
UNIT 17 GENERAL CONSIDERATIONS FOR APPROPRIATENESS

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17.0 INTRODUCTION

Technology has penetrated all spheres of our life today and the field of education is no exception. In fact the impact of technology and various media on education has been so impressive that the teacher is no longer the sole provider of information. This signifies a paradigm shift in the method of teaching as the teacher is taking over the role of a guide and facilitator of self directed, technology-aided learning. However, it is being increasingly realized that technology should not be used indiscriminately. Using technology should not become an end in itself but rather remain as the means to reach the goals of education. Ideally, it should be a means to maximize learning. Hence questions like 'when', 'where' and 'why' and 'how' to use technology in education, especially in distance education come to the fore. In other words we must consider the appropriateness of technology before we choose to apply it in our sphere of work.

Technology in the modern world is advancing rapidly. New technologies are replacing the older ones, thereby rendering them obsolete. Obsolescence of technology is a real challenge we face at the moment. In this unit we shall first discuss the basic concept of appropriateness of technology in education. We shall also analyze weaknesses and strengths of different technologies so that we are able to select technology appropriate for our needs and requirements. The challenge of coping up with the phenomenon of obsolescence of technology shall also be discussed.

17.1 OBJECTIVES

After studying this unit, you should be able to:

- comprehend the concept of appropriate technology;
- explain the criteria that decide the appropriateness of technology;
- discuss the rapid development of technology and about the problem of obsolescence of technology.

17.2 APPROPRIATE TECHNOLOGY: BASIC CONCEPT

It is a widely accepted fact that technology renders the process of teaching and learning more effective. Rightly therefore, the integration of technology into the process of teaching and learning is being widely advocated at all levels of education and already a large number of educational institutions is gearing up for it. However, we have to keep in mind that before taking the plunge and opting for a particular technology it has to be thoroughly evaluated for its effectiveness in facilitating learning. It has to be adjudged, which particular technology would be appropriate for integration into the teaching-learning process.

We know that the word 'appropriate' literally means suitable or proper. Hence 'appropriate technology' may be taken to refer to technology that would be most suitable and effective in a given teaching-learning situation. The technology appropriate for one target group of learners or institution may not be appropriate for others. The appropriateness of the technology depends on the context /situation in which it is to be used. When we intend to use technology in the field of education, we have to bear in mind that it is one of the means for making learning effective. In no way should it be allowed to become an end in itself. Using technology for its own sake overruling all other considerations amounts to technology dominating the teaching-learning scenario. So the goal should not be of 'using technology', but 'making use of technology' to reach the goals. More specifically speaking, the objectives of an educational programme are to be achieved through the aid of appropriately chosen technology.

The question of appropriateness of technology has become overwhelming because today we are deluded with a variety of technology from which the appropriate ones have to be chosen. Appropriateness of technology lies less within the technological device per se and much more in the factors external to it. A technological device has its unique potential and can not be adjudged as good/bad, useful/useless or even appropriate/inappropriate. This is because all these adjectives are contextual to the teaching-learning situation. As has been rightly mentioned by Kumar (1996), educational technology includes in its ambit 'systematic way of applying techniques' to achieve certain objectives and it is as important as the technology itself. Hence technology has to be chosen and applied in such a way that instruction can be imparted with a scientific base and is made more powerful (Tickton, 1971, as quoted by Venkataiah, 1996). This is the pedagogic consideration for selecting a technology. Also how far technology furthers the effectiveness of teaching-learning process without straining the resources of the institutions has overriding significance. There are several such factors that determine the appropriateness of technology. Some of these factors are:

- access of the target group (learners) and teachers to technology
- cost involved in procuring, operating and maintaining it,
- ease of maintenance
- convenience in using it
- pedagogical value of the technology

Besides the above-mentioned factors there are also certain other factors like, policies of the government. Only if the policies allow the opening up of the world of information and permit free exchange of knowledge and information, a technology like the Internet can be appropriate. There are certain areas where due to security reasons, state policies may disallow Internet, and even cell phones. Appropriateness of technology is not a fixed notion. For instance, appropriateness of technology for corporate houses and that of educational institutions may not be the same. Technology that is deemed to be obsolete and has been written off in the industries may still remain appropriate in a particular educational situation.

Today there is an allegation concerning the phenomenon of 'warehousing of education' catalyzed by technology. In this process numerous copies of the same content in print and electronic form like CDs are dished out and degree holders are churned out through a mechanized process of teaching and learning. This phenomenon is too complex to be wished away. But indiscriminate use of technology can certainly take a toll on creativity and innovativeness. To effectively counter it, the teachers have to ensure that technology selected caters to the masses as well as serves individual needs. Let us now discuss the parameters that determine the appropriateness of technology.

17.3 ACCESS TO TECHNOLOGY

While designing an educational course or planning an instructional strategy, if advanced technologies are to be used then the first and foremost consideration should be regarding the access of the learners to the particular technology. For example, a course or instructional strategy requiring the use of videoconferencing may not be feasible if learners do not have access to devices like supporting software applications, microphone, desktop camera etc. Hence we find that access to technology is important. Again access may be of different types that we shall now discuss.

Individual versus group access: Technology may be accessed individually or in groups. In case of individual access, every learner should have access to technology. For instance there may be situations as in the developed countries where every student is provided with his/her own workstation, which is equipped with the latest technology. In many of the developing nations this may not be common. However in the 'Tele Learning Centers of universities like IGNOU, every student has his/her own PC while undergoing training. Financial problems and lack of infrastructure facilities mainly hinder such type of access. In group access, learners access technology as a group. For instance sharing of a computer by a group of learners as is being done in many schools where computers are shared by groups of children. In teleconferencing sessions too learners present in the centers with down linking facilities, the technology is accessed as a group. In this case the benefits of individual access whereby the learner can learn at his/her own pace, style, and time, are not available. However, active and instant collaboration by the learners during learning is made possible by group access.

Direct versus indirect access: Direct access means the learner accesses technology directly by the virtue of the fact that s/he possesses it. For instance, during online learning the learner has to possess the necessary technology, i.e. computer and internet. In indirect access, the learner accesses it through the study center or cyber café and has to depend on their timing for technology use. Such type of access is devoid of the freedom and flexibility that characterize direct access but the main advantage is that it is economic to the learners. So for an online programme, the programme/course designer/instructional strategist has to determine the percentage of learners enjoying direct / individual access to computer and internet. In developing countries like India, access to certain technologies like computer, Internet, broadband is yet to make inroads among all sections of the population. Many still lack direct and individual access to these technologies. In case the target group is unable to access the technology being integrated, then in spite of all other parameters being satisfied, the technology would take the educational programme out of reach of the learners.

17.4 PEDAGOGICAL STRENGTHS AND WEAKNESSES

The pedagogical strength and weakness of technology to be selected and used for educational purposes is also a parameter that determines if the technology is appropriate.

Technology has to be used in education as a tool for furthering learning. Hence it is to be assessed if the objectives /learning outcomes of the course could be fulfilled in a better way by a particular technology. The nature of the content, assignments and activities have to be considered. For some type of content print or audio medium may suffice while some require demonstration and hence require video. A team activity may require audio/videoconferencing facilities. Even the evaluation part has to be considered. If there are to be online assignments and evaluation, then learners' access to the required technology is to be ascertained.

Let us now discuss a little more about the pedagogic appropriateness of technology.

Objectives of a lesson/unit: According to Rajeshwari and Mohan (1996) the objective(s) set for a lesson is important for media selection. The expected behavioral outcomes at the post-teaching stage that have been set at the pre-teaching stage, should be facilitated by the technology chosen. It has to be decided by the teacher which technology would facilitate the attainment of the terminal behaviour by the learners (Singh, 1988). Let us study a few examples in this regard.

Examples:

- i) Objective: Development of awareness about the economic impact of AIDS epidemic
Technology: Audio and/ print technology may suffice.
- ii) Objective: Development of certain skills for driving an automobile
Technology: Computer with facility for simulation
- iii) Objective: Development of positive attitude (affective domain) towards human rights.

Technology: Visuals would evoke strong responses and arouse sentiments. Hence, a video programme would be appropriate technology.

Thus, the objectives to be achieved have a bearing upon the appropriateness of technology chosen for teaching.

Content: The nature of the content to be taught is to be considered for judging which technology would be appropriate. For content related to historical process or architecture, video programmes, films and slides could be appropriate. For content related to numerical data, print teletext through computers could be a better choice (Bates, 1984). When the content is such that the learning has to proceed through logically arranged arguments and counter arguments then discussions, debates recorded in audio programmes would be appropriate. But when, content involves comparisons, say of healthy tissues and diseased ones, multi image technique involving simultaneous projections of more than one visual through slides/transparencies, videos would be more appropriate.

Method of teaching: Today educationists are in favour of constructivism whereby the learner explores, discovers and constructs knowledge and thereby develops mental abilities such as reasoning, analyzing, inferring, etc. Hence technology that allows self learning through exploring, discovering and processing the information obtained through computer and the Internet are suitable.

Teacher: Pedagogical value of technology also depends on the ability and the will of the teacher to extract full benefit out of it. A technology with all its pedagogical strengths may be inappropriate if the teacher cannot operate it. For instance, not all teachers can handle a projector and the films may get damaged. Preparing slides also requires certain skills. Even the tape of a simple audio cassette may get entangled if it is not placed properly. Many teachers are yet to develop the competence to use computers. Again some do not have a positive attitude towards technology for teaching.

Learner: A technology could be appropriate only if it suits the requirements of the learners. For learners with difficulty in reading, print medium whether on paper or as text in computer will not be appropriate and audio could be appropriate. For young children with less attention span lengthy radio talks, recorded discussions would not be appropriate. Powerful visuals would be required to retain their attention. Technology that allows greater control by learners through play back systems, facility for browsing is more suitable from the learners' point of view. Broadcasts and telecast do not allow learning at one's own pace. Their fixed timings also curtail the freedom and flexibility of their use and hence may not be fully appropriate when viewed from this angle. Size of the learners group is also important. Projected media, audio-visual media can be appropriate for large groups. The ability of the learner to operate the technological devices like computer also determines the appropriateness of technology.

17.5 AFFORDABILITY

One of the most important parameters to be considered for adjudging the appropriateness of a technology is the economic factor associated with it. Right from the capital investment that is requiring in procuring the technology and developing the necessary infrastructure, the recurring cost involved in operating and maintaining are to be considered vis-a-vis the funds available and the budgetary allocations of the institution for technology. In case the media to be mounted on the technology is also to be produced by the institution then the cost incurred in media (audio/video programmes) production is also to be included.

According to Rusby and Howe (1986) in one sense, economics is the ultimate reality since most other problems can be traced back to funding. A particular technology can be deemed to be appropriate only if it does not strain the financial resources. The technology selected has to be cost effective, i.e. for the input in terms of cost, the output i.e., benefits accrued from the technology should be to the maximum extent. The cost factor is therefore to be considered for the evaluation of the appropriateness of technology. While selecting technology it has to be seen that the escalation in costs is not unrealistic.

The cost factor associated with technology is of special significance in the developing nations. Budgetary allocations of schools often may not permit the use of sophisticated technology. Hence inexpensive ones like certain audio-visual devices could be appropriate in situations with lower budgets. Such technology can be procured at a low price and also do not require costly infrastructure. Expensive technical devices like projector, computers, etc., lying unused in schools are not uncommon. This makes investment in such technology wasteful. Lack of funds to set up infrastructure necessary to operate them or the lack of competence &/ attitude of the teachers may be the factors that have come in the way of their use. It would be advisable to find from institutions already using/ having invested in the technology about its advantages and disadvantages. Collection of feedback and analysis of data, regarding use of technology and the benefits accrued from it by learners should be a continuous process. The range of products available, their relative costs, features, maintenance services provided by vendors, etc. need to be considered before investing in them. Simpler and less expensive technology that can be operated with the available infrastructure by the teacher would be appropriate in some situations. Thus we see that technology, which can be afforded by the institution in terms of the cost incurred in purchasing and operating is appropriate.

Check Your Progress 1

Answer each of the following questions briefly:

1. What is meant by direct access to technology?
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2. What are the pedagogical weaknesses of radio over print technology?
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3. Why is the cost factor an important criterion for technology selection?
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17.6 MAINTAINABILITY

Procuring technological devices is not enough. They have to be maintained regularly so that they function smoothly. Maintenance of technology ensures that they prove to be cost effective in the long run i.e., from the investment made in technology; benefits can be accrued for a long time if there is proper maintenance. However, maintaining technological devices requires expertise and skill. In case of certain technical devices the user may enter into a special contract with the vendor who takes up the responsibility of regular maintenance. Besides, guarantee and warranty given with product also have to be checked. At times, annual maintenance contracts may also be signed. But in educational institutions especially those with resource crunch, it would be more practical to train some teachers and even students to carry out minor repair work. Hence, whether maintenance of technology would be possible is to be considered at the beginning rather than the institution later having too many non functional gadgets. Even sudden power cuts and voltage fluctuations may damage electronic gadgets unless systems to safeguard against such events are installed. In such case, purchase of these devices too need to be considered. Printed text, radio, television, slides, transparencies, etc. need minimum maintenance. Audio and video tapes also may get damaged but CD and DVD are more durable. But infrastructure for Internet and conferencing facilities need care.

17.7 EASE OF USE

Another important parameter that would be a basis for deciding the appropriateness of technology is the ease with which it could be operated. One of the criteria for adjudging a technology as modern is its being 'user friendly' i.e. the user should find it easy to operate and use. For example the cumbersome cameras of the past that had to be covered with a black cloth for photography have been replaced by digital cameras and automatic ones that can click photographs themselves and even help develop prints within no time. Similarly speedy and portable printers are replacing the heavier ones. Soft wares for computers are now-a-days developed in such a way that even a novice can use them. Since the last several years windows with icons have done away with the need to memorize the keys or their combinations for different functions. Instead of typing laboriously on the keyboard, text can be word processed by dictating it out to the voice-sensitive software. A user therefore need not require fast typing abilities. Fast and effective learning will be aided by technology that is easy to use. A learner or a teacher who has to fumble with technological devices while using them may get frustrated and feel discouraged to use them. Therefore, ease of operation of the technology selected is surely an important factor.

Now let us have a look at the strengths and weaknesses of different types of technology with the help of the following table.

Strengths and Weaknesses of Different Types of Technology

Technology	Strength	Weakness
Print technology	Portable, economic, easy to produce, update, and store, independent of infrastructure requirements, easily maintained, conveys voluminous information, and allows easy browsing	Impact on learner lesser since only one sense (sight) is used.
Projected media slides, transparencies, still pictures, film strips)	Helps in visual identification, can show enlarged versions, easy to produce, economic, portable, can teach groups	Audio effect is lacking. Films are fragile than slides, does not allow browsing
Audio technology	Radio reaches vast millions, useful for rapid dissemination of information, economic, portable, stimulates imagination, easily accessible; Cassettes & CDs allow learners greater control.	Lacking in visuals, unsuitable for certain types of learning such as processes
Audio Visual Technology	Can capture live events, helps in retention of learning since two senses are involved, cassettes and CD-ROM allow replay, DVDs and videotapes can smoothly join frames and present continuous flow of visuals or enhance time intervals, easy to duplicate	Expensive, not so portable, infrastructure requirements are there; production cost is high, difficult to upgrade
Satellite-mediated communication technology	Audio and video conferencing provide interactivity with immediate feedback; Can connect and reach highly scattered learners.	Expensive, heavy capital investments required
Computer	Multidimensional effect, provide text, visuals and sound, can provide simulation effects, storing, processing & retrieval of information easy	Desktops unlike laptops and simputers not portable; expensive
CDROM	May include content in multimedia format with hyperlinking & navigation facilities	A computer is needed to run it. Learner can control pace of learning.
Internet	Vast repertoire of information that can be surfed and downloaded, global knowledge and local resources like libraries (through local area networks) can be accessed, Aids constructivist learning. Allows usage of other techniques like chat, e mail. Conferencing, exchange of IPods, long distance telephonic calls economically, etc.	Expensive and needs complicated infrastructure
Conferencing facilities (audio, audio-video, computer)	Helps online seminars, group discussions, meetings, etc.	Expensive and needs complicated infrastructure

From this table it is clear that the choice of technology cannot be prescriptive, rather it depends on a wide array of factors. Technology selection if done wisely may enhance learning but if not done prudently, learners and teachers may have to grapple with it, which may slow down learning.

Activity

Imagine yourself as a teacher of a topic (of your choice) for a particular grade. Which technology do you consider possessing the required pedagogical strength and why?

17.8 TECHNOLOGY OBSOLESCENCE

The term obsolete refers to something which is no longer useful or that which has lost its utility. Obsolescence i.e. becoming out of use is a process that holds good mainly in the field of technology. In ancient times the technology used to start a fire involved two stones, which were rubbed against each other. Weapons were made of stones and bones. Today even in our wildest dreams, we cannot think of such primitive techniques. They have become obsolete in the true sense and have been altogether discarded. Since the last few decades technology is advancing by leaps and bounds and so is the rate of obsolescence. New electronic devices that are faster, lighter, more user friendly, consume lesser energy and are more powerful are fast replacing the heavy, slower and less powerful technologies.

The phenomenon of technology obsolescence is not only due to the race of the manufacturers to produce better technology, but is also triggered by the modern society's quest for change. Earlier the feeling was that a thing should last for a long time. But now for many such a feeling has given way to the idea that things should be changed frequently for new ones. People today change their cell phones, cars, music systems, etc. more frequently than they did in the past. Disposable things are today popular. At the same time, computer companies and software developers are working at break neck speed to race ahead of others to develop products with greater power, speed and convenience. Such innovations result in rapid obsolescence of technology.

Technological obsolescence is a direct fall out of rapid progress and evolution in this field. For example, new media for storing digital information is rapidly replacing older ones and reading devices for these are become unavailable. Hence one of the major challenges of processing digitalized information is the obsolescence of the media storing it. Although such media may still be there but the technology required to access the information they hold may have a shorter life span due to obsolescence. For instance, you may find it difficult to play the songs recorded in old gramophone records in modern devices if you have problem with your old player.

As per Moore's law, the ever enhancing speed of computing force is leading to newer versions leading to rapid obsolescence of the older ones. But many of the technologies can still be used for many more years to come in spite of there being better models available. The urge to change models frequently would prove to be costly for an educational institutions. This is useful especially true for the educational institutions of developing countries. Unlike industrial houses and business sectors that can afford to keep pace with evolving technology, in the educational institutions with limited funds, discarding old technology is always not feasible.

Not all educational institutions of the developing world can afford to invest in technology. If technical devices are procured, they cannot be disposed off so frequently for new ones. But full use has to be made of them to make them cost effective. It has to be checked if the technology is latest and how far it is amenable to up gradation. One can also delay the purchase if a new version is in the offing. The issue of technology obsolescence would arise in every few years but if the equipment in spite of it having

become obsolete, continues to function reasonably well then they could be retained. Even decades old technology may serve the needs of educational institutions. This is the reason why corporate houses often donate their old computers to schools.

Obsolescence of technology can be dealt with in the following ways.

- If it is affordable to discard old technology in favour of new ones then, anticipating the impending obsolescence, it may be done prior to the technological getting totally obsolete. It would make reselling difficult and these issues have to be considered at the planning and budgeting stage (Kistan, 1996).
- Continuing with obsolete technology till they function reasonably well. This would be economic and also save the institution from the necessity of training its staff to use new ones. This practice of 'amortizing' otherwise obsolete technology could work especially well if there is proper maintenance and care. Depreciation of computer being rapid, amortization i.e., deliberate decision to continue with obsolete technology is done more commonly.
- Upgrading technical abilities of a device by adding to it new facilities and making it more powerful can be done. For example a computer may later be fitted with a CD drive. It is however, advisable to go for up-gradation of an obsolete technology only to the extent to which it can take it. For instance to have sophisticated features like the Internet, pen drive, etc. it is better not to invest in a very old computer.
- To keep away the problem of obsolescence for a longer time it is advisable to invest in the latest one available.

Check Your Progress 2

Answer the following questions briefly:

1. Describe two technologies in the field of education that are on the verge of becoming obsolete today.
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2. Why is it necessary to go for amortization?
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3. Explain any two methods to counter obsolescence?
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17.9 SUMMARY

We have studied in this unit some general considerations for selection of appropriate technology. Unlike in the past we now have a variety of technologies to choose from. A technology, which is not appropriate, would not help in fulfilling the objectives of providing instructions. The technology selected should be the means to facilitate teaching and learning and its use should not be an end in itself but fit into the vision and mission of the institution.

There are several factors that are to be considered before going for a particular technology. The choice should be based on sound reasoning, guided by certain well-defined criteria. Access of the learners to a technology is a criterion that merits prime consideration. Unless the technology is accessible, the question of its facilitating learning does not arise. Another factor, which is the pedagogical strengths and weaknesses of the particular technology, is also to be considered. Whether it facilitates the fulfillment of the objectives of providing instruction, its suitability for the transaction of the content, whether it encourages independent learning, etc. are to be considered. The expenses involved, ease of maintenance and user friendliness are also important factors for selecting it.

A phenomenon that is a cause of concern for the users of technology, and especially for those with limited financial resources is the obsolescence of technology. Due to the rapid evolution of technology, its obsolescence has also accelerated. Keeping pace with it requires frequent up-gradation, change and monetary investments. However, in view of the paucity of funds in most of the schools of the developing world different measures like amortization- that is continuing with old technology as long as possible, going for the latest model whenever a purchase is made, etc. have to be adopted.

17.10 UNIT END ACTIVITIES

1. Make a list of technologies that are available in your study center. Make a note stating their strengths and weaknesses for imparting education to distance learners.

17.11 REFERENCES AND SUGGESTED READING

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You may visit websites on topics discussed in this unit, like the following:

Tom Eglennoff: Planned Obsolescence or a Plot, <http://www.smalltownmarketing.com/speaker.html> (Retrieved on 27.7.07)

National Library of Australia: Preserving Access to Digital Information) <http://www.nla.gov.au/padi/topics/13.html> (Retrieved Oct.2004)

Welch, E. (1999): <http://www.wekcgwrote.com> (Retrieved on 27.7.07)

https://courses.worldcampus.psu.edu/facdev101/content/lesson6/lesson6_02.shtml
Retrieved on 27.7.07

<http://www.nctp.com/downloads/guidebook.pdf> Retrieved on 27.7.07

http://www.iacis.org/iis/2005_IIS/PDFs/Charlesworth_McKinney.pdf Retrieved on 28.7.07

<http://elearningtech.blogspot.com/2007/07/podcasting-has-no-inherent-pedagogical.html>
Retrieved on 28.7.07

17.12 CLUES TO CHECK YOUR PROGRESS

Check Your Progress 1

1. Access due to private possession or immediate purchase;
2. Cannot provide visuals, audio programme may turn monotonous;
3. Schools of developing world often are with limited budget;

Check Your Progress 2

1. OHP, slides
2. Keeping pace with technological evolution is expensive
3. Amortization, purchasing the latest models, etc.