are using e-learning". These definitions are broad and have not been accepted by all practitioners.

Moving away from broad-spectrum definitions, some authors, in their definitions have specifically focused on the use of Internet technologies, which is too narrow. Marc Rosenbery defines e-learning as the use of Internet technologies to deliver a broad array of solutions that enhance knowledge and performance (2001:28). He argues that there are three fundamental criteria for e-learning:

1. It is networked, which makes it capable of instant updating, storage, retrieval, distribution and sharing of instruction and information.
2. It is delivered to the end user via a computer using standard internet and intranet technology.
3. It focuses on the broadest view of learning, learning that goes beyond traditional paradigms of training.

The term e-learning has thus come to encompass both the learning transaction and the technology used for producing and transmitting knowledge, with emphasis on the latter.

You need to also know that e-learning has also been defined in terms of its social context and its ability to offer learners the option of working outside structured educational environments. Doug Hum and Anne Ladoucour define it broadly as "using an electronic means to access information and learn about a topic, be it for personal interest, job at hand or career advancement (2001). Later, they refined their definition to training that takes place over a network, the internet or an intranet (2001).

3.2.1 Elements of Conventional Definitions

From the definitions advanced so far, you can see that e-learning is typically defined in relation to its use and of specific technologies. The elements of these conventional definitions are:

- Information and communication technologies.
- A network, including use of the internet and the World Wide Web.
- Delivery on time, at any time.
- An electronic exchange of information for the purpose of learning.

However as you can see, the above definitions are potentially limiting because for many organisations, e-learning simply means a CD-ROM, DVD and applications loaded unto single computer for computer-based training or instruction. These organisations do need to use networks or web-based applications

3.2.2 Towards a Comprehensive Definition of E-Learning

To derive a foundational definition of e-learning, a set of logical statements can be advanced for you to have a more comprehensive definition:

- E-Learning encompasses any form of learning transacted by way of digital technologies.
- E-Learning delivery systems are subject to the dynamics of socio-technological evolution.
- E-Learning may be synchronous or asynchronous, self-paced or instructor-led, a process or a single event, online or offline, or any combination of these modes.

Thus, taking these statements into consideration and for the purpose of this course, we hereby advance a broad definition of e-learning for the purpose of on-going research.

Electronic Learning can be defined as a learning experience involving the acquisition or transfer of knowledge delivered or transacted through electronic means.

Note again that to restrict the definition of e-learning to Internet connection via networked computers is to ignore mobile devices and any emerging forms of ICT across all dimensions of the learning process. Restrictive definitions in terms of specific technologies are of limited long-term relevance to learning transactions in an electronic context.

3.3 E-Learning versus Related Terms/Concepts of Learning

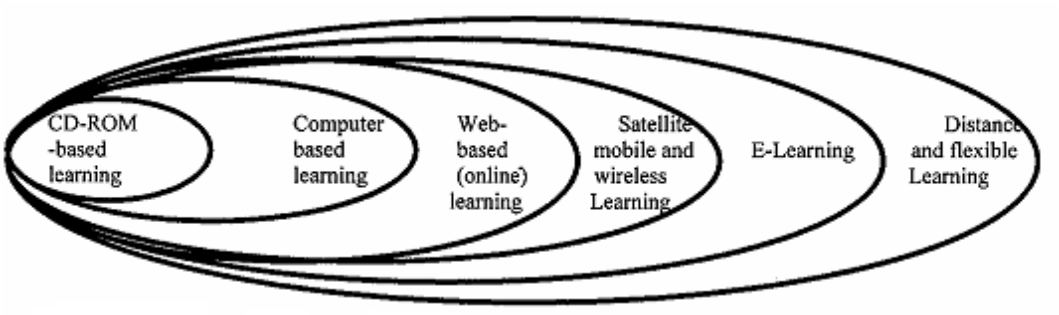
You will notice as you read wide that there are terms and concepts that are seemingly synonymous with e-learning, but are not necessarily the same. Such concepts and terms among others are Distance Learning/Education, Flexible Learning, Web or Online Learning/Training.

E-learning has historically been linked with distance learning and flexible learning. In distance learning, various technologies can be used to link learners, instructors and resources that are separated in time and space.

On the other hand, the main feature of flexible learning, as its name suggests, is its adaptability to learners need and circumstances. Burns *et al* defines flexible learning in terms of its flexible entry, course components, modes of learning and points of exit which offers the learner control and choice regarding the content, sequence, time, place and method of learning including flexible assessment processes. (1997).

While e-learning may be seen as a form of flexible and distance learning, not all flexible and distance learning necessarily involves e-learning (Rosenberg, 2001). For example, in the National Open University of Nigeria (NOUN), interaction between the students and the instructors at the study centers in a conventional classroom style is not e-learning. On the other hand, an interaction between the distance learner students of NOUN and the instructional materials through CD-ROM, DVD, and Internet is considered an e-learning platform.

Figure.1.2 Learning Technologies, Modes and Relationship



Based on Undan & Weggen 2000: 9

As shown in figure1.2, e-learning exists in a wider field of endeavour and has relationships that overlap with many different technologies.

Meanwhile, some authors distinguish e-learning from web-learning (Beer, 2000), or web-based training (Horton 2000). These authors emphasise the distinctiveness of the web as an educational medium that can be used to transfer information and knowledge rapidly without restriction of time and location, and potentially at a lower cost than alternative educational media or environments (Beer 2005).

Horton defines web-based training as any purposeful, considered application of web technologies to the task of educating a fellow human being (2002). But by and large, web learning still remains a subset of electronic learning because the web technology is electronic in function.

As you closely study the historical association between e-learning and distance education, you will see there have been some unfortunate consequences. For example, e-learning programs have sometimes been criticised for being boring, poorly conceived and designed and unable to provide individuals with the knowledge they need. Similarly, distance learning and flexible learning are open to these criticisms. Many of these programmes have disappointed early hopes or promised more than they have delivered. E-learning seems to have inherited some of that legacy.

Although the relationships between electronic learning and distance learning and flexible learning have been cordial, but in some instances there are problems between the two concepts. In some cases, online learning has been introduced to augment and improve existing practices, but in other cases the intention has been to clearly replace existing conditions with an electronic solution as a means of saving money. This seldom produces effective learning experiences and has led some education and training professionals to view e-learning with skepticism.

3.4 Assumptions of E-Learning

There are basic assumptions about e-learning, as well as some misconceptions people have about e-learning.

The following are some of the basic assumptions of electronic learning as adapted from California Distance Learning Project:

1. Anytime, any place, any pace and speedily in one goal for electronic learning.
2. Electronic learning provides access to learners not presently served in traditional settings and enhances learning opportunities for those not being served in traditional learning programme.
3. Electronic learning should be used as a strategic tool to support individual institutional missions. However there are institutional structures and cultures that do not foster an environment where electronic learning can be easily utilised.
4. E-learning often requires resource sharing and collaboration among providers. It can be enhanced by many kinds of partnership.
5. E-learning incorporating emerging information technologies, provides both an opportunity and a challenge to adult educational institutions and corporate organisations to expand their missions and services.
6. E-learning is most effective when staff, along with learners, acquire new knowledge and skills. Thus, on-going staff development must be essential part of the e-learning development process.

3.5 Misconceptions of E-Learning

There are some misconceptions of e-learning, and in this section we shall go through some of these misconceptions so that the right image of e-learning will be propagated.

1. The most common misconception is that e-learning classes, especially online form of it, will be fairly sterile and impersonal. But once a person starts to interact with other group members, they quickly discover that an online e-learning environment can be very rich and very personal. Participants often establish online friendships that outlast the particular class. Furthermore, people typically find that they are drawn into subject matter of the class much more deeply than in a traditional course of the discussions they get involved in.

2. A second misconception is that electronic online learning is only for people who have a lot of experience with computer skills to participate in online e-learning instruction, but certainly you do not need to know very much about computer. With modern software, participating in an electronic learning should not require much more

skill or technical know-how than what you need to operate any piece of office equipment like fax machine, copier, etc.

3. Another common misconception is that e-learning classes will be easy, easier than conventional classes. But almost all participants report that they find e-learning classes much more work, and much more rewarding, than traditional courses they have taken. Again this has to do with the thought of the subject matter that results from online electronic learning discussions. Such classes also require the self-discipline to do the preparation required for e-learning participation and activities, homework is homework, whether offline or online.

4. Finally, it should be mentioned that almost any form of assessment or evaluation is possible with online e-learning classes. You can do traditional quizzes or tests with multiple choice questions or problems to be solved if desired; they can even be done with time limits. In fact, it seems that assignments and project that involve critical thinking, creativity, problem-solving and group discussion/interaction are more appropriate for online e-learning.

The question of cheating always comes up with any form of online electronic learning since online activity is done in an unsupervised setting. To the extent that assessment involves assignment or projects unique to a given individual (or done in a team or group context); this is not likely to be a problem. Tests can also be made unique to each person, or they can be conducted in a supervised environment (like library or learning centre) if really necessary. Basically, if people are going to cheat, they will find a way, online or not.

Assessing group performance in an online electronic learning setting is a little more difficult than evaluating individual efforts- particularly when people do team projects, with a single outcome representing the collective work of the group. Note that this is as true in traditional classroom settings.

4.0 CONCLUSION

As a conclusion, electronic-learning has come to be a form of bridge for those who did not have the first time opportunity to formal education. Not only this, it has cut down on the time and money spent in corporate training. We see the continual emergence of e-learning and being able to “bite” into the big pie of corporate training valued at $100billion.

Though there are some lapses associated with the full implementation of e-learning, especially in the developing economies of the world, but the benefits derived from it far outweigh the challenges.

5.0 SUMMARY

In summary the following are the key points on the fundamentals of E-Learning concept:

i.A more encompassing **definition** of **ELECTRONIC LEARNING** is a learning experience involving the acquisition or transfer of knowledge delivered or transacted through electronic means.

ii.The subject of Electronic Learning (E-Learning) has become pertinent in the dynamic world of today which is driven by information technology.

iii.The **global economy** has not been left out of the positive impacts of e-learning especially in the corporate world where e-learning has reduced the cost of training of personnel.

iv.The **basic concept** of e-learning presupposes that electronic driven technologies can be used to facilitate and enhance learning process.

v.As a fairly new field of study, the key concepts of e-learning and its understanding are still emerging. Therefore, any study of the effectiveness and efficiency of e-learning has to involve multiple issues.

vi.Note that to restrict the **definition of e-learning** to Internet connection via networked computers is to ignore mobile devices and any emerging forms of ICT across all dimensions of the learning process.

vii.While e-learning may be seen as a form of flexible and distance learning, not all flexible and distance learning necessarily involves e-learning (Rosenberg, 2001).

viii.The **basic assumption** of e-learning is that anytime, any place, any pace and speedily is one goal for electronic learning.

ix.The most common **misconception** is that e-learning classes, especially online form of it, will be fairly sterile and impersonal.

x.Part of the **core value** of e-learning is that learning is a life-long process, important to successful participation in the social, cultural, civic, and economic life of the society.

6.0 TUTOR-MARKED ASSIGNMENT

1. Identify and compare the perspectives for defining electronic learning.
2. Pull out your dictionary and search out the meaning of the terms; Training, Education, Learning, Information, Technology and Electronic.

7.0 REFERENCES/FURTHER READINGS

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UNIT 2 BENEFITS AND APPLICATIONS OF ELECTRONIC LEARNING

CONTENTS

6.0 Tutor-Marked Assignment
7.0 References/Further Readings

1.0 INTRODUCTION

This unit focuses on other fundamental issues of e-learning to give you a comprehensive background of the subject.

E-learning as a continually emerging concept has obvious advantages that have endeared the heart of modern day learners. However, e-learning has not and may never completely replace the conventional form of learning because of attending challenges. But the concept of e-learning is bound to thrive because its advantages are significant in the quest to have everybody educated. You know it is commonly said that the merits of e-learning far outweighs the demerits. With the proper advantages and disadvantages, learners will be in a better position to access the concept of e-learning objectively.

In terms of content and objects of learning, the e-learning concept has adopted smaller units of contents that can be reused. This helps to reduce cost, streamlines content creation and brings about increase in quality.

2.0 OBJECTIVES

At the end of this unit, you must be able to:

- identify the characters and features of types of e-learning
- identify the advantages and disadvantages of e-learning
- form an independent opinion on the relevance of e-learning to the society today
- know what constitutes the basic content of an e-learning programme
- clearly answer the question of "who are the main beneficiaries of e-learning?"

3.0 MAIN CONTENT

3.1 Benefits of E-Learning

Electronic-learning technologies offer a myriad of benefits for education, including convenience, flexibility, effectiveness, and efficiency.

Convenience

Electronic-learning technologies can provide convenient locations for both students and instructors. Many of the technologies, such as the Internet, videotape, and telephone, are easily accessed at home. Others, such as desktop videoconferencing, can be distributed from a single point (such as a university) to multiple remote sites (such as schools). Satellite transmissions can be viewed at specified sites, or the transmissions can be videotaped for later viewing at home or school.

Flexibility

Many forms of Electronic-learning provide students the option to participate whenever they wish, on an individualised basis. For example, some students may want to review a videotape in the middle of the night or read their e-mail during early morning hours. In addition, one student may wish to spend 30 minutes reviewing a website, while another spends an hour.

Affordability

Many forms of electronic-learning involve little or no cost. For example, over 99% of the homes in the United States have televisions and 65% are connected to a cable-TV service (Casey, Dager, & Magel, 1998). For these homes, it is relatively easy for the students to watch a videotape or a public broadcast television show. In addition, almost all homes have access to a telephone, enabling the use of voicemail and audio conferencing.

Multi-sensory

One of the benefits of electronic-learning is that there is a wide variety of materials that can meet everyone's learning preference – at least part of the time. For example, some students learn from visual stimuli, such as video, and others learn best by listening or interacting with a computer program. If electronic-learning courses are well designed, they will likely offer learners a wide range of choices, thereby providing the optimal combinations of interaction and media.

Interactivity

Contrary to popular opinion, electronic-learning courses can offer increased interactions with students. In particular, introverted students who are too shy to ask questions in class will often "open up" when provided the opportunity to interact via e-mail or other individualized means (Franklin, Yoakam, & Warren, 1996). Through the increased interactions, teachers can better meet individual student's needs.

Equity

Educational inequity is a major issue in this and other countries. Rural schools often have less contact with educational trends, fewer qualified teachers, and more need for technology. Electronic-learning offers great potential for alleviating these issues and has been employed very effectively in Canada and Australia - two countries with geographically diverse student populations.

3.2 Advantages and Disadvantages of E-Learning

The electronic form of learning is much different from traditional classroom or training room experience even if used as part of conventional class. There are therefore some advantages and disadvantages associated with electronic form of instruction delivery which is what we are set to discuss in this section.

3.2.1 Advantages of E-Learning

- Experience has shown that electronic-learning programs often have more evaluation of learners' progress than do the class/training room programs.
- Electronic-learning increases access to learning opportunities.
- Well-organised electronic distance learning program accommodates multiple learning styles.
- Electronic-learning serves learners who are not likely to attend traditional classroom or training instructions, that is, it is considered effective.
- In most cases, e-learning is cost effective as it can serve as many or more learners per unit amount of money, That is, it is efficient. For example, the use of virtual classrooms has considerable cost advantage for many organisations. IBM seeing the potentials in e-learning had a head start in adopting e-learning and is known to have already achieved annual savings of well over $200million The logistics of organising face-to-face classroom training can account for as much as 40 per cent of corporate training budget. (Koolen, 2001).
- On-going research shows that electronic distance learning can attract and serve lower level of learners.
- Having to write all things in an asynchronous e-learning method gives people a choice to think about their responses, for example when it is an e-mail for e-learning.
- E-learning, for example through internet instruction, changes the social dynamics of education, putting everyone (students, teachers, instructors, and staff) on equal footing. Under normal circumstances,

everyone can post messages. So online participation has the same opportunity to contribute ideas or comments. Consider the situation of the www, a website created by a high school student has exactly the same accessibility as one created by a college professor. Similarly anyone on the Internet can send a message to any one else, regardless of whom they are.

- E-learning for example minimizes discrimination and prejudice that arises naturally in face-to-face setting. Unless someone deliberately reveals it, you have no idea about the age, gender, ethnic background, physical characteristics or disabilities of participating in online class.
- E-learning is flexible, for example, the asynchronous form of e-learning allows participants to control their own timetables and fit learning around their commitments. This is a major advantage especially for adult learners who lead complicated life.

3.2.2 Disadvantages of E-Learning

As we have considered in Unit 3.2.1 above on the advantages of e-learning over conventional learning method, it is worthwhile for us to also consider the disadvantages of electronic form of learning. This will give you the balance view of the concept of electronic learning. The following are some of the disadvantages associated with e-learning:

- One of the major drawbacks of e-learning is infrastructural constraints in terms of hardware and access. For example, a virtual classroom requires learners to have access to fast and reliable network and reasonably sophisticated computing facilities.

- Also learning in a virtual classroom tends to be instructor-led (synchronous) rather based on participatory two-way communication.

- Intellectual constraint is also an issue. Since real communication takes place through written message (e-mail files) writing skill and the ability to put thoughts into words are paramount. People who have poor writing skills may be at a disadvantage in an online environment.

- A further look at e-learning indicates that one of the side effect is of any class involving Internet instruction is plenty of practice in writing.. For many learners, this outcome is just as important as the subject matter being learned. In other words the plenty of writing can be a distraction to knowledge acquisition itself.

- In addition, virtual classrooms share many of the limitation of the conventional classroom in that they require learners to be online at a particular time. This negates one of the major advantages of electronic communication, which is the ability to offer flexible access.

- From the instructor perspective, in e-learning the teacher does not automatically command a presence in an online environment. There is no counterpart to standing at the front of the classroom to capture the attention of the audience. In e-learning, the instructor must adopt the role of a facilitator or moderator-someone who encourages participation and keep discussion focused on certain topics it turn out, this is much more difficult task than conventional classroom teaching which basically involves presentation of materials.

3.3 Applications of E-Learning

Electronic learning applications in higher education and industry are growing at a rapid pace. It is now possible to obtain a college degree without physically attending a traditional class. Likewise, numerous companies are using Electronic-learning technologies to distribute training courses to employees on a worldwide basis.

Electronic learning in K-12 education is not as prevalent as it is in the adult world due to the need to supervise young students. There are, however, many forms of distance learning that are becoming increasingly common in schools throughout the world. The K-12 applications for Electronic learning include

- Instruction for Homebound Students
- Virtual High Schools
- Instruction for Distributed Classes
- Interactions with Outside Experts
- Mentoring and Tutoring of Distant Students
- Collaborative Projects
- Access to Remote Resources
- Staff Development Programs

Instruction for Homebound Students

Electron*ic* learning technologies offer a variety of options for students, who, for one reason or another, are unable to attend school. There are many options for meeting the needs of the homebound students. For example, videotapes can be sent of the classes, internet connections can be established for e-mail and conferencing, or two-way interactive video systems can be installed.

Example

Mr. James was teaching a class with four students and all four were confined to their homes. Through a project organised by Pinellas County in Florida, he is able to communicate with his students through computers and telecommunications. In particular:

- The students send in their work via e-mail before the class meets so that the teacher is assured that the students have organised their thoughts prior to class discussion.
- The teacher gathers updated materials (e.g., newspaper and magazine articles) and sends them immediately to the students via e-mail.
- The students also participate in their own group conference so that they can share pertinent materials with each other (Kantaras, 1993; 49).

Virtual High Schools

Students do not have to be homebound to benefit from electronic learning technologies. Some high schools are experimenting with offering credit courses for students who are home-schooled, those who have previously dropped out of high school, those in juvenile detention institutions, and those who need the flexibility to "attend" school at times other than 7:00 am to 3:00 pm. Virtual high schools can offer the flexibility that appeals to certain students in specific circumstances, while maintaining high standards for education.

Example

Paul needed to re-take American History so that he could graduate from high school with his classmates. The problem was that he also had to report to work at 3:00 each afternoon; there was no time during the school day to take the course. His counselor suggested that he connect to the Internet and check out the Florida High School at http://fhs.net/. The Florida High School is a joint project between Orange and Alachua County public schools (see below). The "virtual" school curriculum currently includes Chemistry, Algebra, Basic, Pascal, SAT Preparation, Economics, and American History. (Any Florida student may take the courses without charge.)

Instruction for Distributed Classes

A number of school districts, particularly in less-populated areas, are using electronic -learning technologies to share teachers among several schools. For example, if only a few students in each school need a course, they can comprise a single class large enough to justify the cost of a teacher. Distributed classes via electronic learning may help alleviate the predicted shortage of teachers in kindergarten schools. Some estimate that by the year 2000 there will only be 1 million teachers for two million positions (Minoli, 1996). These shortages are predicted to be especially acute in the areas of science and mathematics.

Example

Ms. Susan Williamson is teaching a calculus lesson from her studio in Alaska and beaming it up to a satellite. Her students are scattered all over the Northwest in over 100 schools. Through satellite downlinks at each school, they can see and hear their teacher. If they have immediate questions, they can call her during the class period. Otherwise, they can send individual questions to Susan through e-mail or fax. Proctors and teacher's aides supervise the students in the remote classrooms, distribute learning materials, and administer tests.

Interactions with outside Experts

Technologies such as videoconferences, audio conferences, and the Internet allow teachers to bring into the classroom a guest who would normally be unable to visit. Long distances, difficult travel conditions, or busy schedules make it impractical for many individuals to visit school classrooms as guest speakers. Prominent persons are usually more willing to take 15 minutes to talk with a class by telephone or videoconference than they are to spend a couple of hours traveling to and from the school. In addition, there are numerous websites that offer access to experts.

Example

Mr. Reynolds' team of students and teachers was just embarking on an interdisciplinary study of Mars when he learned that a well-known science fiction author lived in town. The author was very interested in education, and agreed to become an advisor to the students as they investigated far-off worlds. In Language Arts classes, students wrote science fiction stories with the author's guidance. He held an audio conference with the student authors to help them develop story ideas, then did some editing via e-mail and chat. The Math and Science classes

designed Mars research stations that were judged by a local team of experts. The engineers and the students used videoconferencing to display and discuss blueprints.

Mentoring and Tutoring of Distant Students

Some school systems have implemented electronic learning technologies to provide students' access to tutors during the early evening hours or on weekends. Depending on the system, the tutors can work at their own homes or at a central location, such as the school, to mentor the remote students. Cross-age mentoring is also possible with older students helping younger students by means of distance learning.

Example

Anita had always dreamt of becoming an astronaut, and thanks to a electronic learning project, she now knows how to make her dream come true. When an astronaut visited her school district, the local educational channel arranged for an interactive, live broadcast to area classrooms. Through the broadcast, Anita learned about the astronaut training program.

Students, including Anita, faxed, e-mailed, and called in questions to the TV studio for the astronaut to answer. After the broadcast, the teacher accessed NASA's website to find out more about the astronaut program. When the students thought of more questions, they began an on-going electronic dialogue with their new mentor by e-mailing him at NASA.

Collaborative Projects

Electronic learning can also be used to enhance collaboration between students in remote classrooms. There are many projects on the Web that promote problem solving, multicultural education, and community involvement. In most cases, one teacher or organisation serves as facilitator for a project. As the data is collected from the remote schools, the facilitator compiles it and disseminates the results.

Example

Ms. Romero's class was beginning a unit on conservation and the environment. In order to make the lesson more authentic, she decided to participate in the Save the Beaches project she had seen on the internet. Through this project, her students would collaborate with students all over the world as they explored their environment. Specifically, they would visit local beaches, collect the data, then analyze it and share the data with the other students (Save the Beaches, 1998).

Access to Remote Resources

Kindergarten schools are often isolated from other learning environments, such as universities, museums, and libraries. Through electronic learning technologies, these resources can become available for students in both urban and rural areas.

Example

Town High School's art classes learned that the city was redesigning and updating the local art museum. The students had plenty of ideas of their own, but they needed more information on how to contribute their ideas to the remodeling project. Some of the students accessed the city government Web pages to learn about the schedule and procedure for providing input about the museum. Another group found websites for museums including the Louvre, Prado, National Gallery of Art, and the Museum of Modern Art. This group did comparisons and evaluations of the virtual art museums, which became a guide to use in making recommendations to the city. A third group contacted other schools and cities to ask about art museums around the country. Finally, the students at Town High addressed the city council with their findings, and offered to help create a website for the newly designed museum.

Staff Development Program

At the end of long days in the classroom, it is difficult for teachers to drive to a university or other facility for in-service credit or to pursue an advanced degree. Through electronic learning technologies, the staff development programs can be delivered to the teachers' school or home. Some universities offer entire Master's and Doctoral programs via electronic learning technologies.

Example

Ms. Brown enjoyed her position as a third grade teacher, and her "job" as a mother of two small children. Through the Learn From A Distance Electronic program at USF, she was also able to attend college and work on her Master's degree. The courses were offered through the internet, and she was able to work at the time, place, and space that were best for her.

4.0 CONCLUSION

Some of the disadvantages ascribed to e-learning , such as the fact that online learning involves a lot of writing, are also the case with in

conventional classroom method of teaching. But this does not rule out the fact that e-learning requires hardware access for it to be effective, especially in the developing parts of the world.

E-learning has been variously applied to prove its relevance in modern education system and it has been found to be very successful. Global effort should be put into the utilization of e-learning to enhance the quest for education for all.

5.0 SUMMARY

Summarily, this unit has advanced the following points to enhance our understanding of e-learning.

i. E-learning is a continually **emerging concept whose obvious advantages** have endeared the hearts of modern day learners. However, e-learning has not and may never completely replace the conventional form of learning because of attending challenges.

ii. **Synchronous/Instructor -** led form of e-learning requires the simultaneous participation of all students and instructor.

iii. **Asynchronous** form of e-learning does not require the simultaneous participation of all students and instructor. Students do not need to gather together in the same location at the same time.

iv. Among the several advantages associated with electronic-learning, prime among them is the fact that it can reach out to serve learners who are not likely to attend traditional classroom or training instructions. By this, it is considered effective.

v. Many forms of electronic-learning provide students the option to participate whenever they wish, on an individualised basis. For example, some students may want to review videotape in the middle of the night or read their e-mail during early morning hours. In addition, one student may wish to spend 30 minutes reviewing a website, while another spends an hour.

vi. Electronic learning applications in higher education and industry are growing at a rapid pace. It is now possible to obtain a college degree without physically attending a traditional class. Likewise, numerous companies are using electronic-learning technologies to distribute training courses to employees on a worldwide basis.

vii. At the end of long days in the classroom, it is difficult for teachers to drive to a university or other facility for in-service credit or to pursue an advanced degree. Through electronic learning technologies, the

staff development programs can be delivered to the teachers' school or home. Some universities offer entire Master's and Doctoral programs via electronic learning technologies

6.0 TUTOR-MARKED ASSIGNMENT

1. Compare and contrast the adoption of e-learning in modern school system.
2. Discuss the benefits associated with e-learning.

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UNIT 3 CATEGORIES OF E-LEARNING

CONTENTS

1.0 INTRODUCTION

One of the biggest challenges in discussing e-learning and the categories arises from different understandings of the field. Most often, we attach

our experiences and career to our conversations, presenting an image of e-learning that reflects what we have encountered. For an instructional designer, e-learning often means courses or learning materials directed at meeting an objective within the larger scope of program development. A corporate trainer may view e-learning as a combination of courses and knowledge management. No one perspective is symbolic of the whole industry.

A danger exists in discussing various segments of e-learning: paying too much attention to distinctions across categories. The real focus and unifying theme is (or at least should be) learning – whether it is in a classroom, online, blended, or embedded. Each category presented here is most effective when properly matched with the appropriate learning environment and desired outcome. None of the categories listed function in isolation. Lines blur between categories, and a successful e-learning implementation will incorporate many different ones.

2.0 OBJECTIVES

At the end of this unit you are expected to:

- know the different categories of e-learning
- be able to distinguish the categories of e-learning
- be able to sketch the mindmap of categories of e-learning
- know the two major forms of e-learning based on the delivery method
- know specific tools and technologies applicable to forms of e-learning.

This Mindmap details the Interrelation of Categories:

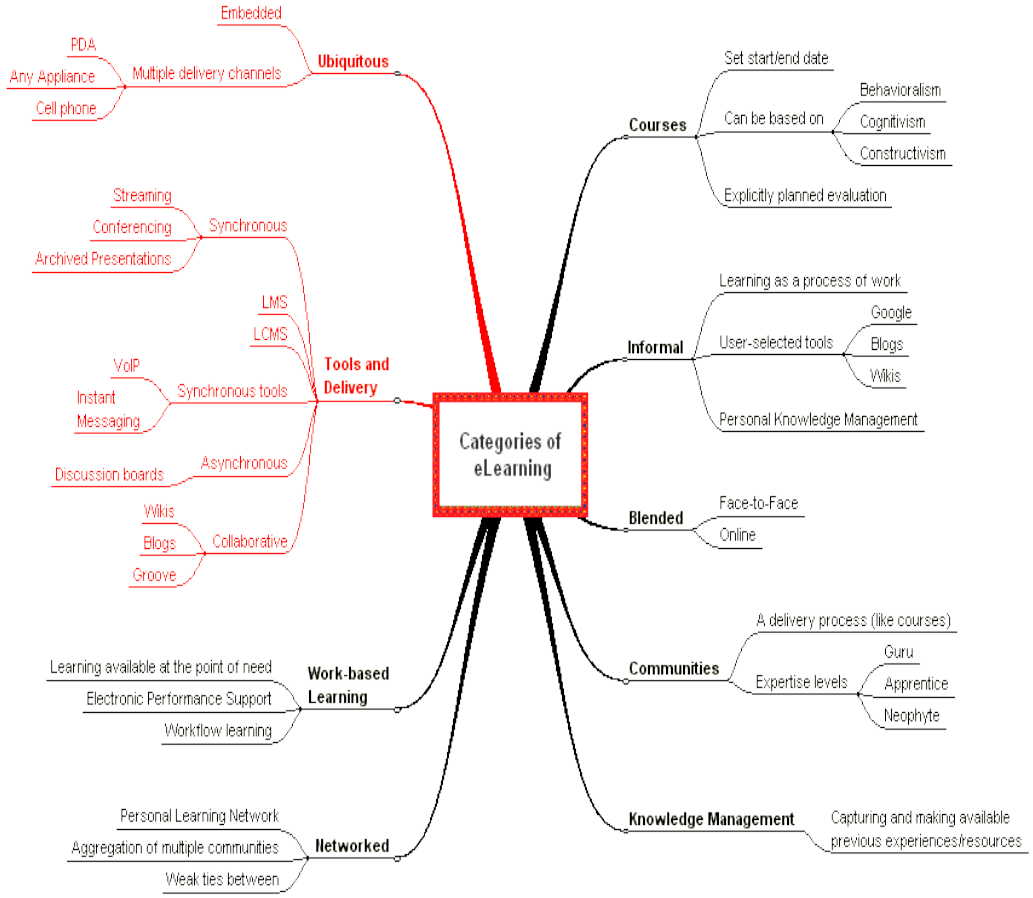

Figure 1.3: Mindmap of Categories of E-learning

3.1 The Categories of E-Learning

The main category of e-learning includes the following:

1. Courses
2. Informal learning
3. Blended learning
4. Communities
5. Knowledge management
6. Networked learning
7. Work-based learning (EPSS).

Courses

Most discussion of e-learning centers on courses. Organisations typically take existing educational materials, add various media, sequence the material and consider it "transferred" to the online environment. The popularity of learning management systems (LMS) like WebCT and Blackboard, (and the perception that they are needed as a starting point) testifies to the prominence of courses as a view of e-

learning. Some designers are beginning to employ simulations, story-telling, and the unique traits of online media in an effort to transform the material for representation in a digital environment. The predominance of "courses as e-learning" view stems from their similarities to the classroom environment. Both learners and instructors are able to relate to the general structure and flow on a course.

Informal Learning

Informal learning is perhaps the most dynamic and versatile aspect of learning. Unfortunately, it is also the least recognised. Informal learning is a by-product of "information foraging" – "the human behaviour when searching for information was similar to that of the hunter-gatherers and animals in search for food" (Dürsteler, undated). Our need for information (and how we intend to use it) drives our search. Search engines (like Google) coupled with information storage tools (like Furl) and personal knowledge management tools like wikis and blogs present a powerful toolset in the knowledge workers portfolio. Jay Cross (2003): states that: "At work we learn more in the break room than in the classroom. We discover how to do our jobs through informal learning – observing others, asking the person in the next cubicle, calling the help desk, trial-and-error, and simply working with people in the know. Formal learning - classes and workshops and online events - is the source of only 10% to 20% of what we learn at work."

Blended Learning

Blended learning provides the best opportunities for learning transition from classroom to e-learning. Blended learning involves classroom (or face-to-face) and online learning. This method is very effective for adding efficiency to classroom instruction and permitting increased discussion or information review outside of classrooms. For example, a new product release may be communicated to sales staff through a three-hour workshop, followed by online resources and discussions for continued learning (without significantly impacting the work activities of the sales force). The rallying cry of educational techno-prophets of the late 90's ("soon we won't need instructor's, we'll learn everything online on our own time") has given way to the reality that learning is a social process, requiring instructor direction and facilitation. Blended learning utilizes the best of classrooms with the best of online learning.

Communities

Learning is social (Driscoll, 2000,). Most problems within our business environments today are complex and dynamic. Yesterday's solutions do not always work today. Problem solving requires different perspectives to create an accurate understanding of potential solutions and environment of implementation. Online communities allow people to stay current in their field through dialogue with other members of the same organisation, or the larger global field. Communities strongly contribute to the flow of tacit knowledge.

Knowledge Management

Knowledge Management (KM) is the significant challenge for businesses in a knowledge economy. KM involves the process of identifying, indexing, and making available (in various formats) knowledge generated within the daily activities of an organisation. Some companies have found value in managing content, mining e-mails, and creating communities of practice. Tafe Frontiers presents eight categories of knowledge management: learning and development, information management, client feedback, knowledge capture, knowledge generation, virtual teams, communities of practice, and content management systems. The duplication of KM and e-learning concepts highlights the strong connections (and blurring) between these fields.

Learning Networks

Communities typically form around a particular goal, concept or theme. A learning network is the loose, personal coupling of communities, resources, and people. It is the cornerstone of personal knowledge management. Vaill (1996) states that: "The permanent white-water in today's systems is creating a situation in which institutional learning patterns are simply inadequate to the challenge. Subject matter is changing too rapidly". The utilisation of personal learning networks allows knowledge workers to remain current in their field.

Work-based Learning

Electronic Performance Support Systems (EPSS) and work-flow learning attempt to inject learning content into the actual point of need. As an alternative to courses, this style of content presentation requires heavy emphasis on context, and the employee control in initiating the learning needed. This style of learning can be seen in many computer applications (context-sensitive help). For organisations, work-based learning requires a significant investment in resource creation and

usability planning (in what situation will a learner want to know this? How should it be presented? What will they search for so they can find it?). Work-based learning is generally an enterprise-wide initiative.

3.2 Impacting Factors

Beyond the categories of e-learning, it is important to note a few additional factors that impact the field:

1. Ubiquitous computing
2. Tools
3. Delivery for e-learning.

These three aspects of e-learning are important to note briefly, as they can influence all of the various categories (and are quickly developing into agents shaping the future direction of e-learning).

Ubiquitous

Ubiquitous learning refers to "everywhere learning" (the internet or learning content follows people around). Core "knowledge pots" (work-related content, personal knowledge, internet) hold content and information. Various devices plug in and retrieve the information in the appropriate format (PDA, cell phone, laptop, or any other appliance). Ubiquitous learning fulfills e-learning's promise of "anytime, anywhere, and any context".

Tools

Tools for e-learning fit into various categories, significantly influenced by the development of communication technologies on the internet as a whole. A few examples of tools:

- Learning Management Systems (LMS)
- Learning Content Management System (LCMS)
- Collaborative tools (aCollab, Groove)
- Identity management and digital rights – still an emerging field, but as the success of Microsoft's Passport reveals, end-users of communication tools require control over their identity. Digital rights tools (for ensuring learning content can be "legally" used) will also continue to grow in popularity).
- Repositories – MERLOT is an example of centralized learning content repositories, but many decentralized repositories follow the success of content sharing programs like KaZaA.

- Voice over IP (VoIP) tools like Skype (http://www.skype.org) will substantially alter the communication landscape. Simple, effective social tools are critical for larger scale adoption of learning that represents the manner in which people work.
- Other social tools: wikis, blogs, instant messaging are being rapidly adopted due to ease of use.

Delivery

Types Based on Delivery Method (Student-Instructor Interactions)

There are two broad types of e-learning based delivery method and on the relationship between the students and the instructor in terms of space and time:

1. **Synchronous/Instructor Led:** This form requires the simultaneous participation of all students and instructor. It is real time. The advantage of synchronous instruction is that the interaction is done in "real time" and has immediacy.

The disadvantage of synchronous instruction is that not all the students will be available to receiving the instructions. Examples of synchronous e-learning are interactive TV, tele/video conferencing and computer conferencing, archived presentations, and Internet chat.

2. **Asynchronous:** This form does not require the simultaneous participation of all students and instructor. Students do not need to gather together in the same location at the same time. Rather students may choose their own instructional time frame and gather materials according to their schedule. It is considered as delayed presentation through learning management systems.

Asynchronous e-learning is more flexible than synchronous. Also its self-paced format accommodates multiple learning levels and schedules. Examples of asynchronous delivery include, e-mail, list serves, audiocassettes courses, CD-ROM, DVD, and world wide web-based courses.

The advantages of asynchronous e-learning includes students' choice of location, and time, and (incase of telecommunications such as e-mail) interaction opportunities for all students.

A disadvantage of asynchronous to consider, with e-mail interaction is considerable written exchange, which really pile up.

	Synchronous	Asynchronous
Video	Videoconferencing	Videotape, Broadcast Video
Audio	Audioconferencing	Audiotape, Radio
Data	Internet chat, Desktop videoconferencing	E-mail, CD-ROM

Figure 1.4. Common Synchronous and Asynchronous Technologies

Types Based on Media and Technology of Instruction

There are different types of e-learning based on technology deployed and interactions between the learner and the tutor. A thorough understanding of the types of e-learning will help the learner in his selection process to meet their knowledge acquisition needs. Based on needs and types, the appropriate technology for study will be deployed.

E-learning which is a modality of broad, mixed category of delivery can also be classified into types based on media and technology of instruction. The types here can be organised along several descriptive dimensions. Remember, however, that these individual types can be mixed into hybrid forms.

The types with their characteristics and notable features are highlighted in the table below.

Media/Technology	Characteristics	Notable Features
Internet	Instructional delivery through the internet, either only learning modules or the entire course.	It is still undergoing improvement. It has broadband communication.
E-mail	Asynchronous text files and attachments.	Good tool to stimulate learning and writing
CD-ROM	Audio learning tool, very mobile and inexpensive when combined with print materials.	Useful in language learning and practice.
Laptop Computer	Versatile approach to providing a wide range of learning activities from skill and drill to simulation.	Hardware is expensive and is being replaced.
Teleconference	Electronic communication	Often use proprietary software

	between among people at separate locations. Can be audio, audio graphic, video or computer based.	and comes in broadband communication that is accessible.
DVD, VCD	Visual and audio tool; the checkout approach with print materials makes it popular.	Multi-sensory tool with linear form.

Table 1.1: Types of E-Learning Based on Media and Technology of Instruction

4.0 CONCLUSION

The different forms of electronic learning highlighted in this unit go a long way to show seemingly complexities in the forms and categories of e-learning. However, a proper understanding of the concept of e-learning will help you in knowing where to place the form of e-learning you are engaging per time.

5.0 SUMMARY

In summarising this unit, the following point, will help you have an overview of the unit:

i. One of the biggest challenges in discussing e-learning and its categories arises from different understandings of the field.
ii. None of the categories listed functions in isolation. Lines blur between categories, and a successful e-learning implementation will incorporate many different ones.
iii. Most discussion of e-learning centres on courses. Organisations typically take existing educational materials, add various media, sequence the material and consider it “transferred” to the online environment.
iv. Informal learning is perhaps the most dynamic and versatile aspect of learning.
v. Blended learning provides the best opportunities for learning transition from classroom to e-learning. Blended learning involves classroom (or face-to-face) and online learning.
vi. KM involves the process of identifying, indexing, and making available (in various formats) knowledge generated within the daily activities of an organisation.
vii. The utilisation of personal learning networks allows knowledge workers to remain current in their field.
viii. For organisations, work-based learning requires a significant investment in resource creation and usability planning (in what situation will a learner want to know this?

ix. Ubiquitous learning refers to "everywhere learning" (the internet or learning content follows people around).
x. Tools for e-learning fit into various categories, significantly influenced by the development of communication technologies on the internet as a whole.
xi. Synchronous/Instructor-Led form of e-learning requires the simultaneous participation of all students and instructor. It is real time.
xii. Asynchronous form of e-learning does not require the simultaneous participation of all students and instructor. Students do not need to gather together in the same location at the same time.
xiii. E-learning which is a modality of broad, mixed category of delivery can also be classified into types based on media and technology of instruction.

6.0 TUTOR-MARKED ASSIGNMENT

1. Discuss 5 categories of e-learning with examples.
2. Enumerate 5 media and technology used for e-learning.

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UNIT 4 INFORMATION AND COMMUNICATION TECHNOLOGIES I

CONTENTS

1.0 INTRODUCTION

All forms of e-learning depend on access to electronic communication technologies. In general, the more interactive the approach, the greater the demands on the communication networks, although the transmission of text is less demanding than the transmission of visual images and sound.

Many of the recent advances in e-learning have been driven by the expansion of fixed-line network capacity and the growth in the Internet use. Of particular interest to many in the e-learning field has been the emergence of the World Wide Web, which offers a user-friendly graphical interface through which learners can gain access to a huge range of information, including images, data file and sound as well as text. More recently, there has been a rapid sound growth of new mobile communications technologies that offer internet access while bypassing both the fixed-line network and the web.

Any assessment of the potential of e-learning must accommodate all these technologies, that is, the various e-learning technologies and their network capacity requirements.

The various technologies used in electronic learning can be roughly divided into three categories: audio (voice), computer (data), and video. Each of these categories has several subdivisions. Be aware, however, that many of the technologies overlap into more than one category. For example, though, audio conferences and videoconferences can take place using a computer and the Internet. The basic technologies are illustrated in the table below. The following units of this course provide advantages, disadvantages and guidelines for each technology.

	Voice/Audio Telephone Voicemail Audio conferences Audiotape Radio
Computer E-mail Web-based courses Videoconferences CD-ROM Collaboration software	**Video** Videotape Satellite delivery Microwave Broadcast video Desktop Video

Figure 1.5*:* E-Learning Technologies

2.0 OBJECTIVES

At the end of this study, you should be able:

- to see the technology perspective of e-learning
- to know the different types of communication technologies deployed in e-learning
- to differentiate the different types of communication technologies
- to know the advantages and disadvantages of the technologies
- to give guide to the type of technology to be deployed in e-learning curriculum design
- description of communication technologies that have been developed to implement and manage e-learning.

3.0 MAIN CONTENT

3.1 Voice/Audio Technologies

Audio or voice technologies offer cost-effective ways to enhance electronic learning courses. The audio component of an e-learning course can be as simple as a telephone with voicemail, or it can be as complex as an audioconference with microphones, telephone bridges, and speakers. (Audio conferences via a computer will be discussed in Figure 3.3.

1. Audiotapes

Audiotapes (cassettes) are inexpensive, easily duplicated, and very versatile. They can be used to deliver lectures, panel discussions, or instructions for the electronic learner. Audio is especially useful in courses that require the nuances of inflection, such as foreign languages, or those that are designed for non-readers.

Audiotapes have several advantages for the delivery of electronic learning courses. First, they are very inexpensive and readily accessible. Almost all students have access to a cassette player in their home, school, or car. Audiotapes are also easy to create, easy to duplicate, and easy to use. Disadvantages of audiotapes include the fact that they are not interactive, and they do not provide the visual elements that many students desire.

When using audiotapes for instruction, be sure to record them using the best equipment possible. A low hiss during the recording process may result in a major distraction when the duplicate is played. Also, include print materials to enhance the tapes and encourage interactions via voicemail, e-mail, fax, or other means.

2. Audio Conferences

Telephones are one of the simplest, most accessible technologies used for electronic learning. Telephone conversations can be used to mentor individual students or to reach numerous students simultaneously via a conference call (audio conference). If more than one person is at each location, audio conferences can be set up using speakerphones and telephone bridges (see Figure 3.3). Speakerphones have been improved in the past few years, but they still have some limitations. Common speakerphones are called simplex message devices - that means that people at both ends of the connection cannot talk at the same time.

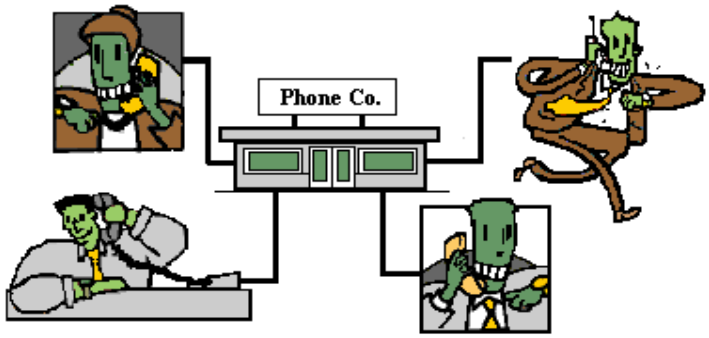

Figure 1.6. Audio conference using a Telephone Bridge

When one of the parties pauses, or when someone in a classroom talks loudly, the standard speakerphone switches off its speaker and activates its microphone. At this point, the voice of the distant person is cut off, and the flow reverses so that the distant person can hear what is being

said in the classroom. Modern speakerphones are capable of making this simplex changes in direction so quickly that it is usually only a minor distraction. As both guest speakers and students become familiar with the limitations, they learn a pattern of brief pauses during interactive discussion to prevent interruptions.

Many telephone lines have simple conference-calling features that make it easy to connect three locations. When more than three locations must be connected, the best solution is to use a telephone bridge. The bridge is an electronic system that links multiple telephone lines and automatically balances all audio levels. The bridge can be provided through the telephone company, or it might be owned and operated by the school system.

A bridge can be either call in or call out. With a call-in bridge, participants in the telephone conference are given the bridge telephone number ahead of time. The participants then call the number to connect to the call. For example, South Carolina conducted teacher training with hundreds of teachers by providing a toll-free telephone number and specific times for teachers to call into the conference. A call-out bridge arrangement requires a person, usually an operator, to dial the telephone numbers of all the locations that will participate in the conference. As each number is reached, it becomes connected to the call.

Audioconferences are relatively easy to set up and conduct; however, it may be difficult to maintain students' interest for long periods of time without visual elements. Therefore, audioconferences used for distance learning should be short, well-planned, and supplemented with visual materials that are distributed in advance.

Advantages of Audio Technologies

- **Inexpensive:** All of the audio/voice technologies are relatively inexpensive.
- **Easily accessible:** Almost every home in the United States has a telephone. In addition, most students have access to an audiotape player in their home or in a car.
- **Easy to use:** Almost everyone is comfortable using a telephone and an audiocassette. With voice technologies, there is no software to install and no hardware to configure.

Disadvantages of Audio Technologies

- **May require scheduling:** Some of the voice technologies (such as audio conferences) are synchronous, meaning that they must be scheduled at a convenient time for the students and teacher.

- **Not conducive to visual information:** Many students find it hard to focus and learn strictly through audio input. In addition, audio-only format restricts the content that can be conveyed (abstract concepts are very difficult to convey through audio).

- **May be impersonal:** With audio-only interactions, there is no eye contact and no body language. Students may be "turned off" by a talking box.

Guidelines for Incorporating Audio Technologies

- **Distribute visual materials in advance:** If an audio conference is scheduled, handouts or other visual materials that might be of value during the presentation should be distributed well in advance.

- **Set communication protocols:** Since the participants will not be able to see each other, it is important to agree on protocols to help identify the speaker in an audio conference. In most cases, it is advisable to instruct all speakers to state their name before making comments. For example, "This is Mary, and I would like to comment about..."

- **Encourage interaction:** In an audio conference, interactions should be built into the format. For example, instructors should call on specific students, instruct students to take turns asking questions, and make sure that one student is not allowed to monopolize the conversation. With both audio conferences and audiotape delivery, students should be required to use e-mail, fax, or voicemail to engage in further interactions with each other and the instructor.

- **Record audio conferences on audiotapes:** It is very easy to record an audio conference. That way, you can distribute the tapes for students who were unable to participate in the conference and for those who would like to review the content.

- **Get to know the students:** If possible, seek ways to get to know the students, such as visiting the remote sites, gathering the students together in one place, or exchanging photographs or videotapes.

3.2 Computer Technologies

With the increased popularity of the internet, computer technologies are receiving more and more attention as a means of delivering e- learning. The primary computer technologies used for electronic distance

education include e-mail, online collaborations, and web-based education.

1. E-mail

Sending e-mail messages is a common and inexpensive way for students to communicate with instructors. In some cases, an entire e-learning course may be structured using e-mail as the only method of communication. In other cases, e-mail may be used to supplement audio or video technologies.

In addition to "regular" e-mail messages, bulletin boards and listserves can also be used to conduct e -learning initiatives. Bulletin boards (also called discussion groups or newsgroups) are electronic forums where students can "post" messages or read messages that others have posted. A threaded discussion group is a bulletin board that allows students to reply to specific messages (the reply is then indented or in some way linked to the original message). Listserves are automated e-mail distribution systems. In other words, if you send an e-mail message to a listserve, it will automatically be distributed to all other members of the listserve. Many faculty members establish bulletin boards or listserves for e- learning classes to facilitate the interactions among the students.

The advantages of e-mail communications include versatility and convenience. In addition to sending straight text, most e-mail systems now allow students to attach files. That means that they can send PowerPoint files, spreadsheets, or any other type of file to each other. The convenience of e-mail is that it can be accessed at any time of the day or night. In addition, students can often obtain an e-mail account for little or no cost.

Disadvantages of e-mail include the requirement to have an internet connection and the complexity of learning to use e-mail software and attachments. Although more and more students have access to the internet at home, it is not safe to assume that they will all have equal access. Prior to involving students in e-mail instruction, you must ensure that they all have the hardware, software, and knowledge to make the communications successful.

2. Online Collaboration: Internet Chat and Conferencing

E-mail communications are asynchronous, meaning that they do not take place simultaneously. However, synchronous communications are possible through online chat, shared whiteboards, and videoconferences.

Online chat refers to a two-way, interactive exchange on the Internet. In chat mode, two or more people at remote computers connect to the same chat "room" and type messages. As each types his or her message, the others can see the messages on a shared screen (see Figure1.7). Online chat allows students and teachers to communicate in "real-time." For example, many instructors will establish virtual office hours, during which they will be available to chat with any students who may have questions. Because the chat takes place on the Internet, there are no phone charges to worry about!

Figure 1.7 Chat screen

Shared whiteboards are another form of collaboration of the Internet. If two or more people are connected to the Internet at the same time, they can communicate through graphic images on a shared whiteboard (see Figure 1.8). Simple drawings tools are provided that allow them to draw arrows, circles, and other simple symbols in the shared space. In addition, one or both of them can paste in images or text that was copied from another source. Shared whiteboards require special software (such as CU-See Me or Net Meeting). Some of the more advanced software even allows users at remote sites to share applications. For example, an instructor may have Excel on his or her computer and be able to display it on a remote student's computer. The student and teacher will both be able to input data and make revisions.

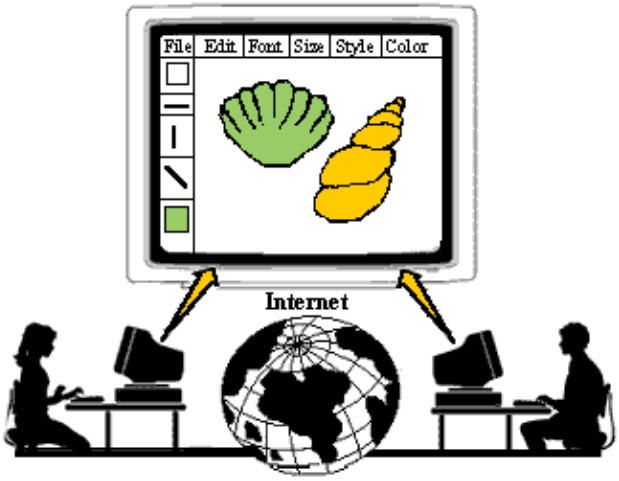

Figure 1.8: A shared white board in use

The advantages of online collaboration through chat or shared whiteboards are that the communications are synchronous and the feedback for the students is immediate. The disadvantages include the need for similar software at both sites and the requirement to schedule the interactions in advance. In addition, the number of participants may be limited for simultaneous collaboration.

3. Web-based Education

The World Wide Web has opened a whole new arena for e-learning courses and the access to remote resources. The Web can be used to enhance education through remote access to resources or experts or it can be used to deliver educational programs.

As an enhancement to education, teachers can locate relevant Web sites for students to explore or have students conduct searches for information related to a specific topic. Bookmark files or Web pages with links can be developed to provide quick access to appropriate sites for the students. For example, Figure 1.9 presents a Web page that was created for the study of art.

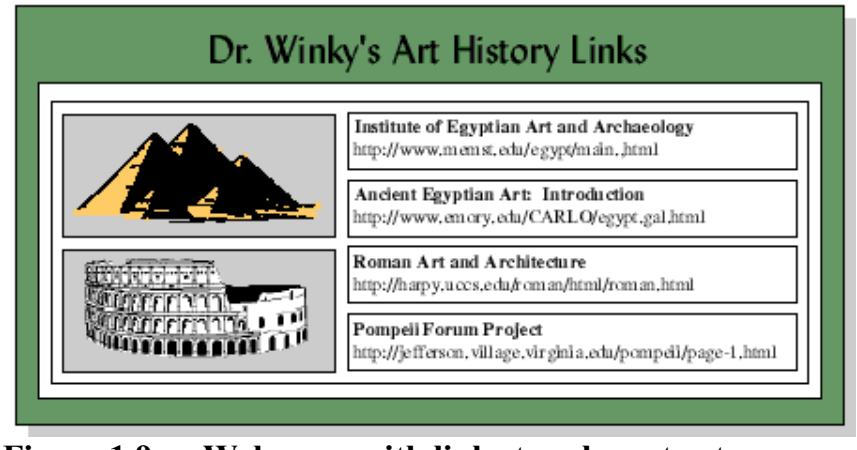

Figure 1.9 Web page with links to relevant art resources.

Advantages of Computer Technologies

- **Allow self-paced instruction:** Computers allow learners to proceed at their own pace, receive feedback immediately, and review as often as they like.

- **May incorporate text, graphics, audio, and video:** With the trend toward digital audio, digital video, and computer animations, it is easy to incorporate various media into computer programs.

- **Allow high levels of interactivity:** Computer technologies allow embedded questions and interactions, as well as online collaboration.

- **Provide written record of discussions and instruction:** Computer logs can easily be generated for computer interactions in distance learning.

- **Inexpensive:** With access to the Internet, it is relatively inexpensive to participate in computer technologies for distance learning.

- **Worldwide access:** The internet can be accessed by millions of people throughout the world. There is no other way to reach so many people for so little money.

Disadvantages of Computer Technologies

- **Require hardware and software:** At a minimum, a computer and internet connection are required for most electronic learning options that involve computers.

- **Generally rely on written communications:** Although it is possible to include audio and video in computer-based distance learning, most of the communications are in the form of text.

- **Require substantial planning:** E-mail and other asynchronous computer technologies require a great deal of planning and preparation on the part of the instructor.

- **Computer viruses.** If students send assignments via a computer, there is always a risk of viruses, especially if they send programs or attached files.

- **No guaranteed performance:** Computer networks are notoriously unreliable. If students wait until the last minute to check their e-mail messages or search the web, there is always the risk the server may be down or the websites may have moved.

Guidelines for Incorporating Computer Technologies

- **Provide adequate structure and guidelines:** The most successful asynchronous projects include deadlines and a structure.

- **Provide timely feedback to participants:** Since the communications in computer-based distance learning are more impersonal than video-based delivery, it is extremely important to provide quick and relevant feedback to students.

- **Get to know the students:** If possible, try to meet the students, either in person or through video. In some cases, the students may be able to meet once or twice; if not, videotapes can be sent to students to increase personal communications.

- **Ensure sufficient technical support:** In a perfect world, the computer and the technology would be invisible to the students. It is very important to provide sufficient technical support so that the students can get help when they need it.

4.0 CONCLUSION

It is obvious that technology is the platform for successful e-learning, therefore emphasis is being placed on technology. However this should not be at the expense of content or the body of knowledge to be imparted.

5.0 SUMMARY

i. The various technologies used in electronic learning can be roughly divided into three categories: audio (voice), computer (data), and video (see Figure 3.2). Each of these categories has several subdivisions. Be aware, however, that many of the technologies overlap into more than one category.

ii. Audio or voice technologies offer cost-effective ways to enhance electronic learning courses. The audio component of an e-learning course can be as simple as a telephone with voicemail, or it can be as complex as an audioconference.

iii. Telephones are one of the simplest, most accessible technologies used for electronic learning. Telephone conversations can be used to mentor individual students or to reach numerous students simultaneously via a conference call (audioconference).

iv. With the increased popularity of the Internet, computer technologies are receiving more and more attention as a means of delivering e-learning. The primary computer technologies used for electronic distance education include e-mail, online collaborations, and web-based education.

v. The World Wide Web has opened a whole new arena for e-learning courses and the access to remote resources. The Web can be used to enhance education through remote access to resources or experts or it can be used to deliver educational programs.

6.0 TUTOR-MARKED ASSIGNMENT

Compare and contrast the use of computer technology and video technology in e-learning.

7.0 REFERENCES/FURTHER READINGS

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UNIT 5 INFORMATION AND COMMUNICATION TECHNOLOGIES II

CONTENTS

1.0 INTRODUCTION

This unit which is a continuation of the previous unit treats E-learning information and communication technologies further.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- see the technology perspective of e-learning
- differentiate the different types of communication technologies
- give guide to type of technology to be deployed in e-learning curriculum design
- description of communication technologies that have been developed to implement and manage e-learning
- explain Video Technologies
- explain Emerging Technologies.

3.0 MAIN CONTENT

3.1 Video Technologies

The ability to see and hear an instructor offers opportunities for behaviour modeling, demonstrations, and instruction of abstract concepts. Video techniques for electronic learning are often characterised by the transmission media (videotapes, satellites, television cables, computers, and microwave). Each of the media can be described as it relates to the direction of the video and audio signals-one-way video; two-way video; one-way audio; and two-way audio (see Figure 1.10).

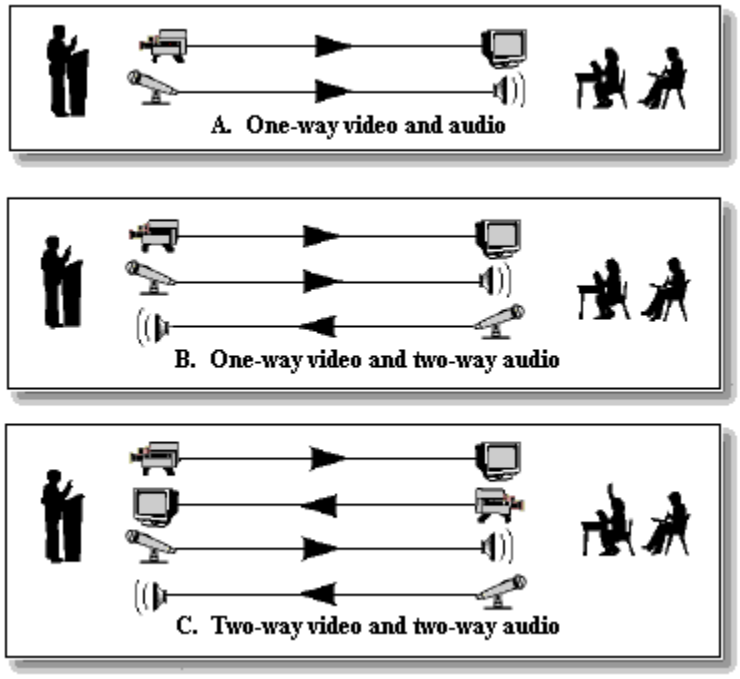

Figure 1.10 Three audio and video configurations.

1. Videotapes

Videotapes such as VCDs offer a popular, easy-to-use format for instructional materials. Almost all students have access to a videotape player at homes, and they are also common at school. Videotapes can be used for demonstrations or documentaries. In addition, it is quite easy to videotape a lecture for a student who is unable to attend class.

Videotapes have several advantages for the delivery of distance learning. In addition to easy access to the hardware, the tapes are quite inexpensive. If a video camcorder is available, videotapes are relatively easy to record (although professional staff and equipment will provide a much better product than an amateur production team).

Disadvantages of videotapes include the fact that they are not interactive. In addition, they wear out with continual use and can be costly to send via the mail.

When using videotapes for instruction, be sure to record them using the best equipment available. If possible, employ professional videographers and editors to achieve professional quality. Interactions through voicemail, e-mail, fax, or other means should also be encouraged.

2. Satellite Videoconferencing

Full-motion video teleconferencing (referred to as videoconferencing) offers the "next best thing to being there." Satellite transmission is one of the oldest, most established techniques for videoconferencing. In most cases, satellite delivery offers one-way video and two-way audio.

Two sets of equipment are needed for satellite systems. The uplink (a large satellite dish) transmits the video and audio signals to the satellite. The downlink (a small dish antenna) receives and displays the signals (see Figure 1.11).

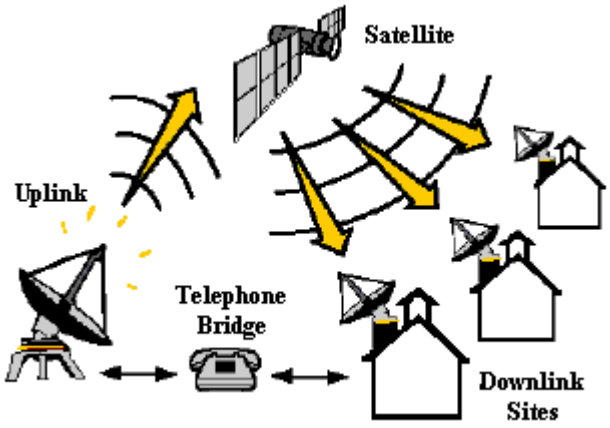

Figure 1.11 Configuration for satellite videoconferences

When satellite videoconferences are used for distance learning, a studio classroom must be properly wired for the lighting, microphones, and cameras needed to produce an acceptable lesson. The cameras are usually connected to a control room, where one or more technicians control the signals. The resulting television signal is then sent to the uplink transmitter. Uplink transmitters are very expensive and are often shared with other schools or businesses.

The receiving sites of satellite videoconferences (in most cases other schools) must have satellite downlinks. These dishes select, amplify, and feed the signals into the classrooms, where they can be displayed on standard television monitors. To provide two-way audio with interactions from the remote classrooms back to the teacher, a telephone bridge is usually employed.

Satellite videoconferencing is very expensive. It would not be cost-effective for most school systems to use uplinks to originate distance-education classes unless the school systems were in a position to market the classes over wide geographical areas. It is reasonable, however, for a school to use a downlink to receive commercial courses that are delivered through satellite channels. One example of an

educational system that makes use of satellite communication is EMG (Educational Management Group).

3. Microwave Television Conferencing

Satellites are a popular method for enabling video communications over long distances. Microwave transmissions provide a cost-effective method for videoconferencing in more localized areas. Most microwave systems are designed to transmit video signals to areas that are not more than 20 miles apart (see Figure 1.12).

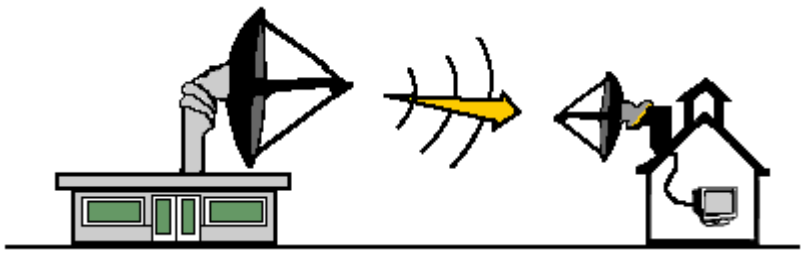

Figure 1.12 Configuration for microwave transmission.

The most common microwave systems use frequencies that have been designated by the Federal Communications Commission (FCC) as Instructional Television Fixed Service (ITFS) stations. When compared with satellite or commercial broadcast television, ITFS stations operate at a lower power, and the transmission equipment is relatively inexpensive. Reception equipment is also reasonably priced, as long as the receiving sites are located within 20 miles of the transmitter and there are no hills or tall buildings to block the line-of-sight signal.

One drawback of microwave ITFS communication involves the limited number of channels available in any one area. Many metropolitan areas already have all available channels in use, so no further expansion of ITFS teleconferencing is possible in these areas.

4. Cable and Broadcast Television

Cable and public broadcast television have been used to distribute instruction for years. In addition to the educational networks, such as CNN, the Learning Channel, and Jones Computer Program, almost all public cable television systems allow schools to transmit television courses. This type of connection can be used to transmit one-way video and one-way audio to the community at large or between specific schools. For example, if two area high schools do not each have enough students to justify an advanced math course, they might team up to teach

a single course delivered through cable television. In one school, the teacher would conduct a regular class; in the other school, the students would watch and listen through a standard cable television channel.

Electronic learning through cable television systems requires both a studio and channels through which to broadcast. The cost depends largely on the "partnership" offered by the cable or broadcast system. Even though the broadcast will take place at a scheduled time, research shows that the majority of the students will tape the program and play it back at a convenient time.

Cable companies will soon be able to use the technology of digital video to offer hundreds of channels to each home and school. Although many of these channels will be used for commercial entertainment purposes, it is almost certain that a large number of channels will become available for education.

5. Digital (Desktop) Videoconferencing

Desktop videoconferencing uses a computer along with a camera and microphone at one site to transmit video and audio to a computer at another site or sites. The remote sites also transmit video and audio, resulting in two-way video and two-way audio communications.

With digital videoconferencing, all of the computers involved must have a videoconferencing board installed. These boards often have the ability to compress and decompress the digitized video, and they are called codec boards (see Figure 1.13). Picture Tel and Vtel are two well-known hardware/software companies that supply desktop video solutions for schools.

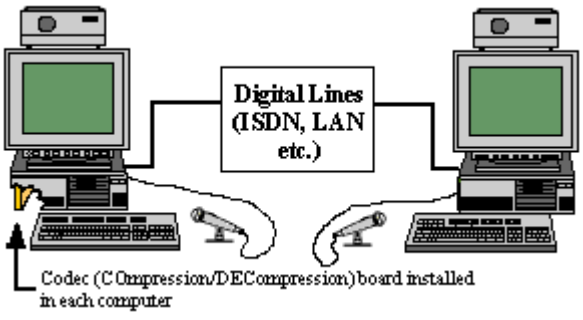

Figure 1.13 Configuration for desktop videoconferencing

Although desktop videoconferencing is considerably less expensive than satellite or microwave systems, there are a couple of limitations. First, the images are usually transmitted at 15 images per second, half the normal video speed. This causes the video to appear somewhat jerky if

any rapid motion takes place. A second concern is related to the connection between the computers. Most systems have been demonstrated either through local area networks (LANs) or through relatively fast connections, such as ISDN or T1 lines. Slower connections, such as a connection with a 28.8 modem, can negatively affect the quality of both audio and video.

6. Internet Videoconferencing

It is also possible to conduct videoconferences over the Internet. Two popular software programs that allow videoconferences are CUSee-Me from Cornell University and NetMeeting from Microsoft. In both cases, you need a video camera and digitizing card to transmit video signals. A microphone, speakers (or headset) and an audio card are required for audio (see Figure 1.14).

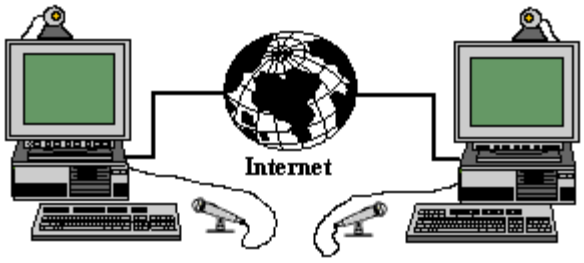

Figure 1.14 Configuration for Internet videoconferencing.

Internet videoconferencing usually results in a small image about 1/16th the size of a computer screen. The video is generally jerky (about 3 or 4 frames per second), depending on the speed of the Internet connection. In most cases, a regular modem is far too slow to transmit effective video.

While all of this sounds very exciting, it is still very early in the development process. The images that are produced by products like CU-See Me are extremely low in quality, and can not be used for many instructional purposes. With luck, it is possible to identify an individual if he or she fills the entire window, but even then, there may be poor synchronization between lips and sound.

Advantages of Video Technologies

- **Allow both audio and video communications:** Video technologies can provide the visual and audio realism of a face-to-face class. It is generally considered the "next best thing to being there".

- **Facilitate personal feelings:** Video technologies enable students and instructors to see facial expressions and body language, adding personalities to communication.

- **Enable high levels of interaction:** Most video communications are synchronous, allowing high degrees of interactions, questions and answers, etc.

Disadvantages of Video Technologies

- **May be Expensive:** Cameras and editing equipment can be expensive. In addition, the infrastructure at each site and the links between sites can be costly. For example, in Florida the rate is $400 per hour for satellite time.

- **Require a great deal of planning and preparation:** To be effective, the camera crews and the instructor must practice and become a team. Faculty members generally need practice and training to be effective in this domain.

- **Must be scheduled:** Most videoconferences are not spontaneous. Instead, they must be planned and the necessary resources must be scheduled.

- **Require technical support team:** Because of the complexity of video recording, mixing, and transmission, a technical support team is required. In addition, site facilitators are necessary to ensure the equipment works properly at the receiving stations.

Guidelines for Incorporating Video Technologies

- **Avoid the "talking head.":** “The early days of distance education witnessed the inclusion of the worst aspects of the old passive/lecture paradigm, which were even more deadly from a distance than in person" (Parker, 1997:10). Talking head refers to simply videotaping the instructor while she or he is talking. Instead, try to vary the camera angle, include still images of appropriate graphics, and encourage student interactions.

- **Practice with the cameras and the crew before the lesson:** It is important to plan practice times for the instructor and the camera crew. By working together, they can anticipate each other's needs and provide the best possible transmissions.

- **Encourage interactions:** Interactions can be added to video-based delivery in many ways. If the lessons are two-way, questions and

other types of interactions can be included. If they are one-way video, interactions can be added through e-mail messages or the telephone.

- **Use the best cameras possible:** The old saying "garbage in; garbage out" is very true of video. The very best possible quality equipment should be used.

- **Ensure quality audio:** Losses in audio quality will be noticeable long before losses in video quality. Always ensure good recording, playback, and speaker quality.

4.0 CONCLUSION

It is obvious that technology is the platform for successful e-learning; therefore emphasis is being placed on technology. However this should not be at the expense of content or the body of knowledge to be imparted. With emerging technologies, e-learning will continually experience acceptance from the marketplace. Conclusively, the technology to be adopted for any e-learning process should be suitable for the purpose. Well enough there are several technologies to choose from.

5.0 SUMMARY

i. The various technologies used in electronic learning can be roughly divided into three categories: audio (voice), computer (data), and video (see Figure 3.2). Each of these categories has several subdivisions. Be aware, however, that many of the technologies overlap into more than one category.

ii. Audio or voice technologies offer cost-effective ways to enhance electronic learning courses. The audio component of an e-learning course can be as simple as a telephone with voicemail, or it can be as complex as an audio conference.

iii. Telephones are one of the simplest, most accessible technologies used for electronic learning. Telephone conversations can be used to mentor individual students or to reach numerous students simultaneously via a conference call (audio conference).

iv. With the increased popularity of the Internet, computer technologies are receiving more and more attention as a means of delivering e-learning. The primary computer technologies used for electronic distance education include e-mail, online collaborations, and web-based education.

v. The World Wide Web has opened a whole new arena for e-learning courses and the access to remote resources. The Web can be used to enhance education through remote access to resources or experts or it can be used to deliver educational programs.

vi. Video techniques for electronic learning are often characterised by the transmission media (videotapes, satellites, television cables, computers, and microwave).

vii. Desktop videoconferencing uses a computer along with a camera and microphone at one site to transmit video and audio to a computer at another site or sites. The remote sites also transmit video and audio, resulting in two-way video and two-way audio communications.

6.0 TUTOR-MARKED ASSIGNMENT

1. List some of the guidelines for incorporating video technology in e-learning.
2. Discuss the application of cable and broadcast television in electronic education.

7.0 REFERENCES/FURTHER READINGS

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MODULE 2

UNIT 1 E-LEARNING PROCESS AND SYSTEMS

CONTENTS

1.0 INTRODUCTION

Although the focus of e-learning should be on delivering learning outcomes for people and organisations, much of the popular literature on the subject is preoccupied with the deployment of specific technologies. This unit adopts a different tack. It begins by focusing on the crucial issue of how people communicate and learn in an electronic environment. This leads into an appraisal of some widely held ideas about the potential for creating modular 'learning objects', which in turn serves as background for a discussion of the terms used to describe the technologies that have been developed to implement and manage e-learning.

2.0 OBJECTIVES

By the end of this unit, you should be able to understand:

- how people communicate in an electronic environment
- how people learn in an electronic environment
- the software that drive e-learning
- the various applications of learning software.

3.0 MAIN CONTENT

3.1 E-Learning Processes

Like any learning process, e-learning depends on effective communication of human knowledge, whether this occurs in a face-to-face classroom or across the Internet. Electronic technologies can no more guarantee effective communication than they can transform 'jxiqwop' into a meaningful word. The medium alone does not create the message.

The effectiveness of e-learning also depends on establishing two-way communication between teachers and learners, and among learners themselves. Unfortunately, when e-learning was first popularised, it was widely promoted as a means of minimising costs by delivering pre-packaged content to large populations of learners by means of electronic networks or CD-ROMs. Such an approach relies on one-way communication from teacher to learner, attenuating the learning experience. It views learners as atomised individuals and fails to take into account the social context in which learning occurs. Above all, it does not engage learners actively in the process of learning.

On the other hand, online technologies can also be used to foster interactive and collaborative engagement. This can be either synchronous or asynchronous: learners and instructors may either have regular, scheduled sessions whether they all 'meet' simultaneously online, or (more commonly) use electronic forums to exchange ideas in their own time.

The most familiar form of synchronous electronic communication is real time two-way text-based online chat, which is widely used in e-learning. More sophisticated forms of synchronous instruction include virtual classrooms, which use information and communication technologies to mimic a traditional classroom environment. This may involve video-conferencing or the use of shared electronic whiteboards, which allow learning materials to be created and modified in real time, either by the instructor or the learners.

In many cases, exchanges during synchronous instruction can be archived so that learners can review them later.

The use of virtual classrooms has considerable cost advantages for many organisations. The logistics of organising face-to-face classroom training can account for as much as 40 per cent of corporate training budgets (Koolen 2001:5). On the other hand, virtual classrooms have several drawbacks. They require learners to have access to fast, reliable

networks and reasonably sophisticated computing facilities. Learning in a virtual classroom also tends to be instructor-led rather than based on participatory, two-way communication. Above all, virtual classrooms share many of the limitations of the conventional classroom in that they require learners to be online at a particular time. This negates one of the major advantages of electronic communication, which is its ability to offer flexible access.

By contrast, asynchronous instruction allows participants to control their own timetables and learning around their other commitments. This is a major bonus, especially for adult learners who lead complicated lives. Many of the technologies used in asynchronous e-learning also permit two-way communication between learners and instructors, or multi-directional, collaborative communication among learners themselves. Listed below are some of the communication technologies most commonly used in asynchronous:

- **Email** is the most common form of electronic information exchange.

- **Collaborative learning forums** promote learner interaction through **message boards**, where students can post questions and answers; **text chat or forums**, where learners can communicate outside the main classroom; and **threaded discussions**, where facilitators and students can discuss a given topic and review each other's responses.

- **E-boards** allow learners and instructors to create images, text and information and present them to other participants.

- **Application sharing** allows instructors and learners to work collaboratively on the same learning materials, either simultaneously or in sequence. Participants can see what is happening at all times.

- **Simulations or virtual laboratories** permit learners to work in teams to construct projects and complete them at their preferred pace.

- **Library/learning session cache access** provides access to archived text, presentations, video, audio and data. This is especially useful for revision or for reviewing synchronous learning sessions a student may have missed.

- **Real-time tests and evaluation** can be triggered at agreed times or completed at the learner's own pace.
- **Video and audio streaming** can be used to disseminate information to learners, and can also enable learners to see and speak with the facilitator via the internet rather than by telephone.

From the instructor's point of view, e-learning also offers classroom management technologies that permit instructors to log students into 'classes', establish work groups, manage interaction between students and receive feedback in real time. Other support services include real-time reporting on learners' progress, timetabling, tracking student and teacher activities, and authoring tools for generating content.

Asynchronous learning can be designed to develop both cognitive and performance skills, engaging learners in a 'cognitive apprenticeship' (Collins, Brown & Newman, cited in Brown, Collins & Duguid 1989b: 32–42). This supports an educational philosophy in which learners are active players in the process of learning.

3.2 Learning Contents and Objects

Electronic learning cuts across several educational sectors of the society, especially the academics, institutions, government, the corporate sector and the community, and the general consumer sectors. Each of these sectors approach e-learning with different type of end-use in mind i.e. different objectives. The approach to e-learning in corporate context is very different from that in formal educational institutions. Historically, learning in educational settings has been organised around self-contained subjects or course units. In contrast many proponents of e-learning in corporate setting envisage systems based on much smaller units of content known as **learning object.**

What is Learning Object

Learning objects are small instructional components that can be reused in different learning contexts. They are designed to be internet deliverable, making them simultaneously available. This makes it possible for developers to collaborate on and benefit immediately from new versions. Creating small, reusable pieces of instructional media makes it easier for instructors to organise the pieces into curricula that fit their individual instructional goals.

The purpose of adapting this paradigm shift is to encourage the re-use of common elements, thereby:

- Decreasing cost
- Streamlining content creation
- Improving quality.

The idea is to structure learning content into common building blocks that can be quickly found, reassembled and customised according to the particular context and learners' needs. Fast retrieval is achieved through

tagging each object with metadata, including descriptive information on authorship, content and composition as well as subsidiary information such as any pre-requisite knowledge or special access conditions. (Brennan, Funke & Anderson 2001).

Note that a metadata is a description of learning content or learning object

Metadata can also be subjective, providing evaluative information such as how well an object works in a particular learning situation. For example, the course content of the MBA (E-Learning) programme of the National Open University of Nigeria (NOUN) can be considered to be a learning object. And a subjective description of it by a metadata suggests it can be applied in part to the MBA (E-Library) programme of the same University (NOUN).

As personalization becomes a key element of learning, subjective metadata becomes increasingly important (Hodgins 2001).

However, you will note that though the corporate organisational use of e-learning systems (compared to the formal educational institutional use), enables effective re-use of content without compromising the context and themes of object. As they travel over several modules or courses, there are some drawbacks. For examples, the disaggregating of learning objects will affect what e-learning can achieve. Some knowledge can be broken and reassembled in ways that can promote the creation of e-learning content in short pieces. Such contents can be re-used and reassembled flexibly. However reducing all knowledge to bit-sized pieces that anyone can reassemble has risk, most especially in loosing the integrity of instructional design and the situated meaning that some knowledge only possess when packaged with other pieces of knowledge.

For further understanding of the advantages and disadvantages in paradigm shift, note that disaggregating learning objects to their smallest form can greatly facilitate the re-use of learning object for multiple and subsequent learning activity. However, if a learning object is disintegrated and dispersed to the extent that it loses its relationship to the instructional purpose or the applied outcome that can be assessed as a stand-alone outcome, then its real value is only as a form of data or information transfer NOT KNOWELEDGE transfer. This is because by definition a learning object holds value because it supports learning that can enable knowledge transfer.
What then could be the solution to the loss of value of learning object through inappropriate application? Wiley (2001) strongly suggests that

learning objects cannot be combined indiscriminately, they cannot be assembled in any old manner, and it requires skills to put them together.

Wiley in proffering solution, suggested that learning objects should be regarded as atoms (the atoms concept of learning object), noting that:

Not every atom is combinable with every other atom.
Atoms can be assembled only in certain structures prescribed by their own internal structure. Some training is required in order to assemble them.

Figure.1.2 Advantages and Disadvantages of Disaggregating Learning Objects to their smallest components

Activity	Information	Learning	Knowledge
Ease of design and reuse	Maximize ease of use and repacking for multiple purposes.	More difficult to maintain instructional integrity because the technology content, or person changes the pedagogy need to be reviewed.	Very difficult to achieve reuse because as technology, content or person changes so should the knowledge become.
Ease of use	Maximize portability and accessibility as anyone can "grab and go" as required	Can be easier to access, but integrity of relationship to learning outcomes in the given situation can rapidly be lost.	Ease of access but without situated meaning and relevance to individual's needs; it is just information.
Ease of management	Once on a central database and metatagged it is easy to move, manage and track.	Clustering into learning components (course, curriculum etc) can ease maintenance but it is hard to manage learning outcomes for one learning object that may relate to multiple learning components.	Can use templates and database to store, retrieve and maintain objects but to hold knowledge value it has to demonstrate an applied outcome.

3.3 E-Learning Technologies

At present, e-learning technologies encompass three main areas of activity:

- **Content creation and management:** the sourcing, creation, storage and management of e-learning content – functions typically addressed by a Learning Content Management System (LCMS);
- **Learning management:** the capture and application of information about learning resources, existing skills and learning activities to measure and manage learning outcomes at the organisational level – functions typically addressed by a Learning Management System (LMS); and

- **Learning activity:** the delivery of e-learning content, facilitating interaction and learning assessment – functions typically performed by instructors or trainers (Brennan, Funke & Anderson 2001: 10).

The three do not necessarily exist as discrete, identifiable systems. There is overlap and ambiguity in their functions and definitions. The term 'virtual learning environments' is also sometimes used to promote systems that have characteristics of all three. Put simply, an LCMS generates, stores, structures and delivers e-learning content (Brennan, Funke & Anderson 2001: 4), whereas an LMS is more an administrative tool that handles enrolment or registration, tracks students' progress, and records assessment scores and course completions. Learning content is created through authoring tools (see, for example, Chapman & Hall 2001), which are generally part of the functions of the LCMS.8 Relearning to E-Learn Brennan, Funke and Anderson (2001) identify the following key building blocks that a good LCMS will provide:

- Easy-to-use content creation tools and support for reusable learning objects;
- Flexible course design and delivery;
- Administrative functions and assessment tools;
- Open interface with an LMS or other enterprise system;
- Communication and collaborative functions;
- Security functions;
- Facilities for content migration; and
- Automated implementation processes.

By contrast, LMSs operate at the other end of the learning trajectory, supporting and analysing the learning transaction; their focus is on assessing learning outcomes and appraising the relationship of outcomes to investment. While LMSs have become a standard component of e-learning technology, Aldrich (2001) regards them as 'empty highways', and suggests that organisations often make costly investments in technologies that deliver little functionality. Ultimately, he claims, 'while we need learning management, we may not need learning management systems' (Aldrich 2001:1).

Aldrich also points out that as of 2001 the LMS market has had no clear leader. He believes that the competitive state of the market has increased buyers' frustration because different vendors promote such different approaches to managing e-learning. In a competitive market, e-learning technology providers are driven to differentiate and value-add their systems by offering unique features. This produces problems in establishing comparability, and therefore compounds buyer confusion. Aldrich summarises the problem as follows:

As with most rapidly evolving industries, there's an inverse correlation between the suppliers with the largest customer bases and those with the best architecture. In other words, [clients] usually have to choose between stability and sophistication, or compromise their needs (Aldrich 2001: 1).

Even though some time has elapsed since Aldrich made these observations, it should not be assumed that the issues have been resolved (Egan 2002). It seems that although there is emerging agreement on what an effective LMS should do, there are still gaps between market expectations and the technologies on offer.

3.4 Learning Management Systems

A learning management system (LMS) is a software application or web-based technology used to plan, implement, and assess a specific learning process. Typically, a learning management system provides an instructor with a way to create and deliver content, monitor student participation, and assess student performance. A learning management system may also provide students with ability to use interactive features such as threaded discussions, video conferencing, and discussion forums.

Key to these development efforts is the creation of international standard for e-learning. The Advanced Distance Learning Group, sponsored by the United States Department of Defense, has created a set of specifications called Shareable Content Object reference Model (SCORM) to encourage the standardisation of learning management systems.

Several examples of learning management systems are as follows:

WebCT

WebCt is an integrated e-learning systems that give faculty members the tutorial flexibility to teach their own way, provide tools to enhance interaction between students and faculty, and offer course materials and well designed content from textbook publishers.

Blackboard

This helps you to create free course website to bring your learning materials, class discussions, and even tests online. Supplement an existing class or teach a course entirely on the web.

Lotus Learning Space

This is the IBM course management system based on Lotus Notes.

WebEd

This software/site offers extensive comparative information on a very large group of online course tools and course management applications.

First Class

This is developed as a communications environment; this application is centred on its messaging and conferencing capabilities.

Discovery School

This is based on Discovery Channel Information; this site offers teachers an array of tools that can help to customise the instructor's own work

4.0 CONCLUSION

The process for e-learning is continually undergoing changes to meet the need of end users, whether corporate, government or formal educational institutions. Learning objects are fundamental to the concept of e-learning especially for its application in corporate organisations, but we must guide against the over-fragmentizing the object for it to retain it relevance in offering knowledge value. The software that drives e-learning processes, that is, learning management system is expanding by the day. The market is also on the increase because of the obvious and anticipated demand for e-learning to achieve flexibility and to cut down on training expenses.

5.0 SUMMARY

Although the focus of e-learning should be on delivering learning outcomes for people and organisations, much of the popular literature on the subject is preoccupied with the deployment of specific technologies.

Like any learning process, e-learning depends on effective communication of human knowledge, whether this occurs in a face-to-face classroom or across the internet.

The use of virtual classrooms has considerable cost advantages for many organisations.

Above all, virtual classrooms share many of the limitations of the conventional classroom in that they require learners to be online at a particular time. This negates one of the major advantages of electronic communication, which is its ability to offer flexible access.

From the instructor's point of view, e-learning also offers classroom management technologies that permit instructors to log students into 'classes', establish work groups, manage interaction between students and receive feedback in real time.

Learning objects are small instructional components that can be reused in different learning contexts. They are designed to be internet deliverable, making them simultaneously available.

Metadata is a description of learning content or learning object. Metadata can also be subjective, providing evaluative information such as how well an object works in a particular learning situation.

However, if a learning object is disintegrated and dispersed to the extent that it loses its relationship to the instructional purpose or the applied outcome that can be assessed as a stand-alone outcome, then its real value is only as a form of data or information transfer NOT KNOWELEDGE transfer.

A learning management system (LMS) is a software application or web-based technology used to plan, implement, and assess a specific learning process.

Key to the development efforts of learning management systems is the creation of international standard for e-learning.

6.0 TUTOR-MARKED ASSIGNMENT

1. Differentiate Learning Content from Learning Objects.
2. Mention the advantages of paradigm shift from learning content to learning object.

7.0 REFERENCES/FURTHER READINGS

Brennan, Funke and Anderson (2001).

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UNIT 2 CONNECTIVITY, BANDWIDTH AND ACCESS TO E-LEARNING

CONTENTS

1.0 INTRODUCTION

You need to know that a major concern for e-learning is the connectivity and transmission speed between the teaching site and the students. Some e-learning technologies use analog transmissions and some use digital. Traditional electronic distance learning techniques (such as telephone and videotape) are analog (represented by a continuous waveform). Newer technologies (such as the computer and desktop videoconferences) are digital (represented by binary codes of zeros and ones).

The trend is to move toward primarily digital systems. The problem is that digital files (especially audio and video) are huge, and they require "pipes" or cables with tremendous capacity to transmit quickly and effectively. The transmission capacity of a cable or a technology is referred to as the bandwidth. The greater the bandwidth, the greater the amount of digital information that can be transmitted per second.

Bandwidth actually refers to the amount of information that can be sent or received at a point on a computer network: the greater the bandwidth, the greater the carrying capacity and speed of transmission. Bandwidth is a major issue in the deployment of e-learning. The higher the quality and quantity of audio, video, interaction and processing tasks, the more sophisticated the communications technology required. The bandwidths of various communications technologies are depicted in Table 1.3

Bandwidth also costs money, so there is a financial cost imperative to manage the amount of bandwidth used for e-learning, particularly where it is used to support remote and distance users who may not have access to fast data connections. The most common way of dealing with bandwidth constraints is to minimize the amount of information that is to be communicated, usually at a considerable cost to learning quality; strategies such as data compression and caching files are also used.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- define concisely the meaning of bandwidth
- list out the roles bandwidth, access and connectivity has to play in the effective implementation of e-learning
- enumerate bandwidth of different e-learning communication technologies associated with them
- list different types of connectivity for e-learning
- enumerate the advantages each form of connectivity offers over others.

3.0 MAIN CONTENT

3.1 Bandwidth versus Communications Technologies

For users of the Internet, the content and services that can be accessed are dictated by the bandwidth available. Ideally, the connection should be broadband (high-speed data transmission), which is considerably faster than the standard 56.6 kbps dial-up modem speed. Table 1.5 depicts the range of communications available across different bandwidths, from mobile cellular network voice connections at 9.5 kbps to the much larger 2400 kbps.

At present, only the densely settled regions of affluent nations have access to fixed-line systems that will support the full range of functions outlined in Table 1.3. Delivery in rural areas is costly, difficult or impossible. Even in some affluent economies, the modernization of fixed-line networks has proceeded more slowly than early projections suggested. In Australia, for example, the take-up of broadband connections has been slow. In 2002, only 10 per cent of homes had high-speed broadband connections over 56.6 kbps (NOIE 2002: 19).

At the same time, although the ‘mobile Internet’ is widely seen as offering an alternative avenue of opportunity for e-learning, it has several barriers to overcome. Not only are most mobile internet devices unable to access the same amount of bandwidth as fixed devices, but they are smaller and tend to have less usable screens and keypads. As yet, no ‘killer application’ has emerged to define how mobile devices could be used for e-learning. The prospect of having mobile access to learning materials – in the ‘right here, right now’ context – is appealing, but it will require a substantial investment in applications to make use of the new technologies. On the other hand, given the astonishing pace of innovation in the past two decades, it would be rash to adopt an approach to e-learning that excluded developments in this area.

3.2 Bandwidth versus E-Learning Applications

	Bandwidth – speed kbps							
Applications	**9.6**	**14.4**	**28**	**64**	**144**	**384**	**2000**	**2400**
Transaction processing	**9.6**	14.4	28	64	144	384	2000	2400
Messaging/text	14.4	14.4	28	64	144	384	2000	2400
Voice/SMS	14.4	14.4	28	64	144	384	2000	2400
Text chats	--	--	28	64	144	384	2000	2400
Still images	-	-	28	64	144	384	2000	2400
Internet /virtual private network	-	-	--	64	144	384	2000	2400
Database access	-	-	--	64	144	384	2000	2400
Application sharing	-	-	--	--	144	384	2000	2400
Low-quality video	-	-	--	--	144	384	2000	2400
High-quality video	-	-	-	-	--	--	2000	2400

Table 1.3 Bandwidth and E-learning Application

3.3 Types of Connectivity

Access to the Internet through a standard modem that transmits at 28,000 bits per second (28.8Kbps) can be excruciatingly slow – causing jerky movies, disjointed sounds, and long wait times. There are several options available now or in the near future that will help to expand the bandwidth and increase the speed of information transfer. These options include ISDN lines, T1 lines, ADSL modems, cable modems, and satellite delivery

Standard Modems

The "standard" speed for modems is currently between 28.8 Kbps and 56 Kbps. Those speeds can provide effective communications via e-mail and websites that do not have extensive graphics. Advantages of standard modems include low cost and compatibility with standard telephone lines.

Although the bandwidth and speed of modems continue to improve, they are far too slow for most video applications. In addition, two modems of different speeds will communicate at the slower of the rates. For example, if you have a 56 Kbps modem, but your Internet Service

Provider has 28.8 Kbps modems, you will only be able to communicate at 28.8 Kbps. Other factors, such as the amount of congestion on the internet, also affect the transmission rate.

ISDN

ISDN stands for Integrated Services Digital Network. It is a totally digital system designed to transmit information faster than standard modems. ISDN is often used for desktop videoconferencing or Internet access. A single ISDN line with two channels can transmit data at 128 Kbps (about five times faster than a regular modem). ISDN telephone lines use interface devices (called ISDN terminal adapters or ISDN modems) to connect to computers (see Figure 1.15).

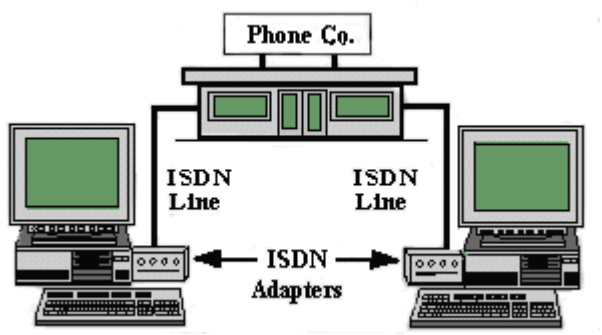

Figure 1.15: ISDN connections

ISDN has great potential for distance learning because it can use the copper telephone wire system that is currently in place. To implement ISDN on a large scale, however, telephone companies need to upgrade their switching equipment, and homes and schools need to upgrade their telephones and computer interfaces.

At present, ISDN availability and costs vary dramatically. In some areas, ISDN lines are available for nearly the same cost as standard voice lines, but, in other areas, they are either very expensive or unavailable. When checking on the price of an ISDN connection, be aware that some systems require a connection fee, a monthly fee, and a charge per minute.

T1 and T3 Lines

A standard T1 line (also referred to as DS1) allows digital information to be transmitted at 1,544 Kbps (1.544 Mbps). This transmission speed

is almost 54 times faster than a 28.8 Kbps modem. Because T1 lines can be quite expensive to lease, many schools lease a "fractional" T1 line through which they have access to a portion of the bandwidth.

T3 lines (also referred to as DS3) are even faster than T1 lines. The T3 lines can transmit data at 44.736 Mbps. This is roughly equivalent to 29 simultaneous T1 lines. T3 lines are extremely expensive, though. In most cases, T3 lines are used to connect parts of the Internet backbone or to connect supercomputers at government and research sites. Both T1 and T3 lines can support video, audio, and data transmissions.

ADSL Modems

ADSL stands for Asymmetric Digital Subscriber Line. ADSL modems can transmit data to users at up to 9 Mbps. The return rate (back to the ISP or Internet) is not quite as fast – only 640 Kbps. In most cases, the difference in the transfer rates is acceptable for internet access. We are most likely to receive large files from the internet (such as graphics and video) that require the faster rates. On the other hand, we generally do not send back as much data to the internet (perhaps an e-mail message or a click on a hyperlink). Therefore, the slower rate on the return segment is not detrimental.

A major advantage of ADSL technology is that it uses standard, copper telephone lines; however, the telephone lines in many areas need to be upgraded to allow the rapid transmission of data. Several companies, including Bell Atlantic, Pacific Bell, and GTE are promoting ADSL and plan to charge approximately $100 per month (Feeley, 1997). An ADSL modem is required as well as an Ethernet card for your computer.

Cable Modems

In some areas, cable companies are offering internet access through the same cable that delivers television signals to our homes. If your area has been configured for this service, you can connect a cable line to a network card on your computer.

The main advantage of cable modems is the bandwidth. Cable modems can bring data to your computer at roughly 400 times faster than a regular modem (Salvador, 1996). If you have a 10 Mbps network card in a computer, you may be able to receive information at that speed. As illustrated in the table below, cable modems offer one of the fastest technologies available for Internet access (Feeley, 1997).

Technology	Speed	
28.8 Modem	28.8 Kbps	
ISDN	128 Kbps	
Satellite	400 Kbps	
T1	1.5 Mbps	
ADSL	9 Mbps	
Cable Modem	10 Mbps	

Table: 1.4: Comparison of sample transfer rates.

Even though cable modems are faster than most other technologies, they are not the most expensive. The relative expenses for monthly use of the various technologies are illustrated in the table 1.5 below.

Technology	Monthly Cost	Price Kbps/month	
28.8 Modem	$25	.87	
ISDN	$80	.63	
Satellite	$40	.10	
T1	$1500	1.00	
ADSL	$40	.004	
Cable Modem	$45	.005	

Table 1.5 Comparison of approximate monthly fees. (Feeley, 1997)

Disadvantages of cable modems are that you must have a computer with a network card and you must purchase a cable modem (see Figure 1.16). In addition, the transfer rate may be slowed if too many people in your

neighborhood all connect to the Internet at the same time. Although this technology is new and the standards for cable modems are not firmly established, cable modems offer great potential for high-speed access to the Internet for schools and homes.

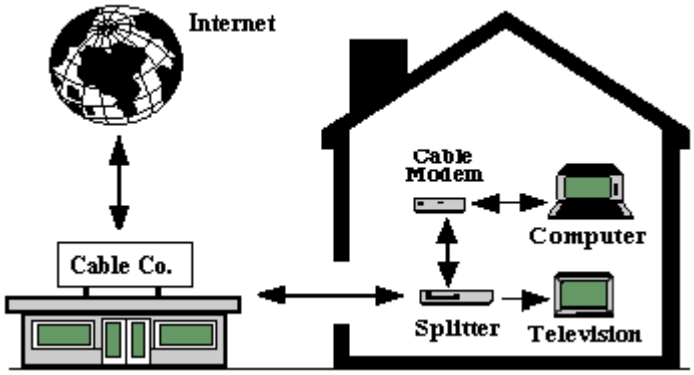

Figure 1.16: Cable modem in a home

Satellite Delivery

It is also possible to receive information from the internet via satellite. Satellite access is relatively fast, does not require the installation of telephone or data lines, and is not adversely affected by the number of users.

Satellite delivery, however, is usually one-way; you cannot send information back up to the satellite (not on a school budget, anyway). In most cases, a telephone line is used to send information back to the Internet or service provider, and the satellite is used to receive information (see Figure 1.17). This configuration works well in most cases, because the information you send back is generally very small (a mouse click or an e-mail message); whereas, the information you receive can be quite large (video files, web pages, etc.).

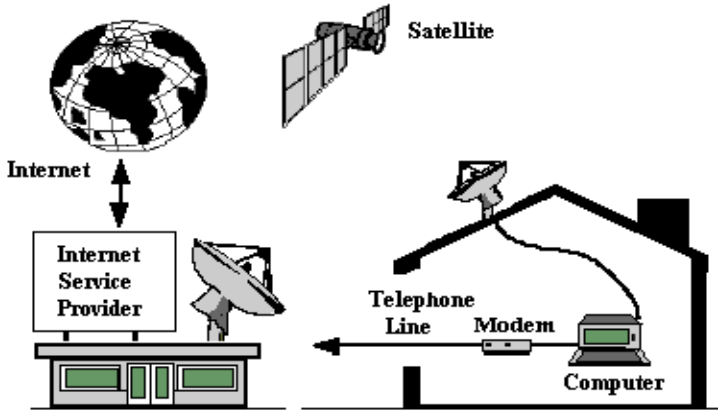

Fig. 1.17: Connecting to the internet via satellite

4.0 CONCLUSION

Truly, the issues of connectivity and bandwidth play significant part in pursuing a successful e-learning programme. But the cost of deploying adequate bandwidth is forestalling the full implementation of a broadband e-learning. The developing economies are highly disadvantaged in their ability to access enough bandwidth to execute sophisticated forms of e-leaning such as videoconferencing. Considerable efforts are made in communications technologies to expand the bandwidth available for e-learning.

5.0 SUMMARY

i. You need to know that a major concern for e-learning is the connectivity and transmission speed between the teaching site and the students.

ii. Bandwidth actually refers to the amount of information that can be sent or received at a point on a computer network: the greater the bandwidth, the greater the carrying capacity and speed of transmission.

iii. For users of the internet, the content and services that can be accessed are dictated by the bandwidth available. Ideally, the connection should be broadband (high-speed data transmission), which is considerably faster than the standard 56.6 kbps dial-up modem speed.

iv. There are several options available now or in the near future that will help to expand the bandwidth and increase the speed of information transfer. These options include ISDN lines, T1 lines, ADSL modems, cable modems, and satellite delivery.

v. The "standard" speed for modems is currently between 28.8 Kbps and 56 Kbps. Those speeds can provide effective communications via e-mail and websites that do not have extensive graphics. Advantages of standard modems include low cost and compatibility with standard telephone lines.

vi. ISDN stands for Integrated Services Digital Network. It is a totally digital system designed to transmit information faster than standard modems.

vii. It is also possible to receive information from the internet via satellite. Satellite access is relatively fast, does not require the

installation of telephone or data lines, and is not adversely affected by the number of users.

6.0 TUTOR-MARKED ASSIGNMENT

1. Define bandwidth and modem and differentiate the two.
2. Discuss bandwidth connection technologies from cost and speed perspectives.

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UNIT 3 STRATEGIES FOR INSTRUCTING AND LEARNING

CONTENTS

1.0 INTRODUCTION

Classroom teachers rely on a number of visual and unobtrusive cues from their students to enhance their delivery of instructional content. A quick glance, for example, reveals who is attentively taking notes, pondering a difficult concept, or preparing to make a comment. The student who is frustrated, confused, tired, or bored is equally evident. The attentive teacher consciously and subconsciously receives and

analyses these visual cues and adjusts the course delivery to meet the needs of the class during a particular lesson.

In contrast, the distant teacher has few, if any, visual cues. Those cues that do exist are filtered through technological devices such as video monitors. It is difficult to carry on a stimulating teacher-class discussion when spontaneity is altered by technical requirements and distance.

Without the use of a real-time visual medium such as television, the teacher receives no visual information from the distant sites. The teacher might never really know, for example, if students are asleep, talking among themselves or even in the room. Separation by distance also affects the general rapport of the class. Living in different communities, geographic regions, or even states deprives the teacher and students of a common community link.

2.0 OBJECTIVES

At the end of this unit, you should be able to achieve the following goals:

- understand the best practical tips to adapt in teaching in e-learning environment
- be equipped with the effective ways of learning in an e-learning environment
- list out how to plan and organise for e-learning instructing
- be able to profile a learner.

3.0 MAIN CONTENT

3.1 Significance and Reason

Many teachers feel the opportunities offered by distance education outweigh the obstacles. In fact, instructors often comment that the focused preparation required by electronic teaching improves their overall teaching and empathy for their students. The challenges posed by distance education are countered by opportunities to:

- Reach a wider student audience.
- Meet the needs of students who are unable to attend on-campus classes.
- Involve outside speakers who would otherwise be unavailable.
- Link students from different social, cultural, economic, and experiential backgrounds.

3.2 Planning and Organisation

In developing or adapting distance electronic instruction, the core content remains basically unchanged, although its presentation requires new strategies and additional preparation time. Suggestions for planning and organising a distance delivered course include:

- Begin the course planning process by studying distance education research findings. There are several research summaries available (see Moore & Thompson, 1990).
- Before developing something new, check and review existing materials for content and presentation ideas.
- Analyse and understand the strengths and weaknesses of the possible delivery systems available to you (e.g., audio, video, data, and print) not only in terms of how they are delivered (e.g., satellite, microwave, fiber optic cable, etc.), but in terms of learner needs and course requirements before selecting a mix of instructional technology.
- Hands-on training with the technology of delivery is critical for both teacher and students. Consider a pre-class session in which the class meets informally using the delivery technology and learns about the roles and responsibilities of technical support staff.
- At the start of class initiate a frank discussion to set rules, guidelines, and standards. Once procedures have been established, consistently uphold them.
- Make sure each site is properly equipped with functional and accessible equipment. Provide a toll-free "hotline" for reporting and rectifying problems.
- If course materials are sent by mail, make sure they are received well before class begins. To help students keep materials organised, consider binding the syllabus, handouts, and other readings prior to distribution.
- Start off slowly with a manageable number of sites and students. The logistical difficulties of distant teaching increase with each additional site.

3.3 Meeting Needs

To function effectively, students must quickly become comfortable with the nature of teaching and learning at a distance. Efforts should be made to adapt the delivery system to best motivate and meet the needs of the students, in terms of both content and preferred learning styles. Consider the following strategies for meeting students' needs:

- Assist students in becoming both familiar and comfortable with the delivery technology and prepare them to resolve the technical problems that will arise. Focus on joint problem solving, not placing blame for the occasional technical difficulty.

•Make students aware of and comfortable with new patterns of communication to be used in the course (Holmberg, 1985).
•Learn about students' backgrounds and experiences. Discussing the instructor's background and interests is equally important.
•Be sensitive to different communication styles and varied cultural backgrounds. Remember, for example, that students may have different language skills, and that humor is culturally specific and will not be perceived the same way by all.
•Remember that students must take an active role in the distance delivered course by independently taking responsibility for their learning.
•Be aware of students' needs in meeting standard university deadlines, despite the lag time often involved in rural mail delivery.

3.4 Effective Teaching Skills

For the most part, effective distance electronic teaching requires the enhancement of existing skills, rather than developing new abilities. Pay special attention to the following:

•Realistically assess the amount of content that can be effectively delivered in the course. Because of the logistics involved, presenting content at a distance is usually more time consuming than presenting the same content in a traditional classroom.
•Be aware that student participants will have different learning styles. Some will learn easily in group settings, while others will excel when working independently.
•Diversify and pace course activities and avoid long lectures. Intersperse content presentations with discussions and student-centered exercises.
•Humanise the course by focusing on the students, not the delivery system.
•Consider using a print component to supplement non-print materials (see Graham & Wedman, 1989).
•Use locally relevant case studies and examples as often as possible to assist students in understanding and applying course content. Typically, the earlier in the course this is done, the better.
•Be concise. Use short, cohesive statements and ask direct questions, realising that technical linkages might increase the time it takes for students to respond.
•Develop strategies for student reinforcement, review, repetition, and remediation. Towards this end, one-on-one phone discussions and electronic mail communication can be especially effective.
•And finally...relax. Participants will quickly grow comfortable with the process of distance education and the natural rhythm of effective teaching will return.

3.5 Interaction and Feedback

Using effective interaction and feedback strategies will enable the instructor to identify and meet individual student needs while providing a forum for suggesting course improvements. To improve interaction and feedback, consider the following:

- Use pre-class study questions and advance organisers to encourage critical thinking and informed participation on the part of all learners. Realise that it will take time to improve poor communication patterns.
- Early in the course, require students to contact you and interact among themselves via electronic mail, so they become comfortable with the process. Maintaining and sharing electronic journal entries can be very effective toward this end.
- Arrange telephone office hours using a toll-free number. Set evening office hours if most of your students work during the day.
- Integrate a variety of delivery systems for interaction and feedback, including one-on-one and conference calls, fax, e-mail, video, and computer conferencing. When feasible, consider personal visits as well.
- Contact each site (or student) every week if possible, especially early in the course. Take note of students who do not participate during the first session, and contact them individually after class.
- Use pre-stamped and addressed postcards, out-of-class phone conferences, and e-mail for feedback regarding course content, relevancy, pace, delivery problems, and instructional concerns.
- Have students keep a journal of their thoughts and ideas regarding the course content, as well as their individual progress and other concerns. Have students submit journal entries frequently.
- Use an on-site facilitator to stimulate interaction when distant students are hesitant to ask questions or participate. In addition, the facilitator can act as your on-site "eyes and ears".
- Call on individual students to ensure that all participants have ample opportunity to interact. At the same time, politely but firmly discourage individual students or sites from monopolising class time.

Make detailed comments on written assignments, referring to additional sources for supplementary information. Return assignments without delay, using fax or electronic mail, if practical.

3.6 Profile of Learners

The primary role of the student is to learn. Under the best of circumstances, this challenging task requires motivation, planning, and the ability to analyze and apply the information being taught. In a

distance education setting, the process of student learning is more complex for several reasons (Schuemer, 1993):

- Many distance-education students are older, have jobs, and families. They must coordinate the different areas of their lives which influence each other — their families, jobs, spare time, and studies.
- Distant students have a variety of reasons for taking courses. Some students are interested in obtaining a degree to qualify for a better job. Many take courses to broaden their education and are not really interested in completing a degree.
- In distance education, the learner is usually isolated. The motivational factors arising from the contact or competition with other students is absent. The student also lacks the immediate support of a teacher who is present and able to motivate and, if necessary, give attention to actual needs and difficulties that crop up during study.
- Distant students and their teachers often have little in common in terms of background and day-to-day experiences and therefore, it takes longer for student-teacher rapport to develop. Without face-to-face contact, distant students may feel ill at ease with their teacher as an "individual" and uncomfortable with their learning situation.
- In distance education settings, technology is typically the conduct through which information and communication flow. Until the teacher and students become comfortable with the technical delivery system, communication will be inhibited.

3.7 Development

Beginning students may have some difficulty determining what the demands of a course of academic study actually are because they do not have the support of an immediate peer group, ready access to the instructor, or familiarity with the technology being used for delivery of the electronic distance-education course. They may be unsure of themselves and their learning. Morgan (1991) suggests that distant students who are not confident about their learning tend to concentrate on memorizing facts and details in order to complete assignments and write exams. As a result, they end up with a poor understanding of course material. He views memorisation of facts and details as a “surface approach” to learning and summarises it as follows:

i. Surface approach

- Focuses on the "signs" (e.g., the text or instruction itself).
- Focuses on discrete elements.
- Memorises information and procedures for tests.
- Unreflectively associate concepts and facts.

•Fails to distinguish principles from evidence, new information from old.
•Treats assignments as something imposed by the instructor.
•Much emphasis is focused on the demands of assignments and exams leading to a knowledge that is cut-off from everyday reality.

Distant students need to become more selective and focused in their learning in order to master new information. The focus of their learning needs to shift them from a "surface approach" to a "deep approach". Morgan (1991) summarises this approach as follows:

ii. Deep approach

- Focuses on what is "signified" (e.g., the instructor's arguments).
- Relates and distinguishes new ideas and previous knowledge.
- Relates concepts to everyday experience.
- Relates and distinguishes evidence and argument.
- Organises and structures content.
- Internalises how instructional material relates to everyday reality.

3.8 Improvement

The shift from "surface" to "deep" learning is not automatic. Brundage, Keane, and Mackneson (1993) suggest that adult students and their instructors must face and overcome a number of challenges before learning takes place including: becoming and staying responsible for themselves; "owning" their strengths, desires, skills, and needs; maintaining and increasing self-esteem; relating to others; clarifying what is learned; redefining what legitimate knowledge is; and dealing with content. These challenges are considered in relation to distance education:

•**Becoming and staying responsible for themselves:** High motivation is required to complete distant courses because the day-to-day contact with teachers and other students is typically lacking. Instructors can help motivate distant students by providing consistent and timely feedback, encouraging discussion among students, being well prepared for class, and by encouraging and reinforcing effective student study habits.

•**Owning one's strengths, desires, skills, needs:** Students need to recognise their strengths and limitations. They also need to understand their learning goals and objectives. The instructor can help distant students to explore their strengths/limitations and their learning goals/objectives by assuming a facilitative role in the learning process. Providing opportunities for students to share their personal learning

goals and objectives for a course helps to make learning more meaningful and increases motivation.

•**Maintaining and increasing self-esteem:** Distant students may be afraid of their ability to do well in a course. They are balancing many responsibilities including employment and raising children. Often their involvement in distance education is unknown to those they work with and ignored by family members. Student performance is enhanced if learners set aside time for their instructional activities and if they receive family support in their academic endeavours. The instructor can maintain student self-esteem by providing timely feedback. It is critical for teachers to respond to students' questions, assignments, and concerns in a personalised and pleasant manner, using appropriate technology such as fax, phone, or computer. Informative comments that elaborate on the individual student's performance and suggest areas for improvement are especially helpful.

•**Relating to others:** Students often learn most effectively when they have the opportunity to interact with other students. Interaction among students typically leads to group problem-solving. When students are unable to meet together, appropriate interactive technology such as e-mail should be provided to encourage small group and individual communication. Assignments in which students work together and then report back or present to the class as a whole, encourage student-to-student interaction. Ensure clear directions and realistic goals for group assignments (Burge, 1993).

•**Clarifying what is learned:** Distant students need to reflect on what they are learning. They need to examine the existing knowledge frameworks in their heads and how these are being added to or changed by incoming information. Examinations, papers, and class presentations provide opportunities for student and teacher to evaluate learning. However, less formal methods of evaluation will also help the students and teacher to understand learning. For example, periodically during the course the instructor can ask students to write a brief reflection on what they have learned and then provide an opportunity for them to share their insights with other class members.

•**Redefining what legitimate knowledge is:** Brundage, Keane, and Mackneson (1993) suggest that adult learners may find it difficult to accept that their own experience and reflections are legitimate knowledge. If the instructor takes a facilitative rather than authoritative role, students will see—their own experience as valuable and important to their further learning. Burge (1993) suggests having learners use first-person language to help them claim ownership of personal values, experiences, and insights.

•**Dealing with content:** Student learning is enhanced when content is related to examples. Instructors tend to teach using examples that were used when they received their training. For distance learning to be effective, however, instructors must discover examples that are relevant to their distant students. Encourage students to find or develop examples that are relevant to them or their community.

4.0 CONCLUSION

Teaching and learning at a distance is demanding. However, learning will be more meaningful and "deeper" for distant students, if the students and their instructor share responsibility for developing learning goals and objectives; actively interacting with class members; promoting reflection on experience; relating new information to examples that make sense to learners; maintaining self-esteem; and evaluating what is being learned. This is the challenge and the opportunity provided by distance education.

5.0 SUMMARY

•In contrast, the distant teacher has few, if any, visual cues. Those cues that do exist are filtered through technological devices such as video monitors. It is difficult to carry on a stimulating teacher-class discussion when spontaneity is altered by technical requirements and distance.

•Many teachers feel the opportunities offered by distance education outweigh the obstacles. In fact, instructors often comment that the focused preparation required by electronic teaching improves their overall teaching and empathy for their students.

•For the most part, effective distance electronic teaching requires the enhancement of existing skills, rather than developing new abilities.

•Using effective interaction and feedback strategies will enable the instructor to identify and meet individual student needs while providing a forum for suggesting course improvements.

•To function effectively, students must quickly become comfortable with the nature of teaching and learning at a distance.

•In a distance education setting, the process of student learning is more complex for several reasons.

•Beginning students may have some difficulty determining what the demands of a course of academic study actually are because they do not

have the support of an immediate peer group, ready access to the instructor, or familiarity with the technology being used for delivery of the electronic distance-education course.

•The shift from "surface" to "deep" learning is not automatic.

6.0 TUTOR-MARKED ASSIGNMENT

1. Discuss the teaching skill for effective e-learning.
2. Compare and contrast deep and surface approaches in the learning process.

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UNIT 4 IMPLEMENTATION OF E-LEARNING

CONTENTS

1.0 INTRODUCTION

The e-learning programme usually should have a technology plan of implementation in place. It provides the guidelines to set priorities. It is recommended that you routinely survey your learners regarding access to and interest in computers and the internet. Determining learners' access to videotape and DVD players should be documented. This information will help plan your intervention strategy.

Including e-learning in your instructional strategies assumes there is a need. A learner centre needs assessment addressing the demand for e-learning, identifying potential learners, their learning styles, and delivery system alternatives should be the starting point. The goal is to define the most cost-effective methods to serve the targeted learner within your technical capabilities.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- identify the major phases in implementing e-learning
- explain the components of E-learning and how to conduct needs assessment
- explain conduct technology analysis
- explain the keys to success in implementing e-learning
- enumerate how a coordinator administers an e-learning center.

3.0 MAIN CONTENT

3.1 Implementation Procedure

The implementation of electronic learning technologies requires careful planning. The figure below illustrates the major phases in the e-learning implementation process

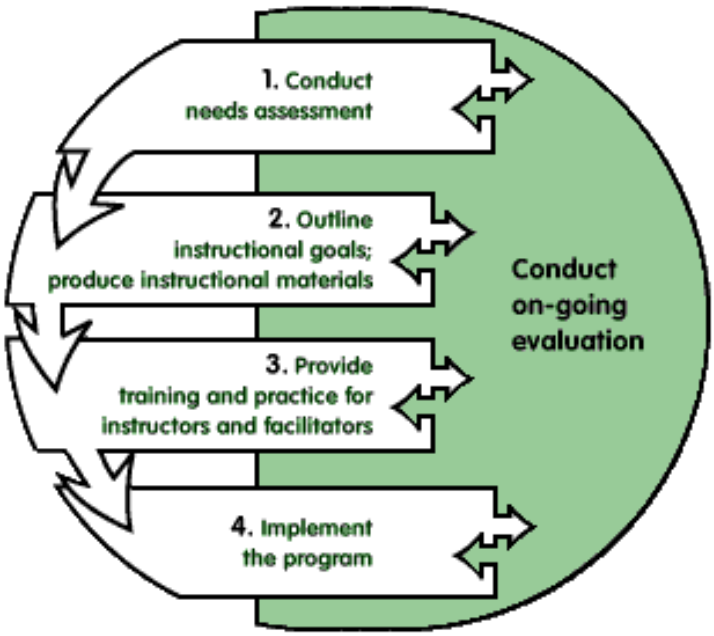

Figure 1.18: Implementation Procedure

1. Conduct Needs Assessment

The needs assessment or analysis phase consists of four parts: course analysis, audience analysis, instructor analysis, and technology analysis.

Course analysis: The course analysis seeks to identify content areas that could be enhanced, expanded, or initiated through distance learning techniques. Begin by examining the instructional needs that are not being met and determining if distance learning could contribute. Potential areas could include courses that have a high demand, but few instructors; courses that are needed in geographically diverse locations; courses that would benefit from remote experts; and courses that could address special needs, such as homebound students.

Audience Analysis: Electronic Distance learning techniques are not appropriate for all students. In most cases, a great deal of motivation and the ability to work in a self-paced environment are essential. You should carefully examine the locations of the students also. For example: Will the instruction be delivered to schools or to homes? Can the students read? What are their learning styles? Is supervision required?

Instructor Analysis: With e-learning, facilitators and technical support teams are also necessary. For example, there may be a "teacher" who delivers the lesson via a videoconferencing system. The class is then sent to several schools throughout the area, and remote students

participate. At each site, however, supervisors must be in the room with the students; technical support staff must make sure that the equipment is functioning.

Technology Analysis: As outlined in chapters 6-9, there are many different technologies that can be used to deliver distance learning. Selecting the most appropriate technology depends on the content area, the learning styles of the students, and the existing hardware and software. For example, foreign language instruction requires an audio component, and Web-based education is impossible if the students do not have access to a computer.

The geographical locations of the teachers and students can also impact the technology solution (Distance Learning: A Primer, 1997). The following table provides recommendations based on the number of sites.

Origination Sites	Reception Site(s)	Synchronous	Asynchronous	Technology
One	Many	S		Satellite videoconference
One	Many		A	Video/audiotapes, CD-ROM
Few	Few	S		Computer videoconference
Few	Few		A	Web-based education
Many	Many	S		Internet chat
Many	Many		A	E-mail

Table 1.6: Technology analysis

2. Outline Instructional Goals and Objectives; Produce Instructional Materials

"The danger in not having clear goals and pedagogical objectives is that technology will be acquired but not truly integrated into the teaching, learning, and research of the school" (Horgan, 1998, 2). A well-structured electronic distance learning course must place instructional objectives foremost. The technology should be as invisible as possible –

just another tool that teachers can use to effectively convey the content and interact with students.

After the goals and objectives are outlined, the instructional materials can be designed and developed. It is important not to underestimate the commitment required for this step – creating effective materials for distance learning is an extremely time-consuming and energy-consuming process. Regardless of whether the technology is audiotape or satellite video, ample time must be allocated to ensure that the materials are accurate, appropriate, and structured to maximise the benefits for distant students and to minimize the limitations.

3. Provide Training and Practice for Instructors and Facilitators

Many of the techniques and skills used in a classroom teaching situation do not translate directly into an e-learning approach. Teacher training programs are important to acquaint the teachers with the use of technology as well as to help with the re-design of the instructional strategies.

"Tele-learning allows us to do the same things, but differently...but also, to do things differently" (Thornburg, 1995). In particular, most teachers need assistance and practice with:

- Effective strategies for implementing small group activities and individual practice.
- Techniques for maximising teacher/student and student/student interactions.
- Successful approaches for integrating technology into the teaching/learning process.
- Tactics for motivating students at a distance.

Facilitators and support personnel are also crucial to successful distance learning experiences. If students are located at remote sites, facilitators will likely be the on-the-spot contacts for the students. It is important that they are fully integrated into the course and communicate frequently with the instructor. In addition, support personnel are important for both the instructor and the students to ensure that the technology functions as it should and do not cause undue frustration.

4. Implement the Program

After the training is complete and a pilot test has been conducted to ensure the technology is functioning, the program can be implemented.

One important factor to keep in mind is the need to include structured activities. Timelines, deadlines, and feedback help to motivate students and provide the framework the students need to function in a flexible environment.

Another important aspect to keep in mind during the implementation phase is the need to emphasise interactions. Research strongly supports the need for interaction in distance learning initiatives. "Programs need to include methods for receiving feedback, providing help, and creating a sense of belonging" (Parker, 1997, 10). Students of all ages respond positively when they know someone cares.

3.2 Conduct On-going Evaluation

Formative evaluation takes place throughout the development and implementation. At each step of the way, instructors and administrators should stop and review. In addition to querying the students, ask others who have implemented similar programs to assess the approach. Make revisions as often necessary.

Summative evaluations take place after the instruction is completed and provides data for future planning (Willis, 1995). Evaluations can be conducted through surveys, achievement tests, interviews, or other methods. Careful analysis of summative evaluations can be used to identify both strengths and weaknesses of the distance learning course, content, and approach.

The following factors have been shown to impact the success of a distance learning project:

Keys to Success

- Select the appropriate technology.
- Allow plenty of time for planning.
- Provide consistent and timely feedback to students.
- Encourage student-to-student interactions.
- Provide training for the instructors and facilitators.
- Ensure a support structure for students.
- Have a back-up plan for the technology.
- Practice, practice, practice.

3.4 Administering E-Learning

An e-learning programme normally has an assigned coordinator. The coordinators responsibilities include:

2. Needs assessment and learner identification.
3. Innovative programme application approval and reporting.

4. Marketing and promotion.
5. Outreach and recruitment.
6. Coordination with classroom programmes.
7. Assessment and enrollment.
8. Testing and progress monitoring.
9. Learning materials inventory.
10. Instructor supervision.
11. Managing and using students and programme information.
12. Programme evaluation and improvement.

The area where programme appears to have their most difficulty is assessing the learner's ability to learn in a self-directed context and providing individual assistance. Screening and counselling should occur during e-learning distance enrolment process.

Providing individual assistance will vary dramatically according to the type of e-learning intervention. Instructor-learner contact is necessary, especially if applied to the educational or informal school system. How and how often it is provided varies. If regular face-to-face contact is impractical, telephone contact or written contact should be used and documented. E-mail and chat activities are important in Internet e-learning provided system.

3.5 Record Keeping

E-Learning centres are required to maintain tracking of programmes and students data on all enrolled learners. Learner can be identified by checking the e-learning box on the special programme that runs the e-learning system. This provides demographic programmatic information on each learner.

Additional learner's progress information is normally maintained in an individual portfolio or file. The content is based on the type of e-learning programme. This information is invaluable in working with the individual learner and monitoring her or his progress.

4.0 CONCLUSION

No matter how laudable an e-learning programme may be in terms of content, knowledge and technology, the implementation process is what eventually guarantees the success of such a programme. This is human-centred activity and thus should be the key factor to the success of

e-learning. A lot of skill, planning and accountability are required to successful implement any e-learning project.

5.0 SUMMARY

i. The e-learning programme usually should have a technology plan of implementation in place. It provides the guidelines to set priorities.

ii. The implementation of electronic learning technologies requires careful planning.

iii. The course analysis seeks to identify content areas that could be enhanced, expanded, or initiated through distance learning techniques. Begin by examining the instructional needs that are not being met and determining if distance learning could contribute.

iv. Electronic distance learning techniques are not appropriate for all students. In most cases, a great deal of motivation and the ability to work in a self-paced environment are essential.

v. Many of the techniques and skills used in a classroom teaching situation do not translate directly into an e-learning approach.

vi. A well-structured electronic distance learning course must place instructional objectives foremost.

vii. Another important aspect to keep in mind during the implementation phase is the need to emphasise interactions.

viii. Formative evaluation takes place throughout the development and implementation.

ix. An e-learning programme normally has an assigned coordinator.

x. E-Learning centers are required to maintain tracking of programmes and students data on all enrolled learners.

6.0 TUTOR-MARKED ASSIGNMENT

1. Discuss the keys to success in the implementation of an e-learning programme.
2. Discuss the practical steps to the implementation of an e-learning programme.

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UNIT 5 EVALUATION OF E-LEARNING

CONTENTS

1.0 INTRODUCTION

Once you have invested valuable time and resources in setting up and maintaining an e-learning course, it is well worth the effort to evaluate its effectiveness.

Rossi and Freeman (1993) defined evaluation as "the systematic application of social research procedures for assessing the conceptualization, design, implementation, and utility of programmes. There are many other similar definitions and explanations of evaluation, and in fact, each evaluation are slightly different, with several different steps.

Evaluation can reveal unexpected results, perhaps learners are using only specific areas of the site, or perhaps they are using the site in a way you had not anticipated, or perhaps they are not using the site at all. This knowledge though could be disheartening, can save you from misspending time and effort. Understanding the strengths and fallings of your approach will allow you to adapt your strategy and make best use of the medium.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- define evaluation
- explain the purpose of undergoing evaluation and be able to differentiate them

- conduct an e-learning evaluation
- identify what you need to evaluate
- equip yourself with some evaluation strategies.

3.0 MAIN CONTENT

3.1 The Reasons for Evaluation

Generally, there are many different reasons to evaluate a programme. Many people think of programme evaluation as a nerve-wrecking process meant to determine continued funding or recognition. Also, one important purpose of any evaluation should be continual programme improvement. Although making decisions on continued funding or recognition can be a purpose of programme evaluation, there are many others, less worrisome reasons to evaluate a programme. Some of these are as follows:

- To provide information to programme personnel and other aspects of the programme that works well and are potential problems.
- To catch potential problems early in the programme so they can be corrected before more serious problems occur.
- To guide further efforts. For instance, an evaluation may bring to light issues that need to be examined in greater detail or an initial evaluation of programmme implementation may be used, in part, to guide a later evaluation of long-term impact.
- To provide information on what technical assistance may be needed
- To determine what impact the programme is having on participants.

From a teacher's perspective in an e-learning environment, effective teachers use a variety of means, some formal and others informal, to determine how much and how well their students are learning. For example, to formally evaluate student learning, most teachers use quizzes, tests, examinations, term papers, lab reports, and homework. These formal evaluation techniques help the instructor to evaluate student achievement and assign grades.

To evaluate classroom learning informally, teachers also use a variety of techniques. For example, teachers pose questions, listen carefully to student questions and comments, and monitor body language and facial expressions. Informal, often implicit evaluations permit the teacher to make adjustments in their teaching: to slow down or review material in response to questions, confusion, and misunderstandings; or to move on when student performance exceeds expectations.
When teaching under e-learning program, educators must address a different teaching challenge than when teaching in a traditional classroom. For example, instructors no longer have:

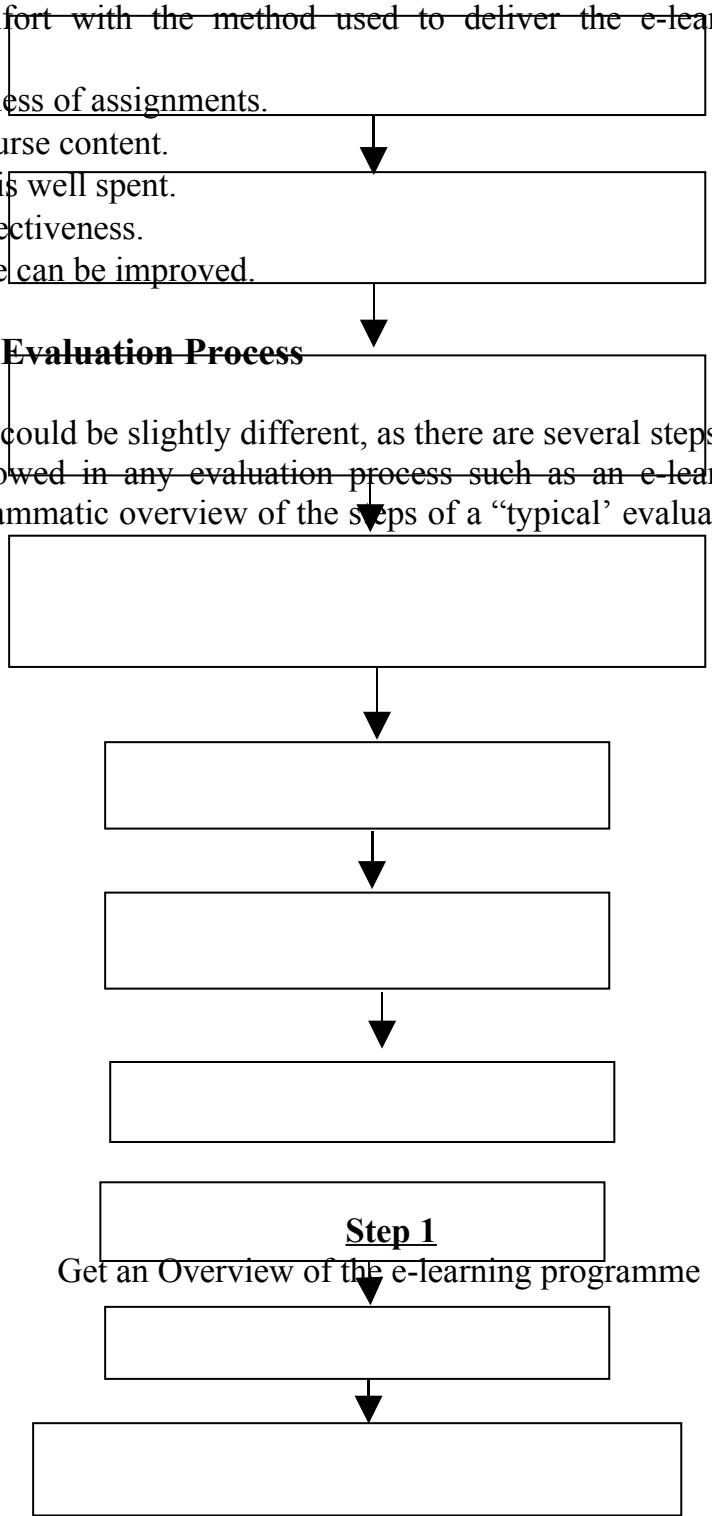
- A traditional, familiar classroom.
- A relatively homogeneous group of students.
- Face-to-face feedback during class (e.g. students' questions, comments, body language, and facial expressions).
- Total control over the distance delivery system.
- Convenient opportunities to talk to students individually.

For these reasons, e-learning educators may find it useful to not only formally evaluate students through testing and homework, but to use a more informal approach (see Angelo and Cross, 1993) in collecting data to determine:

- Student comfort with the method used to deliver the e-learning instruction.
- Appropriateness of assignments.
- Clarity of course content.
- If class time is well spent.
- Teaching effectiveness.
- How a course can be improved.

3.2 Steps in Evaluation Process

Each evaluation could be slightly different, as there are several steps that are usually followed in any evaluation process such as an e-learning project. A diagrammatic overview of the steps of a "typical' evaluations are as follow.



Step 2
Determine Why You Are Evaluating

Step 3
Determine What You Need To Know and
Formulate Research Questions

Step 4
Figure Out What Information You Need
To Answer Questions

Step 5
Design the Evaluation

Step 6
Collective Information/D

Step 7
Analyse Information

Step 8
Formulate Conclusions

Step 9
Communicate Result

Step 10
Use Result To Modify Programme

Figure 1.19: Steps of Evaluation Process

3.3 Types of Evaluation

Evaluation can be either formative, summative, or a combination of both.

Formative Evaluation

A formative evaluation is always conducted in the early stages of a programme and addresses questions about implementation and ongoing planning. This type of evaluation typically examines process rather than product. In the case of technological programmes such as e-learning, a formative evaluation might ask if equipment was received on time, if the expected number of facilitators received professional development, what skills facilitators learnt from professional development, or if the equipment is being used in the classroom as planned.

Generally, formative evaluations are also useful for various purposes such as:

- They may help catch problem early on, while they can still be corrected.
- They are an evaluation process, so they may be useful in understanding why different outcomes emerge and improving programme management
- They provide an opportunity to collect baseline data for future summative (or "impact" evaluations
- They help identify appropriate outcomes for summative evaluations.

Specifically as it relates to e-learning process in practical terms, formative evaluation:

- Is an on-going process to be considered at all stages of instruction?
- Will enable the instructor to improve the course as he/she proceeds.
- Facilitates course and content adaptation.
- Will identify major gaps in the instructional plan or the need for minor adjustments.

Some strategies that educators can use to collect formative data from their e-learning students include:

- Post cards - provide each student with pre-stamped and pre-addressed postcards. On a weekly basis, have students use the postcards to share their concerns or respond to questions during the last three to five minutes of class.
- Electronic mail - Can be a very effective way for instructors and students to communicate. Another plus, while the instructor is eliciting information about classroom learning, students become familiar with the use of electronic mail, a valuable skill.

- Telephone - Call students often. Ask them open ended questions (e.g., "What snags did you run into on the second writing assignment?") to let students voice their concerns. Follow with probes (e.g., "Then, will you need more information sources?"). Set phone-in office hours but be sure to welcome calls at other times.

Summative Evaluation

Summative evaluations assess programme outcomes or impacts. It determines the relationship of different factors to outcomes, similar to formative evaluations, some information used in formative evaluations is collected early in the life of a programme (e.g., baseline score, test scores). Unlike formative evaluations, however, a portion of the information is collected after the programme has been completely implemented and adequate time has passed to expect outcomes to occur. In case of technological programmes such as e-learning, a summative evaluation might ask if facilitator technology skills improved as a result of a professional development activity, if facilitators are using technology to a greater extent in their instruction, or if technology improved student's motivation or performance.

Some advantages of summative evaluation include:

- They can, if designed correctly, provide evidence for a cause-and-effect relationship.
- They assess long-term effects.
- They provide data on impacts.
- They can provide data on change across time.

Specifically as it relates to e-learning process in practical terms, summative evaluation:

- Assesses overall effectiveness of the finished product or course.
- Can be a springboard in developing a revision plan.
- Can be a baseline of information for designing a new plan, program, or course.
- Will not help current students since it is conducted upon course completion.

Some questions that educators may want to ask students when collecting summative data include:

- List five weaknesses of the course.
- List three (or five) strengths of the course.
- If you were teaching the course, what would you do differently?

- Student background information: age, level in school, number of distance delivered courses taken prior to this one.
- What would you recommend to a friend planning to take this course?
- What did you think would be covered in this course but was not?
- Would you recommend this course to a friend? Why or why not?

3.4 Evaluation Methods

Within the context of formative and summative evaluation, data may be collected through quantitative and qualitative methods.

Quantitative Evaluation

- Involves asking questions which can be statistically tabulated and analysed, frequently using a scale, check list, or yes/no responses.
- Limit students to responding to the categories made available to them.
- Needs a large student sample for relevant statistical analyses.

Quantitative methods may be most useful for gathering information on large numbers of respondents for whom more in-depth, personalised approaches are not feasible. However, they do have some significant drawbacks:

- Many distance education courses have relatively small class sizes with students from various backgrounds. These small, stratified populations typically defy relevant statistical analysis.
- Quantitative surveys typically result in a rate of return of under 50 percent. A low rate of return often suggests that only those feeling very positive or negative about the course responded to the evaluation.
- By definition and design, forced choice surveys offer respondents a limited number of possible response options. Therefore, fresh insights and unique perspectives falling outside the provided response categories go unreported.
- The cumbersome and often tedious nature of quantitative data collection can discourage formative evaluation, and often results in an over-reliance on summative evaluation.
- Statistical analysis often results in an illusion of precision that may be far from reality.

Qualitative Evaluation

- Is typically more subjective.
- Involves gathering a wider range and depth of information.

- Is more difficult to tabulate into neat categories.
- Will be less affected by typical small class size.
- Is a more flexible and dynamic method.
- Is not limited to pre-conceived topic of inquiry.
- Allows for student output of topics.

Can use:

- Open ended questioning; with respondents asked to identify course strengths and weaknesses, suggest changes, explore attitudes towards distance delivery methods, etc..
- Participant observation; with the distance educator observing group dynamics and behaviour while participating in the class as an observer, asking occasional questions, and seeking insights regarding the process of distance education.
- Non-participant observation; with the distance educator observing a course (e.g., an audio conference, interactive television class, etc.) without actually participating or asking questions.
- Content analysis; with the evaluator using predetermined criteria to review course documents including the syllabus and instructional materials as well as student assignments and course-related planning documents.
- Interviews; with a facilitator or specially trained individual collecting evaluative data through one-on-one and small-group interviews with students.

3.5 What to Evaluate

There must be reasons in evaluation of a project like an e-learning. Therefore the following areas must be considered:

- **Use of technology** - familiarity, concerns, problems, positive aspects, attitude toward technology.
- **Class formats** - effectiveness of lecture, discussion, question and answer; quality of questions or problems raised in class; encouragement given students to express themselves.
- **Class atmosphere** - conduciveness to student learning.
- Quantity and quality of interaction with other students and with instructor.
- **Course content** - relevancy, adequate body of knowledge, organisation.
- **Assignments -** usefulness, degree of difficulty and time required timeliness of feedback, readability level of print materials.
- **Tests** - frequency, relevancy, sufficient review, difficulty, feedback.
- **Support services** - facilitator, technology, library services, instructor availability.

- **Student achievement** - adequacy, appropriateness, timeliness, student involvement.
- **Student attitude** - attendance, assignments submitted, class participation.
- **Instructor -** contribution as discussion leader, effectiveness, organisation, preparation, enthusiasm, openness to student views.

3.6 Evaluation Tips

To effectively conduct an evaluation exercise in an e-learning environment, the following tips will be valuable and save time:

- Check out and adapt already published questionnaires; there's no need to re-invent the wheel.
- Draft and revise questions; change if necessary.
- Make use of follow-up probes:
- Alternate between instruction and interaction.
- Sequence your questions for best effect - go ahead and ask for suggestions for improvement before asking for what is good. This will help convey sincerity for seeking improvements.
- Place open-ended questions after quick answer questions. This gives students built-in thinking time.
- On summative evaluation, assure anonymity. This can be accomplished by having all questionnaires sent to a neutral site where they would be removed from their envelopes and forwarded to the instructor without a postmark.
- Establish rapport by being interested and supportive. Withhold judgmental responses.
- Adapt to the student in degree of formality and pace of communication.
- Use evaluation as a method for understanding teaching and learning.

Try to get both positive and negative feedback. It is important not only to know what is not working, but also what is working.

4.0 CONCLUSION

Evaluation is under-valued and under-utilised in some e-learning programme. Outcome based learning will drive electronic learning in the future. Yet some programmes cannot effectively document programmes and learners' outcomes and strengths. The expansion of e-learning as acceptable modality will be tied to our ability to document outcomes and, when necessary, compare them with classroom-centred learning.

5.0 SUMMARY

i.Once you have invested valuable time and resources in setting up maintaining an e-learning course, it is well worth the effort to evaluate its effectiveness.

ii.Evaluation can reveal can reveal an unexpected results, perhaps learners are using only specific areas of the site, or perhaps they are using the site in a way you had not anticipated, or perhaps they are not using the site at all.

iii.Although making decisions on continued funding or recognition can be a purpose of programme evaluation, there are many others, less worrisome reasons to evaluate a programme.

iv.From a teacher's perspective in an e-learning environment, effective teachers use a variety of means, some formal and others informal, to determine how much and how well their students are learning.

v.Evaluation can be either formative, summative, or a combination of both.

vi.Formative evaluation is an on-going process to be considered at all stages of instruction.

vii.Summative evaluation assesses overall effectiveness of the finished product or course.

viii.Within the context of formative and summative evaluation, data may be collected through quantitative and qualitative methods.

ix.Try to get both positive and negative feedback. It is important not only to know what is not working, but also what is working.

6.0 TUTOR-MARKED ASSIGNMENT

1. List the major types of evaluation. Compare and contrast them.
2. List the steps of evaluation process in order of priorities.

7.0 REFERENCES/FURTHER READINGS

Beare, P.L. (1989). *The Comparative Effectiveness of Videotape, Audiotape, and Telelecture in Delivering Continuing Teacher Education,* American Journal of Distance Education: 3(2), 57-66.

Brooksfield, S.D. (1990). *The Skillful Teacher: On Technique, Trust, and Responsiveness in the Classroom*, San Francisco, CA: Jossey-Bass.

Dick, W., & Carey, L. (1990). *The Systematic Design of Instruction*, (3rd Ed.) Glenview, IL: Scott, Foresman and Company.

Gustafson, K.L. & Powell, G.C. (1991). *Survey of Instructional Development Models with an Annotated ERIC Bibliography,* (2nd ed.) Syracuse, NY: ERIC Clearinghouse on Information Resources (ED 335 027).

Willis, B. (1993). *Distance Education: A Practical Guide*, Englewood Cliffs, NJ: Educational Technology Publications.

MODULE 3

UNIT 1 INSTRUCTIONAL DEVELOPMENT

CONTENTS

1.0 INTRODUCTION

Instructional development provides a process and framework for systematically planning, developing, and adapting instruction based on identifiable learner's needs and content requirements. This process is essential in e-learning, where the instructor and students may share limited common background and typically have minimal face-to-face contact. Although instructional development models and processes abound (see Dick & Carey, 1990; Gustafson & Powell, 1991), the majority follow the same basic stages of design, development, evaluation, and revision.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- explicitly list out the need to develop instructional materials
- enumerate the stages to go through in instructional development
- understand how to develop instructional materials.

3.0 MAIN CONTENT

3.1 Development Processes

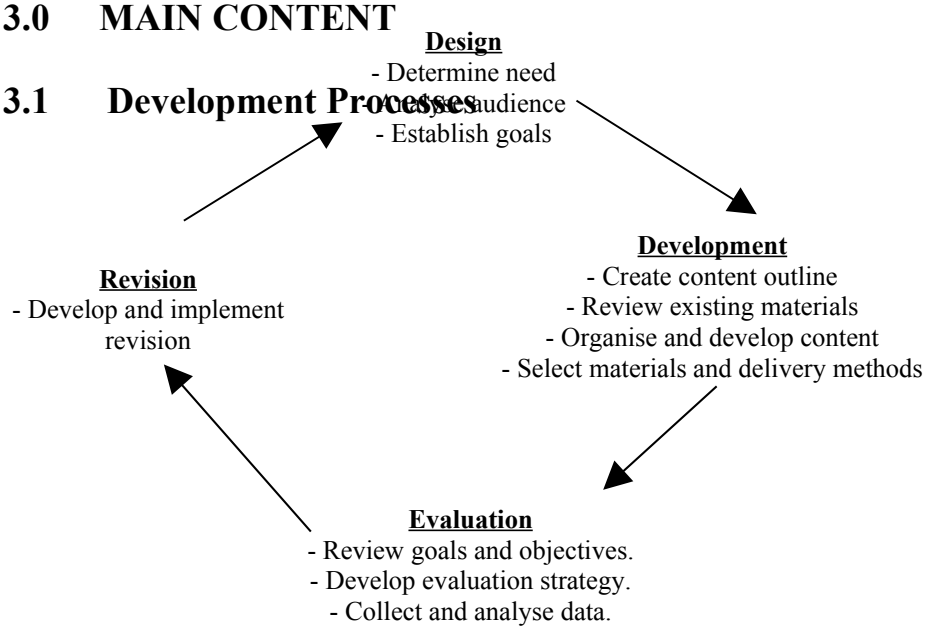


Figure 1.20: Process of instructional development

3.2 Design Phase

•**Determine the need for instruction** - To begin, determine the need for instruction by considering what external data verify the need, what factors led to the instructional need, and what past experiences indicate that the instruction being planned can effectively meet this need.

•**Analyse your audience** - To better understand the distant learners and their needs, consider their ages, cultural backgrounds, past experiences, interests and educational levels. Assess their familiarity with the various instructional methods and delivery systems being considered, determine how they will apply the knowledge gained in the course, and note whether the class will consist of a broad mix of students or discrete subgroups with different characteristics (e.g. urban/rural, undergraduate/ graduate). When possible, the instructor should visit distant sites and interview prospective students, both individually and in small groups. This personalised attention will also show students that the instructor is more than an anonymous presence, linked by electronic technology. Colleagues who have worked with the target population can also offer advice.

•**Establish instructional goals/objectives** - Based on the nature of the problem as well as student needs and characteristics, establish instructional goals and objectives. Goals are broad statements of instructional intent, while objectives are specific steps leading to goal attainment.

3.3 The Development Stage

•**Create a content outline** - Based on the instructional problems, the audience analysis, instructional goals and objectives, and an understanding of the desired course content, create an outline of the content to be covered.

•**Review existing materials** - Next, the instructor should review existing materials. Instructional materials should not be used solely because they are readily available or have been effective in a traditional classroom setting (see Beare, 1989). This is especially true if pre-packaged materials, such as tele-courses, are being considered. Whereas many pre-packaged instructional tools are developed and marketed to reach students with similar backgrounds and experiences, they may have little relevance for distant learners who come to the course with widely varied and non-traditional experiential backgrounds. If pre-packaged materials are to be used, consider developing "wrap around" introductions, conclusions, and summaries that specifically relate the learning materials to the instructional context of the distant student.

•**Organise and develop content** - Perhaps the greatest challenge facing the distance educator is creating student-relevant examples. Content, for the most part, is taught using examples that relate the content to a context understood by the students. The best examples are "transparent", allowing the learners to focus on the content being presented. If examples are irrelevant, learning is impeded. This is a special challenge in rural and multicultural settings where the teacher's realm of experience and related content examples may be foreign to distant learners. To address this problem, discuss potential content examples with a sampling of the target audience.

•**Select/develop materials and methods** - The development of instructional materials and selection of delivery methods will often require integrating print, voice, video, and data technology in concert with face-to-face communication. The challenge here is to integrate delivery components, based on identifiable learner needs, content requirements, and technical constraints. For example, it does little good to rely on delivery technology that is unavailable to some class members. Make sure the same delivery systems are available to all distant learners to avoid the need to create parallel learning experiences.

3.4 The Evaluation Stage

•**Review goals and objectives** - One purpose of evaluation is to determine if the instructional methods and materials are accomplishing the established goals and objectives. Implementation of instruction represents the first real test of what has been developed. Try to pre-test instruction on a small scale prior to implementation. If this is not possible, the first actual use will also serve as the "field test" for determining effectiveness.

•**Develop an evaluation strategy** - Plan how and when to evaluate the effectiveness of the instruction. **Formative evaluation** can be used to

revise instruction as the course is being developed and implemented. For example, the distance educator can give students pre-addressed and stamped postcards to complete and mail after each session. These "mini-evaluations" might focus on course strengths and weaknesses, technical or delivery concerns, and content areas in need of further coverage.

•**Summative evaluation** is conducted after instruction is completed and provides a data base for course revision and future planning. Following course completion, consider a summative evaluation session in which students informally brainstorm ways to improve the course. Consider having a local facilitator run the evaluation session to encourage a more open discussion.

Within the context of formative and summative evaluation, data are collected through quantitative and qualitative methods. **Quantitative evaluation** relies on a breadth of response and is patterned after experimental research focused on the collection and manipulation of statistically relevant quantities of data.

In contrast, **qualitative** evaluation focuses on a depth of response, using more subjective methods such as interviews and observation to query a smaller number of respondents in greater depth. Qualitative approaches may be of special value because the diversity of distant learners may defy relevant statistical stratification and analysis. The best approach often combines quantitative measurement of student performance with open-ended interviewing and non-participant observation to collect and assess information about attitudes towards the course effectiveness and the delivery technology.

•**Collect and analyse evaluation data** - Following implementation of your course/materials, collect the evaluation data. Careful analysis of these results will identify gaps or weaknesses in the instructional process. It is equally important to identify strengths and successes. Results of the evaluation analysis will provide a "springboard" from which to develop the revision plan.

3.5 The Revision Stage

There is room for improvement in even the most carefully developed electronically delivered course, and the need for revision should be anticipated. In fact, there will likely be more confidence in a course that has been significantly revised than in one considered flawless the first time through.

Revision plans typically are a direct result of the evaluation process in tandem with feedback from colleagues and content specialists. The best source of revision ideas may be the instructor’s own reflection on course

strengths and weaknesses. For this reason, revision should be planned as soon as possible after course completion.

Often, course revisions will be minor, such as breaking a large and unwieldy instructional unit into more manageable components, increasing assignment feedback, or improving student-to-student interaction. On other occasions, major revisions will be needed. Significant course changes should be field-tested prior to future course use.

Test revision ideas on small groups of distant learners, content specialists, and colleagues. Results of this process should be tempered by the knowledge that the characteristics of each distant class will vary and that revisions required for one learner group may be inappropriate for a different student population.

4.0 CONCLUSION

While it is possible, even appropriate on occasion, to shorten the instructional development process, it should be done only after considering the needs of the learner, the requirements of the content, and the constraints facing both teacher and students. Adhering to sound principles of instructional development will not overcome all obstacles one encountered en route to developing effective distance education programs. It will, however, provide a process and procedural framework for addressing the instructional challenges that will surely arise.

5.0 SUMMARY

i.Instructional development provides a process and framework for systematically planning, developing, and adapting instruction based on identifiable learner needs and content requirements.

ii.To begin, the design of instructional development for e-learning, determine the need for instruction by considering what external data verify the need, what factors led to the instructional need, and what past experiences indicate that the instruction being planned can effectively meet this need.

iii.At the development stage of instructional development, based on the instructional problems, the audience analysis, instructional goals and objectives, and an understanding of the desired course content, **create an outline of the content to be covered.**

iv.One purpose of evaluation in instructional development is to determine if the instructional methods and materials are accomplishing the established goals and objectives.

v.There is room for improvement in even the most carefully developed electronically delivered course, and the need for revision should be anticipated

6.0 TUTOR-MARKED ASSIGNMENT

1. Diagrammatically describe the instructional development process.
2. Discuss the steps to be taken in evaluating instructional development.

7.0 REFERENCES/FURTHER READINGS

Beare, P.L. (1989). *The Comparative Effectiveness of Videotape, Audiotape, and Telelecture in Delivering Continuing Teacher Education,* American Journal of Distance Education: 3(2), 57-66.

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UNIT 2 COPYRIGHT AND CORE VALUES OF E-LEARNING

CONTENTS

1.0 INTRODUCTION

Educators have always utilised outside resources to enhance the learning experience for their students. These resources can range from a newspaper clipping to a book to a movie. All of these items, and many other resources, are copyrighted materials.

The Copyright Law of 1976 established the rights of the copyright holder as well as providing for the use of copyrighted materials, especially in educational settings. In order to comply with the law in the area of copyright and proper use of copyrighted materials, educators must be aware of the law and the parameters that govern proper or "fair use" of copyrighted publications (Dalziel, 1995).

There are both civil and criminal penalties for infringement of copyright law. Civil awards generally include a monetary award of up to $1,000,000 (Mason, 1996), attorney fees, an injunction against the violator, and confiscation of the materials that used the copyrighted works (17 USC sections 502-505).

Distance educators have a unique dilemma when dealing with copyright law. Due to the time that the law was passed and the rapid advancement of technology for distance education, the provisions for education in the copyright law are often unclear for the distance education classroom.
The Copyright Law of 1976 defined the right of the copyright holder, items that may be copyrighted, fair use guidelines, etc. The right to a work may be used, sold, or given away as the copyright holder deems appropriate. The exclusive rights provided for in the Act (17 USC section 106) include:

- to reproduce the copyrighted work in any format;
- to prepare derivative works;
- to distribute copies of the copyrighted work to the public by sale, rent, lease, or gift;
- to perform the copyrighted work publicly (in the case of plays, musical recordings, movies, etc.); and
- to display the copyrighted work publicly (in the case of literary, musical, pictorial, graphic works, etc.)

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- understand copyright in relation to e-learning
- explain the need for a copyright in e-learning process
- the formal steps to take in obtaining copyright

- basic principles in preparing multimedia in line with the copyright acts
- list out the steps to take to avoid copyright abuse
- enumerate some core values that are associated with e-learning.

3.0 MAIN CONTENT

3.1 What is Copyright?

A copyright grants the holder the sole right to reproduce or grant permission to others to reproduce the copyrighted works. The copyright holder is defined as the person who owns the exclusive rights to a work. The protection is limited to original works, whether or not they have been published. However, it is the expression of the idea that is copyrighted, not the idea in and of itself (Brinson and Radcliffe, 1994).

Copyright may be held on a variety of original works which include: literary works, musical works, dramatic works, graphical works, motion pictures, sound recordings, and architectural works (17 USC section 102, and Brinson and Radcliffe, 1994).

For works created prior to 1978, copyright protection lasts 75 years from the date of first publication or 100 years from the date of creation of the work, contingent on which date allows the copyright to expire first. For works created after 1978, protection begins at the creation of the work and lasts 50 years after the death of the author (17 USC sections 104A).

What is "Fair Use"?

The concept of “fair use” was established in the Copyright Law of 1976. It specifies situations in which copyrighted materials may be used without express permission of the copyright holder (17 USC section 107). However, with the technology available today, it is very easy to abuse the “fair use” provision. The US House of Representatives suggested that the three major considerations in determining fair use should be: brevity of the selection, spontaneity of the decision, and the cumulative effect of the use of the selection (HR 1476, 1976).

Section 107 of the Copyright Law lists four factors that define “fair use” (17 USC sections 107):

- The purpose and character of the use must be educational or non-profit in nature.
- The nature of the copyrighted work.
- Copied material must be an excerpt or a portion of the original work without being a critical portion.

- The teacher may not impair the marketability of the work. This is the most difficult condition to determine and is the most controversial (Dalziel, 1995).

Publishers and educators agreed to more specific guidelines which will provide a list of safe parameters in which colleges may operate. However, if a college exceeds the guidelines, they will open themselves to a lawsuit to challenge the use as fair. Congress never agreed to these guidelines, but since they were established by a diverse group of educators and copyright holders, courts tend to recognise their validity (Dalziel, 1995).

These guidelines indicated that copying is allowed when the instructor decides to use a work spontaneously for educational purposes (NACS and AAP, 1991) and also outline the length of works that may be copied:

- A complete article or story less than 2,500 words;
- 1,000 words or 10% (whichever is shorter) of a prose work that is excerpted;
- One illustration, chart, diagram, or picture per book or periodical issue; and
- A short poem of less than 250 words, or an excerpt of a longer poem of not more than 250 words.
- The guidelines also require that the copying be for only one course, and no more than one short poem, article, or story or two excerpts can be copied from the works of any one author. Lastly, all copied materials MUST show the original copyright notice from the work.

There are also several prohibitions related to fair use. These are guidelines, and are not the law (NACS and AAP, 1991).

- Unauthorised copying may not be used to replace an anthology or compilation.
- Unauthorised copies may not be made of consumable works such as workbooks or standardized tests.
- Unauthorised copying may not substitute for the purchase of books, authorised reprints, or periodicals.
- Unauthorised copying may not be directed by a higher authority, such as a department head or dean.
- The same instructor may not copy the same item without permission from term to term.
- Students cannot be charged beyond the actual cost of photocopying.

3.2 How to Obtain Copyright Permission

Copyright permission must be obtained from the copyright holder of the work in which you are interested. However, copyright notice is optional for works published on or after March 1, 1989, so tracking down the copyright holder may be difficult (NACS and AAP, 1991).

When requesting copyright permission, include all of the following information (NACS and AAP, 1991):

- Full name(s) of the author, editor, and/or translator;
- Title, edition, and volume number of the work;
- Copyright date of the work;
- ISBN for books or ISSN for magazines;
- Exact pages, figures, and illustrations you wish to use;
- The number of copies to be made;
- If the material will be used alone or in combination with other works;
- Name of the college or university;
- Date when the material will be used; and
- Instructor's full name, address, and telephone number.

3.3 Copyright in Multimedia Productions

As distance educators, preparing multimedia presentations is a viable teaching strategy. In doing so, the instructor must keep in mind some basic principles (Brinson and Radcliffe, 1994):

- Combining content from other sources can be copyright protected.
- Original multimedia works are copyrighted.

In 1995, the Consortium of College and University Media Centers established a working group of educators and copyright holders to establish a group of mutually agreed upon guidelines for multimedia fair use (Dalziel, 1995). Although no conclusions have been reached, those involved tend to agree with the following statements (Dalziel, 1995):

- Educators may use their own multimedia presentations for educational use.
- Educators may use unreleased materials over a closed circuit, and access to material must be limited to class members.
- Commercial reproduction or distribution must have copyright permission. It is strongly recommended that multimedia producers

obtain copyright permission during, not after, the production is developed.

3.4 Copyright Suggestions for E-Learning

There are several precautionary steps that may be taken in order to avoid copyright infringement. This is not a complete list, but rather highlights that will assist in avoiding illegal copying of materials (Bruwelheide, 1994):

- Utilise the copyright policy adopted by your governing agency.
- Provide instructor and staff training in current copyright law and institutional policy.
- Do not hesitate to request permission. When in doubt, ask.
- Be aware of the law, but realise that a great deal of educational copying is legitimate.
- If you are copying to avoid purchase of a text, you are probably in violation of the law.
- Give proper copyright credit.
- Label equipment that may be used for unauthorized copying with a restriction.

3.5 Core Value and Tenets

There are also core values associated with e-learning as it contributes to the overall mission of education. This value helps to strengthen the concept of e-learning.

Bearing in mind that the practice of electronic-learning and its application in distance education, contributes to the larger mission of education and training. E-learning therefore, reflects the following tenets and values.

- Learning is a life long process, important to successful participation in the social, cultural, civic, and economic life of the society.
- Lifelong learning involves the development of a range of learning skills and behaviours that should be explicit outcome of learning activities.
- The diversity of learners, learning needs, learning contexts, and modes of learning must be recognized if the learning activities are to achieve the goals.
- All members of the society have the right to access learning opportunities that provide the means for effective participation in society.

- Participation in a learning society involves both right and responsibilities for learners, providers, and those charged with the oversight of learning.
- Because learning is social and sensitive to context, learning experiences should support interaction and the development of learning communities, whether social, public, or professional.
- The development of learning society may require significant changes in roles, responsibilities, and activities of provider organisations and personnel as well as of the learners themselves.

4.0 CONCLUSION

A basic knowledge of copyright law is essential for any educator. Instructors in a distance education classroom are subject to additional concerns due to the nature of the educational environment. This issue concerns the instructor, the students, the administration, and the institution with which they are all involved, and it is not an issue that can be taken lightly.

5.0 SUMMARY

i. Educators have always utilized outside resources to enhance the learning.

ii. Experience for their students. These resources can range from a newspaper clipping to a book to a movie. All of these items, and many other resources, are copyrighted materials.

iii. A copyright grants the holder the sole right to reproduce or grant permission to others to reproduce the copyrighted works.

iv. The copyright holder is defined as the person who owns the exclusive rights to a work.

v. The concept of “fair use” was established in the Copyright Law of 1976. It specifies situations in which copyrighted materials may be used without express permission of the copyright holder.

vi. Copyright permission must be obtained from the copyright holder of the work in which you are interested.

vii. Among others, to avoid abuse of copyright, utilize the copyright policy adopted by your governing agency.

viii. There are also core values associated with e-learning as it contributes to the overall mission of education.

ix. The diversity of learners, learning needs, learning contexts, and modes of learning must be recognized if the learning activities are to achieve the goals.

x. The development of learning society may require significant changes in roles, responsibilities, and activities of provider organisations and personnel as well as of the learners themselves

6.0 TUTOR-MARKED ASSIGNMENT

1. There should be copyright for e-learning materials. Discuss
2. What are the core values of e-learning?

7.0 REFERENCES/FURTHER READINGS

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UNIT 3 E-LEARNING IN CORPORATE ORGANISATIONS

CONTENTS

1.0 INTRODUCTION

Most corporate organisations pay lip service to some form of training, whether e-learning or in the classroom, but intensifying competitive

pressures are now forcing them to look hard at ways of using new technology in the learning process.

E-learning is changing the way corporations organize and manage training. In the past, IT was delivered separately from other training skills. Non-IT topics, such as finance, management, employee orientation, and product information are being delivered through common e-learning systems.

Some pioneer corporate organisations are well advanced in the use of e-learning, while others show varying degree of interest and many remain to be convinced. Yet despite the illusion caused by past hypes, there is a growing sense among executives and analysts and that e-learning- the use of IT and the Internet to enhance training- is a market with a huge potential.

Corporate e-learning is one of the fastest-growing sectors within the education market. E-learning is moving out of the early technology phase into a more mainstream business market. As well as connecting employees through e-learning, companies can also link up with partners, suppliers and customers. Huge benefits will accrue when content flows seamlessly – often over mobile networks-through industry value chains. (KPMG Consulting, 2002).

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- have an understanding of e-learning from a corporate perspective
- from statistical perspective know the trend in corporate e-learning
- know what are the benefits of e-learning to corporate organisation
- have facts of the problems confronting the application of e-learning effectively in the corporate market place
- know the economics of e-learning in corporate organisation
- consider the cost versus benefits of e-learning
- use case study to underline the use of e-learning in corporate organisations.

3.0 MAIN CONTENT

3.1 Statistics

Statistics has been used to illustrate the trend and growth in e-learning in corporate organisations. The forecast for the global e-learning market of 2002 was put at about $4.2billion by Gartner, an IT analyst group. For the year 2004, IDC, the market research company forecast the global

e-learning market was worth some $23billion, while Gartner group puts the 2005 projected figure at $33billion.

E-learning still has far to go, however, with experts variously describing it as the toddler or pre-adolescent stage. At present it is only a small part of the overall global training market of more than $100billion. But according to Gartner group, by the middle of this decade it will make up almost one-third of all training deployed.

Executives of corporate organisations are offered increasingly flexible courses of life-long learning within their own companies as the estimated 2,000 corporate universities expand towards 3,700 at the end of the decade.

Year	Value ($billion)	Forecast Group
1999	1.7	IDC
2002	4.2	Gartner
2004	23.0	IDC
2005	33.0	Gartner

Table 1.7: Global e-learning market

3.2 Benefits of E-Learning in Corporate Organisations

As corporate leaders try to leverage the value of the value of their worker's ability to learn on the job and reskill for new ones - the Internet provides new tool, not just a faster and less costly way of delivering the old training programmes.

Also, an awareness of the tangible business benefits, as indicated by the statistics, is part of what drives the corporate e-learning market. Some of the benefits include:

1. **Speed:** Since IT has been used to speed up and streamline most aspects of business, it has also been applied to the often complex and costly process of training and e-learning is the ideal model for that purpose, now. Companies use e-learning to bring employees up to speed on new products, sales methods, financial practices or regulatory requirements.

2. **Savings:** saving money is also an attraction for e-learning in the corporate training, if executed properly. For example, a client of Fuel, (an e-learning provider), a major telecommunications company saved 1.3million pounds on a course for one product by using e-learning. The course that involved substantial spending on

equipment would have cost 1.4milion pound, but using e-learning and the creation of ‘ virtual’ versions of the equipment cost just 100,000 pounds.

But savings should not be considered as the main factor for adoption of e-learning in corporate place. It cannot be the only reason for e-learning or it will fall.

Seeing the potentials in e-learning, the IT giants are eager to gain a big slice of the IT market. IBM has a head start, having already achieved annual savings of well over $200million by adopting e-learning for its own activities.

3. **Flexibility:** E-learning, especially so called asynchronous or learning, offers companies a way of delivering training in a very flexible way. It helps companies rethink the way to assess, source, deliver, evaluate, manage the development of their staff at all levels, making the process, easier, faster and more effective.

4. **Skills Training:** e-learning process is being used for staff training in the skills needed for today’s volatile and fast moving markets. There is a desperate need to transfer skill quickly, and e-learning is a veritable concept for this purpose.
5. **Access:** e-learning via the internet is advantageous in that it enables people to access up-to-date information as they perform important tasks. The concept of e-learning is changing from a course, consisting of 20 minutes to an hour of continuous material, to a ‘learning object’ which may be a few seconds to a few minutes of material.

For example, a new employee might access a series of learning objects through very structured series of courses designed to explain the company and its products. Alternatively, an existing employee might use one of those same 30 seconds learning objects to help them solve a peculiar problem

3.3 Problems of E-Learning in Corporate Organisations

The shape of the new market is, however, confused, both geographically and in terms of content, and there are a series of hurdles still standing in the way of a fully integrated e-learning industry.

- **Language** is a big barrier, but technological advances may make expansion possible. For example, a company Cathay Pacific Airways is using a system called EKP to train 14,000 employees. The system

can handle double-byte character set languages, such as Chinese and Japanese, as well as western languages such as English and French.

- Another problem is the growing demand from companies for e-learning programmes which will come with **full service back-up**, including online technical support and increasingly, tutorial and mentor services.

This all about creating the community aspects taken for granted in the classroom. It is about support-mentoring, web help-desks, expert answers, and 'pushing and pulling' the learner

3.4 E-Learning and Corporate Goals

Organisations are beginning to understand the fact that though e-learning could bring about savings and some other benefits highlighted above, the critical factor for adoption of e-learning is its ability to meet the corporate goals and objectives as well as making employees more productive.

This means training and development should be managed along a company's overall strategy and performance, not as something apart from the main activities. Corporate organisations are advised to think long and hard about what they want to achieve from e-learning. The ground work takes time.

For example, IBM a big player in the fragmented e-learning market encourages corporate organisations to carry out strategy study before taking any action, that is, e-learning should be viewed as an essential part of corporate strategy and not just as a fix for a problem.

Once organisations have decided what they want to achieve, businesses should think about content, the mix between online and classroom-based training, the type of IT systems and architecture they need and whether they want to outsource all or part of the process to outside experts.

Most importantly they most consider how training ties in with their performance objectives. They need to see e-learning as part of the way to do business not in isolation. This approach is in line with the greater focus on return on investment as companies consider how to get the most out of the large sums they have spent on IT in the past decade.

Corporations are now being encouraged to view their training activities from a broader perspective, so that these are integrated into their business. There is greater emphasis on tying learning to critical business goals.

Learning is becoming a part of consolidated approach to performance enhancement. Some companies see this but many are not yet there. But sooner other companies will begin to pay attention to the benefits of e-learning.

3.5 Economics of E-learning in Corporate Organisation

In the modern corporate organisations, there is hardly anybody that does not need to learn something about something, so the market for e-learning and learning management software is growing very fast.

The economics of e-learning are compelling because it reduces travel and material distribution costs and delivers content that is always up-to-date.

The general believe is that e-learning over the Internet will be more successful than the e-learning of computer-based training (CBT) which preceded it. This is because the former requires only a web browser with standard multimedia extensions. CBT was more difficult to deploy, requiring compact disk player and proprietary software to be installed on each desktop computer.

The learning management software market does not provide the training content, but the complete infrastructure required to use it. This includes user profiles, skills assessment, registration content delivery, training resource management, examination and so on. A critical element is correlation tools that connect the learning activities with the organisation's core business system in order to show the business impact in learning activities.

The training manager cares about the traditional learning metrics of hour per employee or dollars per employee. However, chief executives only care about how training has impacted revenue, costs, and market share or customer satisfaction.

The e-learning tools will demonstrate whether a salesman sells more products or the call center agent answers calls more quickly.

Content can be delivered by a link to third party websites with which the organisation has a contract. Some of these provide no feedback and others use industry standards interfaces that should back on the employees' progress and results to the learning management systems.

Although most content is run directly from the web, in low bandwidth environments it can be combined with a compact disk for audio and video that does not change frequently. Synchronous software also allows

learning material to be downloaded to a portable computer and the progress and results uploaded to the server later.

The high point in the e-learning market has historically been in customer facing application such as training customers, distributors, resellers, sales, and customer support and field service personnel. This radically changes revenue, as well as reducing the cost of customer support and field service.

E-learning is now spreading to manufacturing to improve the quality of products, to human resources for basic skills training and for employee training in topics like filing in travel expenses.

The use of e-learning for formal qualifications varies by industry. In the financial services and pharmaceuticals industries, it is nearly 100 per cent, because of the regulatory requirements. In high technology it is only 15-20 per cent, which is mainly certification programme for resellers.

If employees undertake external training for their own benefit, the software will still track how effective it is to determine if it should be made more widely available. The employee's complete learning profile can also be captured in one place.

Cost vs. Benefits

When establishing an e-learning program, one of the first things considered is the cost of the system. Several cost components factor into the design of an electronic system (Threlkeld & Brzoska, 1994):

- **Technology** - hardware (e.g., videotape players, cameras) and software (e.g., computer programs).
- **Transmission** - the on-going expense of leasing transmission access (e.g., T-1, satellite, microwave).
- **Maintenance** - repairing and updating equipment.
- **Infrastructure** - the foundational network and telecommunications infrastructure located at the originating and receiving campuses.
- **Production** - technological and personnel support required to develop and adapt teaching materials.
- **Support** - miscellaneous expenses needed to ensure the system works successfully including administrative costs, registration, advising/counseling, local support costs, facilities, and overhead costs.
- **Personnel** - to staff all functions previously described.
- Although the costs of offering distance education courses may be high, there are high costs associated with offering conventional

courses. Benefits of e-learning courses to the learner include (Ludlow, 1994):

- Accessible training to students in rural areas.
- Students may complete their course of study without suffering the loss of salary due to relocation.
- Students are exposed to the expertise of the most qualified faculty.

Perhaps the question institutions must answer is whether it is part of their mission as educators to offer programs to those who might not be reached without distance education. The primary benefit to educational institutions through distance education may be the increased number of non-traditional students they are able to attract and serve. Research also suggests that as programs become more efficient, program costs should decrease (Ludlow, 1994).

3.6 Case Study

This case study is used to demonstrate in practical terms the use of e-learning in corporate organisation to meet its corporate goals.
Corporate Organisation under study: Cisco Systems

Case Under Study: Use of Desktop Training to save time and money

The Problem

By January of 2000, Cisco internal training scheme was reaching a crisis point. This was not because of a problem with the quality of the training, but with the share quantity. The company was growing exponentially and could not train its expanding workforce fast enough.

In less than two years, Cisco had acquired 50 companies and diversified from it core market in data networking into telecoms. According to its European managing director of corporate communications and training the, "when you grow like this it becomes impossible to keep up with the requirement to train all your people in selling, supporting and fixing your product. The only way to cope is to move to fundamentally different training model."

The Solution

Until January 2000, Cisco used standards, instructor-led training, and sending employees to the classroom. Since then it has **adapted**

e-learning, using the company intranet to deliver training to direct to the laptop. In January of 2001, more than half their training programmes were delivered over the net.

Cisco has also scaled up it training, offering its internal courses over the Internet to its external marketing partners.

Methodology

The training programmes are delivered in two ways, either as Cisco TV, broadcast to the desk, or as video-on-demand. For example, Staff are informed that at 9am Monday there is a company broadcast on the latest high speed gigabit router They can click in and watch it like in an Open University programme. The programme is videotaped and stored for staff to dial in and replay at any time.

The broadcast is interactive, allowing staff to ask questions, either directly, or via a moderator who summarizes all questions, to prevent the flow being interrupted. Those learning from the video can phone a tutor- or Cisco interactive mentor- for advice.

Employees have an individual training programme, and their progress can be monitored remotely. This makes training very much more personal.

Concerns

Replacing leader-led training by electronic means by e-learning was risky because they risked losing quality. But they rather found out that that people enjoyed it more, and the result went up in terms of the average performance on tests.

There was also concern among employees that the introduction of e-learning would force them to catch up on coursework after hours. In the event, more than 80 per cent of training is still done in the working day. There is no compunction on when staff do training. People do it to suit themselves, dialing to do an hour, and breaking it into manageable chunk, like taking three meals in a day.

Benefits

- By scaling up its volume of training, huge amount of money was saved.
- Not only did the company save the cost of airfares and hotel bills, but staffs are also more productive because they spend less time away from their desk.

- Before e-learning, sales staff spent 6 days a year away on product training, technical staff 12 days a year.
- The more people you train the, the more you reduce cost, unlike in traditional training. For example when the train 100 people on one topic, they had to pay the instructor four times and pay travel costs for 100 times. But when they teach the same 100 over the internet, they only paid the instructor once, and there were no travel .costs.
- E-learning also offer huge advantages in terms of updating the curriculum and training materials A textbook takes two years to rewrite, but now they do quarterly updates of all Cisco training manuals.
- Cisco spends $40m in a year on training in Europe, and the savings of the e-learning can be quantified in tens of millions
- Also, the improved quality of training and the productive gains have broader implications.
- The move to e-learning has been instrumental in helping Cisco to hit its aggressive revenue targets.
- Cisco sells mainly through distributors, and e-learning means they can insure all their partners have access to the same training at the same time.
- Sales staffs are tested online to ensure they have mastered the details of Cisco products.

4.0 CONCLUSION

There is an expectation of a significant consolidation in the e-learning market as large companies' increase their penetration and smaller ones are swallowed up or find the going too tough. There success, whatever their size, will depend on how many companies can be persuaded not just to test the waters of the e-learning market but to take the plunge.

For corporate organisations, the next decade will see a rapidly expanding market in e-learning. The only cloud in the sky is the possibility that some ventures will provide the 'dotcom' disasters of the future.

5.0 SUMMARY

i.Most corporate organisations pay lip service to some form of training, whether e-learning or in the classroom, but intensifying competitive pressures are now forcing them to look hard at ways of using new technology in the learning process.

ii.Some pioneer corporate organisations are well advanced in the use of e-learning, while others show varying degree of interest and many remain to be convinced.

iii.Statistics has been used to illustrate the trend and growth in e-learning in corporate organizations.

iv.Statistics has been used to illustrate the trend and growth in e-learning in corporate organisations.

v.E-learning via the internet is advantageous in that it enables people to access up-to-date information as they perform important tasks.

vi.Another problem is the growing demand from companies for e-learning programmes which will come with **full service back-up**, including online technical support and increasingly, tutorial and mentor services.

vii.Organisations are beginning to understand the fact that though e-learning could bring about savings and some other benefits highlighted above, the critical factor for adoption of e-learning is its ability to meet the corporate goals and objectives as well as making employees more productive.

viii.Corporations are now being encouraged to view their training activities from a broader perspective, so that these are integrated into their business. There is greater emphasis on tying learning to critical business goals.

ix.The economics of e-learning are compelling because it reduces travel and material distribution costs and delivers content that is always up-to-date.

x.The high point in the e-learning market has historically been in customer facing application such as training customers, distributors, resellers, sales, and customer support and field service personnel. This radically changes revenue, as well as reducing the cost of customer support and field service.

6.0 TUTOR-MARKED ASSIGNMENT

1. What are the critical issues making corporate organisations to adopt e-learning?
2. Discuss the economics of e-learning.

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UNIT 4 COMPUTER INSECURITY

CONTENTS

1.0 INTRODUCTION

Most current real-word computer security efforts focus on external threats, and generally treat the computer system itself as a trusted system. Some knowledgeable observers consider this to be a disastrous mistake, and point out that this distinction is the cause of much of the insecurity of current computer systems-once an attacker has subverted one part of a system without fine-grained security, he or she usually has access to most or all of the features of that system. Because computer systems can be very complex, and cannot be guaranteed to be free to defects, this security stance tends to produce insecure systems.

The 'trusted systems' approach has been predominant in the design of many Microsoft software products, due to the long-standing Microsoft policy of emphasising functionality and 'ease of use over security. Since Microsoft products currently dominate the desktop and the home computing markets, this has led to unfortunate effects. However, the problems described here derive from the security stance taken by software and hardware vendors generally, rather than the failing of a single vendor. Microsoft is not out of line in this respect, just far more prominent with respect to its consumer market share.

It should be not that the Windows NT line of operating systems from Microsoft contained mechanisms to limit this, such a services that ran under dedicated user accounts, and Role-Based Access Control (RBAC) with user/group rights, but the Windows 95 line of products lacked most of these functions. Before the release of Windows 2003, Microsoft has changed their official stance, taking a more locked down approach. On 15 January 2002, Bill Gates sent out a memo on Trustworthy Computing, marking the official change in company stance. Regardless, Microsoft's latest operating system windows XP is still plagued by complaints about lack of local security and inability to use the fine-grained user access controls together with certain software (esp. certain popular computer games).

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- view the issue of computer security from another perspective, especially from the negative angle
- examine the financial implications of systems insecurity
- answer the question of the different types of computer attacks
- understand different ways to reduce computer insecurity
- examine the security measures to deal with threat and attacks of computer.

3.0 MAIN CONTENT

3.1 Financial Cost of Computer Insecurity

Serious financial damage has caused by computer security breaches, but reliably estimating costs is quite difficult. Figures in the billions of dollars have been quoted in relation to the damage caused by malware such as computer worms like the Code Red worm but such estimates may be exaggerated. However, other losses, such as those caused by the compromise of credit card information, can be more easily determined, and they have been substantial, as measured by millions of individual

victims of identity theft each year in each of several nations, and the several hardship imposed on each victim, that can wipe out all of their finances, prevent them from getting a job, plus be treated as if they were the criminal. Volumes of victims of phishing and other scams may not be known.

Individuals who have infected with spyware or malware likely go through a costly and time-consuming process of having their computer cleaned. Spyware and malware is considered to be a problem specific to the various Microsoft Windows Operating Systems; however this can be explained somewhat by the fact that Microsoft controls a major share of the PC market and thus represent the most prominent target.

3.2 Form of Computer Insecurity

There are many similarities (yet many fundamental differences) between computer and physical security. Just like real-world security, the motivations for breaches of computer security vary between attackers, sometimes called hackers or crackers. Some are teenage thrill-seekers or vandals (the kind often responsible for defacing websites); similarly, some website defacements are done to make political statements. However, some attackers are highly skilled and motivated with the goal of compromising computer for financial gain or espionage. An example of the latter is Markus Hess who spied for the KGB and was ultimately caught because of the efforts of Clifford Stoll, who wrote an amusing and accurate book, The Cuckoo's Egg, about his experiences. For those seeking to prevent security breaches., the first step is usually to attempt to identify what might motivate an attack on the system, how mush the continued operation and information security of the system are worth, and who might be motivated to breach it. The precautions required for a home PC are very different from those of banks' internet banking system, and different again for a classified military network. Other computer security writers suggest that, since an attacker using a network need know nothing about you or what you have on your computer, attacker motivation is inherently impossible to determine beyond guessing. If true, blocking all possible attacks is the only plausible action to take.

Vulnerabilities

To understand the techniques for securing a computer system, it is important to first understand the various types of" attacks" that can be

made against it. These threats can typically be classified into one of these seven categories:

Exploits

Software flaws, especially buffer overflows, are often exploited to gain control of a computer, or to cause it to operate in an unexpected manner. Many development methodologies rely on testing to ensure the quality of any code released; this process often fails to discover extremely unusual potential exploits. The term "exploit" generally refers to small programs designed to take advantage of a software flaw that has been discovered, either remote or local. The code from the exploit program is frequently reused in Trojan horses and computer viruses. In some cases, vulnerability can lie in a certain programs processing of a specific file type, such as a non-executable media file.

Eavesdropping

Any data that is transmitted over a network is at some risk of being eavesdropped, or even modified by a malicious person. Even machines that operate as a closed system? (i.e. with no contact to the outside world) can be eavesdropped upon via monitoring the faint electro-magnetic transmissions generated by the hardware such as TEMPEST. The FBI's proposed Carnivore program was intended to act as a system of eavesdropping protocols built into the systems of internet service providers.

Social engineering and human error

A computer system is no more secure that the human systems responsible for it operation. Malicious individuals have regularly penetrated well-designed, secure computer systems by taking advantage of the carelessness of trusted individual's or by deliberately deceiving them, example sending message that they are the system administrator and asking for passwords. This deception is known as Social engineering.

Denial of service attacks

Denial of service (DoS) attacks differs slightly from those listed above, in that they are not primarily a means to gain unauthorized access or control of a system. They are instead designed to render it unusable. Attackers can deny service it individual victims, such as by deliberately guessing a wrong password 3 consecutive time and thus causing the victim account to be locked, or they may overload the capabilities of a

machine or network and block all user at once. These types of attack are, in practice, very hard to prevent, because the behaviour of whole networks needs to be analysed, not only of small pieces of code. Distributed denial of service (DDoS) attacks are common, where a large number of compromised hosts (commonly referred to as "zombie computers") are used to flood target system with network request, thuds attempting to render it unusable through resource exhaustion. Another technique to exhaust victim resources is though the use of an attack amplifier – where the attacker takes advantage of poorly designed protocols on 3rd party machines, such as FTP or DNS, in order to instruct these hosts to launch the flood. There are also commonly vulnerabilities in applications that cannot be used to take control over a computer, but merely make the target application malfunction or crash.

Indirect Attacks

Attacks in which one or more of the attack types above are launched from a third party computer which has been taken over remotely. By using someone else's computer to launch an attack, it becomes far more difficult to tract down the actual attacker. There have also been cases where attackers took advantages of public anonymising systems, such as the to onion router system.

Backdoors

Methods of bypassing normal authentication or giving remote access to a computer to somebody who knows about the backdoor, while intended to remain hidden to casual inspection. The backdoor may take the form of an installed program (e.g., Back Orifice) or could be in the form of an existing "legitimate" program, or executable file. A specific form of backdoors are toolkits, which replaces system binaries and/or hooks into the function calls of the operating system to hide the presence of other programs, users services and open ports. It may also fake information about disk and memory usage.

Direct Access Attacks

Common consumer devices that can be used to transfer data surreptitiously.

Someone gaining physical access to a computer can install all manner of devices to compromise security, including operating system modifications, software worms, keyboard loggers, and covert listing

devices. The attacker can also easily download large qualities of data onto backup media, for instance CD-R/DVD-R, tape; or portable devices such as key drives, digital; cameras or digital audio players. Another common technique is to boot an operating system contained on a CD-ROM or other bootable media and read the data from the hard driver(s) this way. The only way to defeat this is to encrypt the storage media and store the key separate from the system.

3.3 Reducing Vulnerabilities

Computer code is regarded by7 some as just a form of mathematics. It is theoretically possible to prove the correctness of computer programs (though this is usually too difficult to be practicable outside very limited circumstance) though the likelihood of actually achieving this in large-scale practical systems is regarded as unlikely in the extreme by most with practical experience in the industry.

It's also possible to protect messages in transit (i.e. communications) by means of cryptography. One method of encryption-the one-time pad-has been proven to be unbreakable when correctly used. This method was used by the Soviet Union during the Cold War, though flaws in their implementation allowed some cryptanalysis. The method uses a matching pair of key-codes, security distributed, which are used once-and-only-once to encode and decode a single message. For transmitted computer encryption this method is difficult to use properly (securely), and highly inconvenient as well. Other methods of encryption, while breakable in theory, are often virtually impossible to directly break by any means publicly known today. Breaking them requires some non-cryptographic input, such as a stolen plaintext (at either end of the transmission), or some other extra cryptanalytic information.

Social engineering and direct computer access (physical) attacks can only be prevented by non-computer means, which can be difficult to enforce, relative to the sensitivity of the information. Even in a highly disciplined environment, such as in military organisations, social engineering attacks can still be difficult to foresee and prevent.

In practice, only a small fraction of computer program code is mathematically proven to even goes through comprehensive information technology audits or inexpensive but extremely valuable computer security audits, so it's usually possible for a determined cracker to read, copy, alter or destroy data in well secured computers, albeit at the cost of great time and resource, extremely few, if any attackers would audit applications for vulnerabilities just to attack a single specific system. You can reduce a crackers' chances by keeping your systems up to date, using a security scanner or/or and hiring competent people responsible

for security. The effects of data loss/damage can be reduced by careful backing up and insurance.

3.4 Security Measures

A state of computer "security" is the conceptual ideal, attained by the use of the three processes.

1. Prevention
2. Detection
3. Response.

- User account access controls and cryptography can protect systems files and data, respectively.

- Firewalls are by far the most common prevention systems from a network security perspective as they can (if properly configured) shield access to internal network service, and block certain kinds of attacks through packet filtering.

- Intrusion Detection System (IDS's) are designers to detect network attacks in progress and assist in post-attack forensics, while audit trails and logs serves a similar function for individual system.

- "Response" is necessarily defined by the assessed security requirements of an individual system and may cover the range from simple upgrade of productions to notification of legal authorities, counter-attacks, and the like. In some special cases, a complete destruction of the compromised system is favored.

Today, computer security comprises mainly "preventive" measures, like firewalls or an Exit Procedure. A firewall can be defined as a way of filtering network data between a host or a network and another network, such as the Internet, and is normally implemented as software running on the machine, hooking into the network stack (or, in the case of most UNIX-based operating system such as Linux, built into the operating system kernel) to provide real time filtering and blocking. Another implementation is a so called physical firewall which consists of a separate machine filtering network traffic. Firewalls are common amongst machines that are permanently connected to the Internet (though not universal, as demonstrated by the large numbers of machines "cracked" by worms like the Code Red worm which would have been protected by a properly-configured firewall). However, relatively few organisations maintain computer systems with effective detection system and fewer still have organized response mechanisms in place.

3.5 Difficult with Response

Responding forcefully to attempt security breaches (in the manner that one would for attempt physical security breaches) is often very difficult for a variety of reason:

- Identifying attackers is difficult, as they are often in a different jurisdiction to the systems they attempt to breach, and operate through proxies, temporary anonymous dial-up accounts, wireless connections, and other anonymising procedures which make backtracking difficult and are often located in yet another jurisdiction. If they successfully breach security, they are often able to delete logs to cover their tracks.

- The sheer number of attempted attacks is so large that organisations cannot spend time pursing each attacker (a typical home user with a permanent (e.g, cable modern) connection will be attacked at least several times per day, so more attractive targets could be presumed to see many more). Note however, that most of the sheer bulks of these attacks are made automated vulnerability scanners and computer worms.

- Law enforcement officers are often unfamiliar with information technology, and so lack the skills and interest in pursing attackers. There are also budgetary constraints. It has been argued that the high cost of technology, such as DNA testing, and improved forensics mean less money for other kinds of law enforcement, so the overall rate of criminals not getting dealt with goes up as the cost of the technology increase.

4.0 CONCLUSION

The impact of computer threats and attacks on organisations has been enormous and on the increase, so also are the forms of attacks on information systems. This informs the need for organisations to accord information system security more priority. From the developers' perspectives, more efforts should be used to develop more robust and secure system.

5.0 SUMMARY

i.Most current real-world computer security efforts focus on external threats, and generally treat the computer system itself as a trusted system.

ii.Serous financial damages have been caused by computer security breaches, but reliably estimating costs is quite difficult.

iii.Individuals who have been infected with spyware or malware likely go through a costly and time-consuming process of having their computer cleaned.

iv.There are many similarities (yet many fundamental differences) between computer and physical security. Just like real –world security, the motivation for breaches of computer security vary between attackers, sometimes called hackers or crackers.

v.A computer system is no more secure than the human systems responsible for its operation. Malicious individuals have regularly penetrated well-designed, secure computer systems by taking advantage of the carelessness of trusted individuals, or by deliberately deceiving them.

vi.Social engineering and direct computer access (physical) attacks can only prevented by non-computer means, which can be difficult to enforce, relative to the sensitivity of the information.

vii.Today, computer security comprises mainly "preventive" measures, like firewalls or an Exit Procedure. A firewall can be defined as a way of filtering network data between a host or a network and another network.

viii.Responding forcefully to physical security breaches) is often very difficult for a variety of reasons.

6.0 TUTOR-MARKED ASSIGNMENT

1. Discuss 5 forms of security threats to information in an organization.
2. Discuss the term 'Computer Firewall.

7.0 REFERENCES/FURTHER READINGS

Ross J. Anderson:' *Security Engineering: A Guide to Building Dependable Distributed Systems.*

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UNIT 5 COMPUTER SECURITY

CONTENTS

1.0 INTRODUCTION

This unit which is the last unit of this course work dwells on computer security. Learners' attention is drawn to computer security by design, Techniques for creating secure systems and network security

2.0 OBJECTIVES

At the end of the study unit, you should be able to:

- define computer security
- explain how to secure operating system
- identify the techniques for creating secure systems
- explain network security.

3.0 MAIN CONTENT

3.1 Secure Operating System Context

One context of the term computer security is its use pertaining to a technology to implement a secure operating system. Much of this technology is based on science developed in the 1980s and used to produce what may be some of the most impenetrable operating systems ever. Though still valid, the science did not change, the technology is almost inactive today, perhaps because it is complex or not widely understood, such ultra strong secure operating systems are based on operating system kernel technology that can grantee that certain security policies are absolutely enforced on an operating environment. An example of such a security policy is the Bell-LaPadula model. The strategy is based on a coupling of special microprocessor hardware features, often involving the Memory management Unit, to a special correctly implemented operating system kernel. This forms the foundation for a secure operating system that if certain critical parts are designed and implemented correctly can ensure that it is physically impossible for arbitrarily hostile or intelligently subversive applications to violate the security policy. This amazing capability is enabling because they not only impose a security policy, but they also *completely* protect themselves from corruption. Ordinary operating systems lack the completeness property in this latter capability. The design methodology to produce such secure systems is not an ad-hoc best effort activity, but one that is very precise, deterministic and logical.

Systems designed with such methodology represent the state of the art of computer security and the capability to produce them is not widely known. In sharp contrast to most kids of software, they meet specifications with verifiable certainty comparable to specifications for size, weight and power. Secure operating systems deigned this way are used primarily to protect national security information and military secrets. These are very powerful security tools and very few secure operating systems have been certified at the highest level (Orange Book A-1) to operate over the range of Top Secret to unclassified (including Honeywell SCOMP, USAF SACDIN, NSA Blacker and Boeing MLS LAN). The assurance of security depends not only on the soundness of the design strategy, but also on the assurance of correctness of the implementation, and therefore Criteria quantified security strength of products in terms of two orthogonal components, security capability (as Protection Profile) and assurance levels (as EAL levels). For reasons that are the subject of another article, none of these ultra high assurances secure general purpose operating systems have been produced for decades or certified under the Common Criteria.

3.2 Computer Security by Design

Computer security is a logic-based technology. There is no universal standard notion of what secure behaviour is. "Security" is a property that is unique to each situation and so must be overtly defined if it is to be seriously enforced, defined by a security Policy. Security is not an ancillary function of a computer application, but often what the application doesn't do. Unless the application is just trusted to "be secure," security can only be imposed as a constraint on the application's behaviour from outside of the application. There are several approaches to security in computing; sometimes a combination of approaches is valid:

- Trust all the software to abide by a security policy but the software is not trustworthy (this is computer insecurity).
- Trust all the software to abide by a security policy and the software is validated as trustworthy (by tedious branch and path analysis for example).

- Trust no software but enforce a security policy with mechanisms that are not trustworthy (again this is computer insecurity).

- Trust no software but enforce a security policy with trustworthy mechanisms.

Many approaches unintentionally follow 1. Obviously, 1 and 3 lead to failure. Since 2 is expensive and non-deterministic, its use is very limited. Because 4 is often hardware-based mechanisms and avoid abstractions and a multiplicity of degree of freedom, it is more practical. Combinations of 2 and 4 are often used in a layered architecture with thin layers of 2 and thick layers of 4.

There are a variety of strategies and techniques used to design in security. There are few, if any strategies to add on security after design. Some of the strategies to design in security are discussed in this section.

One technique enforces the principle of least privilege to great extent, where an antitype has only the privileges that are needed for its function. That way, even if an attacker has subverted one part of the system, fine-grained security ensures that it is just as difficult for them to subvert the rest.

Furthermore, by breaking the system up into smaller components, the complexity of individual components is reduced, opening up the possibility of using techniques such as automated theorem proving to

prove the correctness of crucial software subsystems. This enables a closed form solution to security that works well when only a single well-characterised property can be isolated as critical, and that property is also assessable to math. Not surprisingly, it is impractical for generalised correctness, which probably cannot even be defined, much less proven. Where formal correctness proofs are not making modules secure.

The design should use "defense in depth," where more than one subsystem needs to be compromised to compromise the security of the system and the information it holds. Defense in depth works when subverting one hurdle is not a facilitate subverting another. Also, the cascading principle acknowledges that several low hurdles do not make a high hurdle. So cascading several weak mechanisms does not provide the safety of a single stronger mechanism.

Subsystems should default to secure settings, and wherever possible should be designed to "fail secure" rather than "fail insecure" Ideally, a secure system should require a deliberate, conscious, knowledge and free decision on the part of legitimate authorities in order to make it insecure. What constitutes such a decision and what authorities are legitimate is obviously controversial.

In addition, security should not be an all nothing issues. The designers and operators of systems should assume that security breaches are inevitable in the long term. Full audit trails should be kept of system activity, so that when a security breach occurs, the mechanism and extent of the breach can be determined. Storing audit trails remotely, where they can only be appended to, can keep intruders from covering their tracks. Finally, full disclosure helps to ensure that when bugs are found the "window of vulnerability" is kept as short as possible.

3.3 Techniques for Creating Secure Systems

The following techniques can be used in engineering secure systems. These techniques, whilst useful, do not of themselves ensure security. One security maxim is "a security system is no stronger than its weakest link".

Automated theorem proving and other verification tools can enable critical algorithms and code used in secure systems to be mathematically proven to meet their specifications.

Thus simple microkernel's can be written so that we can be sure they do not contain any bugs: e.g. EROS and Coyotos.

A bigger OS, capable of providing a standard API like POSIX, can be built on a microkernel using small API servers running as normal programs. If one of these API servers has a bug, the kernel and the other serves are not affected: e.g. Hurd.

Cryptographic techniques can be used to defend data in transit between systems, reducing the probability that data exchanged between systems can be intercepted or modified.

Strong authentication techniques can be used to ensure that communication end-points are who they say they are.

Secure crypto processors can be used to leverage physical security techniques into protecting the security of the computer system.

Chain of trust techniques can be used to attempt to ensure that all software loaded has been certified as authentic by the system's designers.

Mandatory access control can be used to ensure that privileged access is withdrawn when privileges are revoked. For example, deleting a user account should also stop any processes that are running with that user's privileges.

Capability and access control list techniques can be used to ensure privilege separation and mandatory access control. The next sections discuss their use.

•Don't run an application with known security flaws. Either leave it turned off until it can be patched or otherwise fixed, or delete it and replace it with some other application. Publicly known flaws are the main entry used by worms to automatically break into a system and then spread to other systems connected to it. The security website Secunia provides a search tool for unpacthed known flaws in popular products.

•Cryptographic techniques involve transforming information, scrambling it so becomes unreadable during transmission. The intended recipient can not.

•Backups are a way of security your information; they are another copy of all your important computer files kept in another location. These files are kept on hard disks, CD-Rs CD-RWs, and tapes. Backups can be kept in a multitude of locations, some of the suggested places would be a fireproof, any heat proof safe, or in a separate, offsite location than that in which the original files are contained. Some individuals and companies also keep their backups in safe deposit boxes inside bank

vaults. There is also a fourth option, which involves using one of the file hosting services that backs up files over the Internet for both business and individuals.

•Backups are also important for reasons other than security. Natural disasters, such as earthquakes, hurricanes, or tornadoes, may strike the building where the computer is located. The building can be on fire, or on an explosion may occur. There needs to be a recent backup at alternate secure location, in case of such kind of disaster. The backup needs to be moved between the geographic sites in a secure manner, so as to prevent it from being stolen.

•Anti-virus software consists of computer programs that attempt to identify, thwart and eliminate computer viruses and other malicious software (malware).

•Firewalls are systems which help protect computers and computer networks from attack and subsequent intrusion by restricting the network traffic which can pass through them, based on a set of system administrator defined rules.

•Access authorization restricts access to a computer to group of users though the use of authentication systems. These systems can protect either the whole computer –such as through an interactive logon screen – or individual services, such as an FTP server. There are many methods for identifying and authenticating user, such as passwords, identification card, and more recently, smart cards and biometric systems.

•Encryption is used to protect your message from the eyes of others. It can be done in even removing characters from the message. These have to be used in combination to make the encryption secure enough that is to say, sufficiently difficult to crack. Public key encryption is a refined and practical way of doing encryption. It allows for example anyone to write a message for a list of recipients, and only those recipients will be able to read that message.

•Intrusion-detection systems can scan a network for people that are on the network but who should not be there or are doing things that they should not be doing, for example trying a lot of passwords to gain access to the network.

•Social engineering awareness-Keeping yourself and your employees aware of the dangers social engineering can reduce successful breaches of your network and servers.

3.4 Network Security

Network security consist of the provisions made in an underlying computer network infrastructure, policies adopted by the network and the network- accessible resources from unauthorised access and the effectiveness (or lack) of these measure combined together.

How different is it from computer security in plain words?
Securing any network infrastructure is like securing possible entry points of attacks on a country by deploying appropriate defense. Computer security is more like providing means of self-defense to each individual citizen of the country. The former is better and practical to protect the civilians from getting exposed to the attacks. The preventive measure attempt to secure the access to individual computers – the network itself – thereby protecting the computers and other shared resources such as printers, network-attached storage connected by the network. Attacks could be stopped at their entry points before they spread. As opposed to this, in computer security the measure taken are focused on securing individual computer hosts. A computer host whose security is compromised is likely to infect other hosts connected to a potentially unsecured network. A computer host's security is vulnerable to users with higher access privileges to those hosts.

Network security starts from authenticating any user. Once authenticated, firewall enforces access policies such as what services are allowed to be accessed by the network user. Though effective to prevent unauthorized access, this component fails to check poetically harmful contents such as computer worms being transmitted over the network. An intrusion prevention system (IPS) helps detect and prevent such malware. IPS also monitors for suspicious network traffic for contents, volume and anomalies to protect the network could be encrypted to maintain privacy. Individual events occurring on the network could be tracked for audit purposes and for a later high level analysis. *Honeypots,* essentially decoy network as surveillance and early-warning tools. Techniques used by the attackers that attempt to compromise these decoy resources are studied during and after an attack to keep an eye on new exploitation techniques. Such analysis could be used to further tighten security of the actual network being protected by the honeypot.

4.0 CONCLUSION

Coming advances in computation will no doubt produce new security problems. Also though advances in technology may change some features of security, it will continue to be true that information security must be seen as a human problem. Management must be involved. Without higher level management support, there will be insufficient budgets; necessary control measures will not be made. Without

sufficient management attention must be involved. Without higher level management support, there will be insufficient budgets; necessary control measure will not be made. Without sufficient management attention, control of decisions that need to be made will be ignored.

5.0 SUMMARY

i.Computer security is a field of computer science concerned with the control of risk related to computer use. Computer security can be seen as a sub-field of security engineering, which looks at broader security issues in addition to computer security.

ii.One context of the term computer security is its use pertaining to a technology to implement a secure operating system. Much of this technology is based on science developed in the 1980s and used to produce what may be some of the most impenetrable operating systems ever.

iii.Computer security is a logic-based technology. There is no universal standard notion of what secure behaviour is. “Security” is a property that is unique to each situation and so must be overly defined if it is to be seriously enforced, defined by a security Policy.

iv.In addition, security should not be an all or nothing issue. The designers and operators of systems should assume that security breaches are inevitable in the long term. Full.

v.Cryptographic techniques involve transformation, scrambling it so it becomes unreadable during transmission. The intended recipient can unscramble the message, but eavesdroppers cannot.

vi.Anti-virus software consists of computer programs that attempt to identify, thwart and eliminate computer viruses and other malicious software (malware).

vii.**Network security** consists of the provisions made in an underlying computer network infrastructure, policies adopted by the network administrator to protect the network and the network-accessible resources from unauthorized access and the effectiveness (or lack) of these measure combined together.

6.0 TUTOR-MARKED ASSIGNMENT

1. Differentiate computer security from network society.
2. Mention and explain 5 computer measures.

7.0 REFERENCES/FURTHER READINGS

Ross J. Anderson: *Security Engineering: A Guide to Building Dependable Distributed Systems.*

Bruce Schneier: Secrets & Lies: Digital Security in a Networked World.

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