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Modern Educational Technology Training: Definitions, Components and Functions

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Abstract

The paper presents a review on the practice of modern educational technology in high school. The term "educational technology" is now a common termnology in science and education. Generally, it is described to be composed of three facets, namely: (1) scientific, (2) procedural and descriptive, and (3) procedural effective. In order to determine a universal structure for educational technology, the authors identified the following components; (1) the conceptual part, (2) substantive part, (3) procedural part, and (4) methodological and software support part. It is noted from our analysis that, a good technical information technology is needed to develop programmed instructions, which are associated with the unique capabilities of modern computers and telecommunications. The main goal of modern information technology education is to prepare students to function holistically in the existing information society.

Keywords: Educational Process, High School, Modernity, Pedagogical Technologies Training, Student, Teacher.

Introduction

The ideal modern teaching persona is not to only develop an encyclopedic memory, but a flexible mind with a rapid response to all new information. It is expected that teachers should have full, well-developed knowledge which can further produce independent actions with good indicative skills and creative abilities. "*One of the most serious shortcomings of our school practice is that teaching children is mainly done by the teacher*" – this opinion by V. Sukhomlinsky is still applicable to today's educational process (Sukhomlinsky, & Soloveichik, 1977; Sukhomlinsky, 1981).

The development of the creative potential of the student is treated today as the main task of higher education. To implement this aim, we must first consider the student not as a sum of external influences, but as a coherent, active being. In this sense, the main essence of restructuring of the educational process is to transform the student - not as an object but above all, the creator of his/her own "I". Consequently, the learning process should be constructed so as to promote the conscious participation of the individual who learns the discipline.

Presently, addressing these urgent concerns may be possible only through the extensive introduction of new educational technologies that are aimed at the comprehensive development of students. According to one of the earliest definitions, "*educational technology is a field involved in the facilitation of human learning through systematic identification, development, organization and utilization of a full-range of learning resources and through the management of these processes*" (Association for Educational Communications and Technology, 1972).

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Currently, educational technology is seen to be composed of three fields of use. These include: *"(i) Technology as a tutor (computer gives instructions and guides the user), (ii) Technology as a teaching tool and (iii) Technology as a learning tool"* (Stošic, 2015, p. 111). Learning with innovative technologies are much efficient than the old classical form of education. These technologies are also able to integrate the learning processes used within classical education, training, career planning, and continuous education. As observed, several studies have been conducted on the use of educational technology, but little has been done regarding the scientific analysis of existing educational technologies which are used in the educational process.

Method

The study was conducted as part of a comprehensive program for the Research Department of Theory and Methodology of Professional Education at Kharkiv National Pedagogical University named after G. S. Skovorody. The main project is titled; "*Improving the effectiveness of the educational process in secondary and higher education*" [LC number 200199004104].

During the study, the following methods were used:

i. theoretical analysis of the sources of problems,
ii. examination of electronic educational resources, and
iii. synthesis and evaluation of the results.

Results and Discussion

The Term "Educational Technology"

Lately, the concept of "educational technology" is increasingly spreading across science and education. Terms like "educational technology", "technology education", "technology in learning", and "technology in education" – are widely used in psychological and pedagogical palette and have a lot of formulations, depending on how the authors imagine their structure and component of the educational process.

The etymologly of the word "technology" means "*knowledge of material processing*." Technology also includes the art of the process, so personalized. The process always involves a sequence of operations using the necessary means [materials, tools] and conditions. In procedural understanding, technology answers the question: "*How do you do (what and in what ways)?"* In practice, technology goes with innovation. Thus, "innovation" has to do with updating the learning process and relies mainly on domestic factors (Savelev, 1990). "Innovative Technology" is a systematic purposeful set of methods and means that cover the whole process of learning to obtain results. The system is based on the internal conditions of learning, thus, "educational technology" is related to the ideas and experiences of psychology, sociology, systems analysis etc. (Burkova, 2001).

The concept of "educational technology", known from the XX century were founded in the works of A. Uhtomskyy, S. Shatskyy, V. Behtyerev, and I. Pavlov. In subsequent years, the essence of the concept was extensively published by researchers such as; T. Ilyina, S. Shapovalenko, L. Pressman, D. Chernilyevskyy, O. Filatov, I. Lerner, V. Bespalko, M. Klarin, V. Buhvalov, M. Sybirska, B. Horyachov, V. Huzyeyev, A. Kushnir, V. Monahov, H. Selyevko, M. Choshanov, V. Yevdokymov, I. Prokopenko, V. Palamarchuk, S. Sysoyeva, O. Pyehota, T. Nazarova and others (Bespalko, 1989). In foreign pedagogical theory and practice, problems presented in educational technology research were done by scholars such as K. M. Culp, M. Honey, E. Mandinach, M. Clark, D. C. Duhaney, F. Percival, H. Ellinhton, P. Mitchell, M. Woolman, S. Spaulding, S. Wedemeyer, R. Thomas and others (Culp, Honey, & Mandinach, 2005; Duhaney, 2001; Klarin, 1989; Wells, & Lewis, 2006).

Likewise, "educational technology" reflects the way specific educational material (concepts) develops within respective subject, topic, and issue. In esscence, a comprehensive look at educational technology cannot be complete if it fails to offer special needs of educational content, it forms and methods (Sysoyevoyi, 2001). Different authors have given different definitions over the years. According Klarin (1989), educational technology means the totality of the system and the functioning of all personal, instrumental and methodological tools used to achieve educational goals. "Educational technology" can also be deifned as a set of tools appropriate to the needs and capabilities of the individual and society that are theoretically grounded in teaching and educational systems of socialization, personal and professional development and self rights in an

educational institution. This also offers teachers with optimal resources and guarantees the efforts of all participants in the educational process to ensure an effective implementation of consciously defined educational goals (Sysoyevoyi, 2001). Others have also defined "educational technology" as a joint industry of educational knowledge (Pyekhota, Kiktenko, & Lyubars'ka, 2001).

Summarising from these definitions, educational technology can be represented in three aspects: scientific [educational technology – part of science teaching, designing educational processes in educational systems]; procedural narrative [description, algorithm process, set the goals, content methods and tools to achieve guaranteed results intended purpose]; an effective procedural [implementation process, the operation of personal methodological tools and pedagogical tools]. Though, the concept of "educational technology" is very common in science and education, there are diverse approaches to describe it.

Characteristics of Modern Educational Technologies

The analysis of "educational technology" shows the following structure:

i. Conceptual part [brief description of ideas, hypotheses, principles that help its understanding];
ii. Content part [learning objectives, scope and nature of educational content];
iii. Procedural part – production process [organization of educational process, methods of learning among students, methods and forms of teacher training process diagnostics];
iv. Software and methodological support [curricula and programs, teaching and learning aids, learning tools and diagnostics].

A critical look at the structure of educational technology may not provide the same high level educability and education for all students; the outcome is influenced by many factors. These factors may include: the level of pedagogical skill of the teacher, intellectual and emotional background of the group, the material base of the institution and more. Important basic criteria that educational technology need to meet include the follwoing:

i. Conceptuality [relying on a concept that includes philosophical, psychological, educational, social and pedagogical justification for educational purposes];
ii. Systematic [educational technology must have all the features of a system];
iii. Process logic [the relationship of all its parts, integrity];
iv. Controllability [goal planning, design learning, staged diagnosis – varying means and methods to correct results];
v. Efficiency [optimal cost, guaranteed to achieve the intended result – a certain standard of education];
vi. Reproducibility [possibility of other similar conditions as other business to make use].

Modern educational technologies come from sources like:

i. Social transformation and new pedagogical thinking;
ii. Social, educational, psychological science;
iii. Modern advanced teaching experience;
iv. Historical domestic and foreign experience [heritage of previous generations];
v. Folk pedagogy (Bespalko, 1989).

The leading principles that matter to educational technology include:

i. The principle of orientation - clearly and thoroughly defined goals [objectives formulation is either through the contents of an object or its parts through the work of the teacher];
ii. The principle of elected training – didactic choice [this principle implements students' rights to freedom of didactic choice];
iii. The principle of subjectivity training [individual subjectivity (personality) appears in integrating and evaluating facts, events, events of reality based on personal values and significant internal guidelines. This should help individuals to know themselves (self-determination and self-realization, not predetermined shape properties)];
iv. The principle of variability study [requires original and new pedagogical impact of students' perception. As subjects constantly change, the teacher should be able to naturally and organically change their position according to the new situation by providing a dynamic learning process];
v. Pedagogical competence principle [dictates the optimal ratio of different types of students (e.g. training, employment, social, sport, art), gaming and non-gaming, traditional and

original forms of educational work, mind and emotions of teachers in student life, providing educational measure];

vi. The principle of corresponding human nature [this means building a learning process that best meets the natural mechanisms of assimilation of social experience and provides students the opportunity to develop their intellectual capacities).

vii. The principle of professional similarities and borrowings [demonstrating the close relationship of educational technology to other types 'chelovekovedcheskih' activities {theater, rhetoric, psychotherapy, social psychology, aesthetics}, requiring mandatory teaching professional interpretation of borrowing to convert them into actual pedagogical tools] (Burkova, 2001).

Classification of Educational Technology

Among the educational technologies are the following groups: educational technology for the target orientation, educational technology for the nature of the relationship between teacher and student, and educational technology by means of training (Savelev, 1994; Sokolov, 1995). From this review, the following groups (types) of educational technologies can be identified to emit certain types of technologies:

i. Pedagogical technologies for target orientation:

- The level of use [for general technology, subject specialization technology, module-rating technology];
- The contingent consideration of students [gifted education technology, technology for working with "difficult" students, the mass technology, advanced technology education, etc.];
- The direction of modernization for traditional education [based on revitalization, based on the intensification of activities based on the performance of education, copyright technology based on humanization and democratization of relations, based on new didactic and methodological organization {reconstruction} materials];
- The nature of the content [teaching and educating, general and professional, humanistic and technocratic].

ii. Teaching technology for teacher-student relationship:

- Depending on learners [authoritarian technology-centered, technology cooperation, free education, esoteric technology].

iii. Pedagogical technologies by means of training:

- The organizational forms [lectures and seminars, individual, group, collective, in pairs, academic and club [interest] individual and differentiated learning];
- The dominant means [dogmatic, reproductive, explanatory, illustrative, software, problem, dialogue, developing education, flexible learning technologies, gaming technology, self-development training, computer technology];
- The type of cognitive control activities [classical learning, learning through audiovisual TMT, the system of "adviser"; learning through textbooks, the system of "small groups" – group, differentiated teaching methods, computer training, the system of "tutor" – individual training, "training program", for which there are pre-compiled program] (Bespalko, 1989)
- The focus on personality structure [Information technology – designed to build knowledge and skills; operational – aimed at creating ways of learning activities, self – formation mechanisms of self-identity, heuristics – the development of creative skills] (Vitvyts'ka, 2003).

New Information Technology [NIT]

"New information technology [NIT]" is a set of methods and technical means for collecting, organizing, preserving, processing, transmiting and presenting information through computers and computer telecommunications (Zhernovnykova, 2016; Zyazyun, 2001).

"Pedagogy determining NIT" as a form of training methodology and technology for educational process uses the latest e-learning approaches. The components of NIT training generally focus on means and methods of NIT training.

By means, NIT assign training through the following components:

i. Hardware [classes teaching computers, local and global educational computer networks, electronic equipment demonstration].

ii. Software and methodology [software and methodological tools, computer courses, instructional software and systems];

iii. Teaching (teaching manuals, specifications and technical documentation, organizational and instructional materials).

By methods, NIT also assign training through the following components:

i. Traditional learning model [fragmented computer use in the classroom or as a trainer for demonstration, monitoring and testing knowledge, scientific and research work of students];

ii. Alternative learning model [research work in computer laboratories, computational experiments, telecommunication projects educational, distance learning] (Okomkov, 1994).

Functions of Educational Technology in Learning

The functions of educational technology are both essential and numerous. Its main purpose is to prepare students for a full life in the information society (Lozova, 2000; Lozovoyi, 2005). Currently, educational technology is being applied in the following learning methods:

First is the dogmatic learning approach. This is based on dogmatic learning – a way to study the facts and phenomena of reality as certain immutable provisions (dogmas) without practice, and human experience. The use of educational technology in dogmatic learning teaches learners to memorize subject materials. It also allows the mechanical reproduction of finished phrases, quotes, extraordinary thoughts, that to some extent, it contributes to the development of mechanical storage instead of individual intellectual capabilities and their independence.

Secondly, it is also applied in an explanatory learning approach. The main purpose of this method is to provide a system of mastering the subjects of scientific knowledge, and related skills. This explains, justifies, comments and enables the comprehension of materials that cannot be learnt through rote memorization and therefore needs comprehensive mental activities. Consequently, educational technology provides the opportunity for independent work, tasks, exercises, translations, preparation of charts, and tables for such purposes. It also incorporates the extensive use of visuals and reproductive nature of learning process.

The next is the problem learning approach. This is the organization of the learning process with the focus on problem situations; identifying problems and enabling students independently or to solve them with the help of their teachers. So, the main tasks of problem-based learning are to use educational technology to develop thinking skills of the individual learners. Again, it enhances their creative skills and promote the capacity of students to solve non-standard problems during active cognitive activities.

The modular learning approach uses educational technology to teach substantive modules. This approach is composed of the following components: target – the purpose and objectives of the study of a particular module. A module is meaningful and presents the basic content in unit terms. It also contains concepts and laws that are the essence of a particular section of the discipline. The analysis indicates each unit module is reflected in the scores that each student gains. Modular learning is associated with a ranking system control; the larger and more complex the module, the more points it is given.

The distance learning approach provides spatial distance learning subjects that interact with each other via telecommunications. This type of learning is built on the use of computer technology. It allows students to access the world and scientific treasures from anywhere where there is access to the Internet to communicate with teachers, professionals, peers from other cities, universities, and experts. It also allows students to choose from the system of training, and can simultaneously be in different virtual classes with their own pace of learning. The simultaneous participation in the Olympiad, where large number of students from different cities has the effect of their creative union and the general cooperation is an example. It allows students to publish their work online and in addition, remove the psychological problems associated with direct communication.

Next is the personality-oriented learning approach. This is also called the student-centered learning. This approach is based on the learner's identity, and self-worth of each person. This means that educational technology develops software based on the unique identification of individual subjective experience, abilities, interests, values, and consequently offers opportunities to realize themselves through knowledge acquisition, training activities, and behaviour.

Another function of educational technology is to provide a developing learning approach. This method is composed of an orientation of the educational process, contents, principles, methods. This promotes different levels or forms potential development of a person [intellectual, sensual, strong-willed sphere etc.]. The main task of the teacher in the process of developing training is to organize educational activities/subjects aimed at developing students' mental abilities, cognitive activities, independence, and cognitive interests using technology.

Finally, the mobile learning, which is becoming very popular in recent times offers learning based on an intensive use of modern mobile equipment and technology. It is closely linked to educational mobility in the sense that students are able to participate in educational activities without restrictions in time and space. The use of mobile technology opens up new opportunities for learning, especially for those living in isolated or in remote places who faces difficulties in accessing proximal traditional learning institutions. The ability to study anywhere at anytime, which is characteristic of mobile learning, is becoming the general trend of education in the information society.

Conclusion

The article discusses modern educational technology and give reasons to believe that they are of much importance when it comes to the art and science of teaching and learning. From the many definitions and descriptions of educational technology, the central theme is that it is associated with the unique capabilities of modern computers and telecommunications. Studies of many authors suggest that the main goal of modern information technology education is to get ready – students for a full life in the information society. The newest of modern technology is the technology of mobile learning which is based on intensive use of modern mobile equipment and technology.

Conflicts of Interest

The authors declare that they do not have any conflict of interest.

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