

# **Approaches of Educational Technology**

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Discussion carried out in analyzing the concept of educational technology helped us to conclude that educational technology is a multifaceted concept. This has led to view it in terms of some specific types of approaches. Accordingly, Lumbsdaine (1964) has listed three distinct approaches of educational technology.

1. Educational technology I or hardware approach.
2. Educational technology II or software approach.
3. Educational technology III or systems approach.

Let us discuss these types or approaches.



## **Educational Technology I or Hardware Approach**

This type of educational technology has its origin in physical sciences and engineering and is based on the concept of service, i.e., using technology in education (Silverman 1968). While teaching in a big hall, a teacher uses microphone for making his voice audible, he may be said to approach such type of educational technology for making his teaching effective. In this sense, audio-visual aids such as charts, models, slides, filmstrips, audio cassettes and sophisticated equipment and gadgets such as radio, television, films, projectors, tape recorder, record player, video, teaching machines and computers may mean to use the technological advancement in the world of communication for educational purposes. Such type of mechanical and technical revolution has almost mechanized the teaching-learning process. The mass media movement, a result of this approach, is now contributing a lot to reach the educational benefit to masses with great ease and in a cost-effective way. In this way, hardware approach to education has resulted in improving the efficiency of educational means and reducing the cost of education. However, this type of technology or approach tries to enter education from outside, operating more in isolation than in combination. Almost all the material and equipment of hardware approach originally belong to areas other than education and are being borrowed and utilized for educational purposes.

## **Educational Technology II or Software Approach**

While the first type of educational technology (hardware approach) has originated from the physical science and applied engineering, the second type of educational technology (software approach) owes its origin to the behavioural sciences and their applied aspects concerning the psychology of learning. Psychology of learning provided solid technology for bringing the desirable behavioural changes in the students and thus serves the cause of education by laying down definite instructional procedure, teaching behaviour and behaviour modification devices. It is in this sense that the second type of educational technology is sometimes referred to as instructional technology, teaching technology or behaviour technology.

Having originated from the theories of learning, this type of technology tries to adopt a process-oriented technique for the production of suitable teaching-learning material, teaching-learning strategies, and evaluation techniques for the optimum results in the process of teaching and learning. Thus, in this type and approach, educational technology basically stands for the technique of developing and utilizing software and, that is why, it is referred to as the software approach. In this sense, the materials, such as the programmed material and teaching-learning strategies based on psychology of learning are usually known as software and the equipment and gadgets are called hardware. In hardware approach, we are more concerned with the production and utilization of audio-visual aid material, sophisticated instruments, gadgets, and mass media for helping the teacher and learners to achieve better results. On the other hand, in software we try to exploit the psychology of learning for the production and utilization of software techniques and material in terms of learning material, teaching-learning strategies, tools of evaluation, and other devices to soften and smoothen the task of teaching and learning.



## Distinction between hardware and software technologies

Distinction between the hardware and software technologies may be made clear through the classification carried out in Table 1.1.

**TABLE 1.1** Hardware and software technologies

<i>Hardware technology</i>	<i>Software technology</i>
1. Hardware technology has its origin in physical sciences and applied engineering.	Software technology has its origin in behavioural sciences and their applied aspects concerning psychology of learning.
2. It is more concerned with the production and utilization of audio-visual aid material and sophisticated instruments, and mass media for helping the teacher and learners in their task.	It makes use of psychology of learning for the production and utilization of software techniques and materials in terms of learning material, teaching-learning strategies, and other devices for smoothening the task of teaching learning.
3. It tries to adopt product-oriented approach. What is produced through software technology in the shape of teaching-learning material and strategy gets utilized by the hardware instruments and gadgets for effective teaching-learning.	It tries to adopt a process-oriented technique or approach for the production of teaching-learning material. What is produced here is made available for being used by the hardware appliances.
4. It is based on the concept of service. It provides services in the field of education much in the same way as provided by telephone, electric heater and bulb in our day-to-day life. In this sense, hardware technology clearly stands for making use of technology in education.	Software technology does not provide direct services to its users as provided by hardware technology and applied engineering. It helps in the production of software material which are used by the hardware appliances and gadgets for delivering their service to the users, i.e. the teachers and learners.
5. As examples of the appliances and gadgets used in hardware technology service, we can name radio, television, tape recorder, video, slides and film projectors, teaching machines and computer.	As examples of the material produced through software technology, we can name programmed learning material, teaching-learning strategy on psychology of learning (put into practice in the shape of charts, pictures, models, slides, films, trips, audio and video cassettes, software packages, etc.).
6. Hardware technology needs the services of software technology for its use and functioning. It cannot go without the aid of software technology, e.g. computer hardware in the shape of a machine like device	Software technology proves most useful and productive in the case if it is assisted and made into use by the hardware appliances and gadgets. However, it can itself deliver services to the users without any aid from the hardware

(Contd.)



**TABLE 1.1** Hardware and software technologies (Contd.)

<i>Hardware technology</i>	<i>Software technology</i>
<p>is of no use if it does not make use of software service both for its operation as a machine and for its multidimensional utilities. The use of application and utility software is a must for taking any service from the hardware technology of the computers.</p>	<p>technology, i.e. one can use programmed learning material, a graph, or a text directly for the individualized as well as group instructions.</p>
<p>7. Hardware technology has its mass appeal and utilization. It can contribute a lot in handing over the educational benefits to the mass with greater ease and economy.</p>	<p>Software technology has no such wide application and appeal to the masses as found in the case of hardware appliances like radio, telephone, computer application, etc.</p>
<p>8. Hardware technology has resulted in improving the efficiency of educational means and reducing the cost of education. A teacher may handle a big class with the help of hardware appliances such as microphone, slides and film projectors.</p>	<p>Software technology contributes to increase the efficiency of the teachers as well as the learners. However, it lags behind in the task of improving efficiency and reducing cost of education.</p>

## Role of hardware and software technologies in modern educational practices

Technologies, by their nature and characteristics, stand for smoothening the execution process of a task leading to achieve the best possible results or outcomes from the execution of that task. The same is true for hardware and software technologies employed in the field of education. Here, they stand for bringing improvement in the process and products of teaching-learning from all the possible angles. However, we will try to limit ourselves in discussing their roles in some of the important modern educational practices.

**1. Individualization of instruction:** Individualization of instruction is a major trend in the modern educational practices and is the demand of the hour. The psychology of individual differences has brought the necessity of organizing instructional process according to the needs, interests, pace and abilities of the individual learners. Use of hardware and software technology may help in this task on account of their very nature and possibility of application. In brief, we can highlight the role of hardware and software technologies on this account by stating some of the materials and equipment as follows:

- Programmed instructions, programmed textbooks, and programmed learning modules.
- Teaching machines, computer assisted instruction and computer managed learning.
- Video and audio recorded learning and instructional material.
- Email, Internet, teleconferencing and other online educational facilities.



- Special aid material, equipment and appliances used for special educational and adjustment measures for the disabled (physical, mental and learning disabled).
  - Special provisions and facilities for the creative and gifted to nurture and develop their individual capacities according to their pace and interests.
2. **Use of multimedia and multi-sensory approach to teaching-learning:** Hardware and software technologies help the teacher as well as learners for making a proper and judicious use of the multimedia and multi-sensory aid material, equipment and principles of teaching-learning, derived from psychology and technology of teaching. It has made the use of the following possible:
- All the sensory organs sense of sight, hearing, touch, smell and taste for the acquisition of the desired teaching-learning experiences.
  - Multimedia, material and appliances involving hardware and software technologies for sharing desirable teaching-learning technologies.
  - All the relevant and needed teaching-learning methods, devices, and strategies, well-accompanied and aided by hardware and software technologies.
3. **Management of the affairs of educational practices in an efficient and productive way:** Use of software and hardware technology may help the teacher in the task of managing his affairs related to the educational and professional responsibilities in the spheres as follows:
- Planning of teaching-learning.
  - Organization of teaching-learning.
  - Leading teaching-learning.
  - Controlling teaching-learning.
4. **Providing proper input and process for the best possible outcomes (products):** In the true spirit of the system engineering, use of hardware and software technologies can help the educational and instruction systems to make all possible efforts for providing adequate input and the needed process organizations to arrive at the best possible outcomes, i.e. realization of stipulated teaching, learning objectives in a most efficient and cost-effective way.
5. **Fulfilling the expectation of distance and correspondence education:** The demands of today's education and modern educational practices are putting increasing emphasis on the extension of distance education and correspondence educational facilities to the increasing number of learners. In fact, distance, correspondence and online education is the need of hour and this need can only be better realized through the services of hardware and software technologies.
6. **Making the task of teaching-learning interesting, purposeful and productive:** Use of hardware and software technologies help both teachers and learners in the realization of their teaching-learning objectives by making the task of teaching-learning quite interesting, purposeful and productive through the provisions as follows:
- Suggesting suitable teaching-learning methods, devices and strategies based on the psychology of teaching-learning.
  - Suggesting suitable maxims and principles of teaching-learning based on the theory and practice of the technology of teaching-learning.

- Putting various types of audio-visual aid material and equipment at the disposal of teachers and learners.
- Providing a variety of instructional and self-learning material suiting the varying needs of teaching-learning situations and individuality of the teachers and learners.

As a result of the help derived from the above-mentioned provisions, one can enjoy the serious task of teaching or learning leading him or her for the proper realization of his or her goals. A teacher by using transparencies through overhead projectors, interacting with students in their language laboratory, and making them discover the facts by observing a video film and audio recording, or taking online tutorial help through e-mail or online-conferences may always help his students relish the desired fruits of their efforts.