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ОСОБЛИВОСТІ ТЕХНОЛОГІЧНИХ ПІДХОДІВ ДО НАВЧАННЯ

У статті розглянуто поняття «технології» та «навчання», описано технологічні підходи закордонних науковців до навчання у вищій освіті, проаналізовано історичний аспект. Представлено характеристику технологічних підходів закордонних науковців до навчання. Встановлено, що до основних ознак технології відносять проектованість, керованість, коректованість, результативність, діагностичну доцільність, аналіз діючих факторів, ефективність методів, системність і цілісність. Зазначено, що до провідних чинників технологічного підходу відноситься мотивація самостійної роботи з придбання знань, джерела якої знаходяться як у контексті практичної, так і в навчальній діяльності.

Ключові слова: педагогічна технологія, технологічний підхід, навчання, вища освіта.

The state of the problem. The educational process – is an integral pedagogical system. Educational content includes not only learning of the course material, but also the content and way of learning, which is technology and forms of learning activities, teaching methods and diagnostics of the results – to the extent of how it influences on erudition and personal development. Management of the process of studying requires technological approach. It is necessary to realize a profound theoretical analysis of the nature of the educational process as a system, the laws of its functioning and development, as well as the nature of the process of teaching.

In Ukraine the increase of necessity in highly qualified specialists is caused by technological progress in the society. Modern experts must be efficiently and professionally prepared. The problem of teaching efficiency has always been important. Technological progress requires a relevant level from the educational process. On the one hand the intensive development of technologies allows using modern teaching tools. On the other hand the use of new educational tools requires defining of the characteristics of technological approach to teaching for further development of teaching methods.

Analysis of current research. The problems of modern educational technologies are analyzed in works of scholars: A. Savelyev, A. Okolelov, G. Selevko, A. Hutorskoy. M. Klaryn studied innovative teaching models. Pedagogical approaches to teaching were investigated by G. Atanov, V. Nykytayev, etc. However, the issues of technological approaches to teaching are not enough investigated.

The purpose of the article is to study concepts of technology and learning, to describe the features of technological approaches to learning in higher education, to analyze the historical aspect and represent the characteristics of technological approaches to learning.

Methods of research. Analysis, synthesis, generalization.

Main content. In modern meaning the technology of teaching is the complex of issues related to the objectives, content, organization and realization of the educational process [4; 8], the principles and techniques of its optimization and manageability, the increase of efficiency [9, 115–116], a system of methodological, didactic, psychological and pedagogical procedures that carry out the necessary changes in activity [12]; special combinations of methods and techniques of teaching to guarantee the achievement of planned results [3]; systematic method of creation, use and defining the whole process of teaching and learning with the technical and human resources and their interaction, aims to optimize the forms of education [10]. Modern technologies of general education are described in the monograph of G. Selevko [14].

The main features of the technology are projecting, manageability, updating ability, productivity, diagnostic expediency, analysis of existing factors, effectiveness of methods, consistency and integrity. The setting of teaching goals is realized through the result expressed in the actions of the student, i.e. through the concept of erudition. The taxonomy of the objectives in the cognitive area includes knowledge, comprehension, use, analysis, synthesis, evaluation of meaning [1, 365], four-level schemes and their modifications are widespread.

For a long time the teaching technology was understood as the use of technical tools of teaching and the use of computers in the process of teaching. A. Savelyev [13] classifies teaching technologies according to the direction of the actions of students and teachers, the purposes of study, the objective environment, the use of technical tools of teaching, the forms of the educational process organization, methodological problems. It is well-known from the history of teaching technologies that scholastic verbal instruction, which requires mastering the basic principles of subjects from the words of the teacher, dominated till the fifteenth century. Its total inefficiency caused I. Komenskyi to introduce the visual studying under the slogan – it is better to see once than hear a hundred times. «The World of Sensual Things in Pictures» and «The Great Didactics» by Komenskyi initiated the scientific theories of teaching and training in the process of education. Nonoptimality of the visual principle emphasizes the activity-based approach – it is better to carry out the action by yourself than many times to see how others do it [5, 87; 11]. The concept of pedagogical technology was generated by the development of the technical means of teaching and searching for new means to improve the effectiveness of the process of studying, scientific approach to it, which led to the enthusiasm of simple learning devices that, as soon as it turned out, did not give any significant advantages over the printed textual means of programmed learning, which was based on the behavior learning concept. It was based with the hope that action recurrence will give a student expressions, thoughts and ideas, a set of mastered operations. Under the influence of these ideas the operationalism of

P. Bridgman was composed [2, 198], its main idea is that concepts contain only the system of operations by which they are determined. The development of this concept in psychology caused the emergence of neobehaviourism of E. Tolman and K. Hull and introduction of the concept of latent learning that has merely an informative nature without satisfaction of needs [18, 298], but the cognitive and executive aspects of learning leave aside development of abilities. The main task of programmed learning was to develop skills according to educational program that became the mediator between a teacher and a student, but to teach students to think and analyze was beyond its capacity.

Pedagogical technology gives a description, project of the process of student's individuality formation and it must include diagnostic purposes and content of education, didactic processes and organizational forms of teaching. The components of the didactic process are: motivation as a forming of stable student's interest to studying activity and transformation of external purposes into internal needs; cognitive activity of the student, the result of which is knowledge comprehension; teacher management depending on the purpose of study.

Relying only on curiosity does not ensure a firm sustainable motivation, there is a necessity to create motivational problem situations or to set specific cognitive tasks. Method of management depends on the purpose, if the goal is familiarization, presentation, then the type of studying is reproductive. Reproductive technology is appropriate if the goal of studying does not exceed the level of comprehension, it includes lectures, work with textbook, doing practical tasks according to instructions. Reproductive algorithmic technology aims at comprehension of algorithm actions, abstracting and reviewing of educational material, solution of common tasks. Searching heuristic technology is required if the goal is didactic processes focused on the problem-based teaching, didactic games, the actual design, analysis of atypical work situations. Creative technology of studying corresponds with the purpose of studying that aims to reproduce scientific personnel, it includes discussion, problem-solving tasks, preparing and making a research, analysis of results. The technology, the integrity of which is ensured by using three components of didactic system – didactic processes, forms of organization and qualifications of teachers – is more adequate than a didactic task [6, 96–98].

Educational technologies should contain conceptuality – didactic, psychological, philosophical and social pedagogical argumentation of educational purposes; consistency – logics and interconnection of all parts and aspects of the process, the integrity of the designing and implementation of the educational process; the management – variation of teaching methods and tools for correction of results which are revealed in the process of diagnostics; the effectiveness of results and economic parameters; reproducibility by other teachers and departments.

The effectiveness of educational technologies is mainly defined by the proportion of the achieved result to time and resource charges – material, technical, informational, human. The technological approach to teaching in its rigid orientation on standard is associated with the loss of a search component and didactic incompleteness of teaching, which affects the development of thinking [9, 203]. In modern meaning the teaching technology should focus on the development of personality and creativity, that is why it must include a system of multilevel creative tasks, research projects [3]. At the undergraduate level pedagogical technology of the heuristic type, based on the motivation of educational cognitive activity through communication and cooperation affects the intellectual status. The need to communicate appears if there is a necessity in the functioning of thought caused by a nonstandard situation, but not only reproduction or fulfillment. The form of educational material presentation in heuristic technology is a chain of problem-solving situations that starts the mechanism of motivation, searching for ways of its solving, which corresponds to the mentality of students – individual work with literature, contacts and discussions with classmates, active communication with a teacher [17, 336–337].

Creative activity is hardly measurable, but the ability to creativity can occur in certain actions of the student. Stages of analytical thinking are expressed clearly enough to tell about them, whereas in intuitive thinking such clarity is absent and the result is sometimes achieved without understanding the process that leads to it. However there are some attempts of direct teaching of thinking as a skill, instead of a simple transference of information. The thesis that everyone has some creative potential allows to build educational creative technologies based on the system of continuous formation of creative thinking. The main principles of this system are: humanization as a factor of providing the freedom of thought and behavioral choice and democratization as a factor of rejection from authoritarianism, visual methods as the factor of use of signal symbolic means, educating and problem-solving studying, heuristics and role-play games; interaction of the individual and the group, psychological diagnostics, sociometry, motivation activities, intellectual activity, forming a creative system of thinking based on the systematic, personal, problem-solving, algorithmic and activity-based approaches, integrity, continuity of searching cognitive activities, phasing of conceptual figurative structure, methodology of creativity including integrative special courses, computer support, the transference from a problematic situation to creative task, accounting of professional interests.

However similar concepts should be supported by objective data. There is not much information about how people think. It is known more about results than processes and ways to achieve them. Scientists still argue whether it is a conscious process of thinking or not. To create an artificial intelligence as a copy of human perception, memory, language, thinking, they must be realized in a human cognition. On the one hand, a mind able for understanding

can be created by the proper programming way; on the other hand, artificial intelligence is regarded as a heuristic means for the study of human cognition.

A kind of computer determinism significantly distorts the effectiveness of educational information technology, researches also show that students prefer to print hypertext and multimedia, electronic books and guides, it increases the quality of preparing to 15–20 % only at the level of familiarization, but dealing with typical and atypical tasks, their impact is insignificant. To hope for the effect of high computer technologies is possible only in large scopes, but there is also a danger: as the use of calculators prevents the formation of skills to perform arithmetic operations, as the graphic interface harms natural language, thus a powerful and complex program gives a result hiding the process of its reception. Information models of subject domains, algorithms of teaching and control in educational systems, modeling of thinking have not achieved such a condition yet, when the advantages of information technology studying could be revealed in large scopes, but in prospects they can become a key factor in the development of the educational system.

The mechanism of learning is not completely described in science yet, but there are a lot of facts. The process of studying is more effective when methodology and technology of teaching process is coordinated with the technology of learning. Systematic approach to higher education includes the construction of the model of subject domain, the increase of thesaurus as the basis for studying, forming the links of new and old concepts, knowledge structuring, singling out the main concepts, forming of associative relationships between symbols and concepts. The rate of understanding depends on the complexity of educational material and channel admission ability: visual information has high admission ability, but the aural canal is more effective while reading textbook. The effectiveness of studying depends on the constantly maintaining purpose. Deduction creates system thinking and satisfies the need for concretization. The account of the current control in the final grade is also useful. Control with the help of questions with ready answers trains memory, but the level of understanding requires other formulation. Implicit knowledge concept helps to form practical skills in individual work. The system of education is described through goals and objectives, set of parameters, limitations, processes.

In the domain of natural sciences there is a broad searching for didactic means of the transformation of teaching into the technological process with guaranteed results. The authors of these works among such characteristics as guarantee, stability, and reproducibility of results distinguish such important criteria of technologies as projecting and purposefulness, consistency of actions, including of advanced pedagogical experience, the actuality for didactic tasks solving, algorithmization and structuring of educational material. Not all learning content can be technologized since it does not subject to algorithms. The teaching technology includes a description of the teacher's activity, using

of specific forms, techniques, methods and means of teaching which subordinate to the general purpose. Its theoretical foundation is the teaching methodology as a science about teaching methods, teaching patterns of a certain subject. The main stages of the designing of teaching technologies include the analysis of the content of study, identification of priority goals, concretization of the technology, establishment of feedbacks and diagnostics of results [15]. In activity-based technology of teaching physics there are procedural, meaningful and instrumental sides [16, 88–89], which include the implementation of learning activities towards the system of tasks provided with a set of means that contribute to solving and understanding.

There are two ways to improve teaching practice in the methodology of research: officially regulated, oriented on the requirements which are formulated according to the levels of education, that are confirmed by federal educational standards; and innovative education of a person-oriented type with priority tasks of development. It is time to form consciously the interest to the process of gaining knowledge, reflection of intellectual and practical activity of both students and teachers. Pedagogical reflection involves focus on understanding and awareness of the studying activity, its objectives, content, results and methods of their gaining by means of observation and analysis of actions by the subjects of study. The objective basis of it may become the measurement of characteristics of learning at all stages, its comparison with the necessary norms and specific ways to achieve them. Student's reflection is based on self-determination when compared with their own norms, needs and abilities with external and then taking them into correspondence. Reflection is based on a comparison of combined results of studying with social demands, analysis of the effectiveness of each element of didactic system, finding their acting factors and the degree of differential and integral effect on learning. As a result of this analysis there is a possibility of operative learning management, general, special and individual correction.

Problem-modular technology and approaches to teaching opened the way to a new quality of education in some aspects, these technologies are developed for reaction to the situations in labor market and for individualization of educational programmes considering interests and abilities of students, combined with an objective evaluation of their activity. In technology the integration of factors of the compaction of educational information, modularity and problem-solving aims to provide not only erudition, but also the willingness to solve problems competently – a necessary quality of professional competence achievement. The advantage of new technologies is operational control of studying activities of students. The task of the condition diagnostics of the subject of study with continuously variable parameters can be solved in two ways: test diagnostics defines the state of the reaction to the test, functional diagnostics – defines reaction on actions during

studying activity. The diagnostics is possible out of teaching plans, and also within them, without distracting from purposeful studying activity. The diagnostics is successful if it allows making quantitative and qualitative evaluation of the effectiveness and efficiency of teaching technology, which is used on the whole and in its individual elements and units with the purpose of its permanent improvement in the process of studying.

Conclusions and main prospects for further research. One of the leading factors of technological approach is motivation of individual work with obtaining of knowledge. Its sources are in the context of practice and lerning activity. The other important factor is flexibility of the technology and its ability to adapt quickly and flexibly to the learning environment, to the students, to time budget and to other circumstances. The cognitive teaching technology is also effective, it is based on the subjective quality of erudition and problem-modular studying and activity-based approach. The principal factors of the technology are the complex of individual course tasks combined into a common educational research and monitoring of the quality throughout the studying activities of students. The comparison of the intersubjectivity of evaluation and the objectivity of measures of educational achievement allows solving the tasks of the final evaluation of learning outcomes. This search is necessary, the theory gives only a general orientation, it must be understood from own experience, it must be given evaluation and there must be defined its place in the classroom.

REFERENCES

1. Bloom B. S. Handbook on formative and summative evaluation of Students Learning / B. S. Bloom. – N.-Y. : McGrow-Hill, 1971. – 923 p.

2. Bridgman P. W. The Logic of Modern Physics / P. W. Bridgman. – N.-Y., 1958. – 228 p.

3. Abdullina O. Democratization of education and teaching of specialists / O. Abdullina // Higher education in Russia. – 1996. – № 1. – P. 73–78.

4. Aynishteyin V. In the world of educational technology / V. Aynishteyin // Higher education in Russia. – 1996. – № 2. – P. 122–126.

5. Atanov G. Activity-based approach to learning / G. Atanov. – Donetsk : EAI-Press, 2001. – 160 p.

6. Bespal'ko V. Terms of educational technology / V. Bespal'ko. – M. : Pedagogy, 1989. – 192 p.

7. Innovation in Higher Technical School in Russia / Coll. Art. Issue 2. Modern technologies in engineering education. – M., 2002. – 503 p.

8. Kasimov R. A Ranking in high school: Patterns and random / R. Kasimov // Higher education in Russia. – 1994. – № 3. – S. 66–77.

9. Clarin M. Innovative training models in foreign pedagogical researches / M. Clarin. – M. : Arena, 1994. – 223 p.

10. Manuilov V. Modern Technologies in Engineering Education / V. Manuilov, I. Fedorov, M. Blagoveshchenskaya // Higher education in Russia. – 2003. – № 3. – P. 117–123.

11. Nikitayev V. Activity-based approach to the content of higher education / V. Nikitayev // Higher education in Russia. – 1997. – № 1. – P. 34–44.

12. Okolelov O. Modern technologies of teaching in high school / O. Okolelov // Higher education in Russia. – 1994. – № 2. – P. 45–50.

13. Saveliev A. Teaching technologies and their role in the reformation of higher education in Russia / A. Saveliev // Higher education in Russia. – 1994. – № 2. – P. 29–37.

14. Selevko G. Modern educational technology / G. Selevko. – M. : Education, 1998. – 256 p.

15. Semchuk N. The content of the course «Technology of teaching of natural sciences» / N. Semchuk // Higher education in Russia. – 1997. – № 2. – P. 97–100.

16. Improving the theory and methodology of teaching physics in continuing education / Coll. tr. II Intercollegiate science. – Pract. Conf. – Tambov : TSU, 1998. – 100 p.

17. Hutorskoy A. Didactic heuristics. Theory and technology of creative learning / A. Hutorskoy. – M. : MSU, 2003. – 416 p.

18. Shadrikov V. Activities and abilities / V. Shadrikov. – M : Logos, 1994. – 320 p.

РЕЗЮМЕ

Самойленко А. Н. Особенности технологических подходов к обучению.

В статье рассмотрены понятия «технологи» и «обучения», описаны технологические подходы зарубежных ученых к обучению в высшем образовании, проанализирован исторический аспект. Представлена характеристика технологических подходов зарубежных ученых к обучению. Установлено, что к основным признакам технологии относят проектированость, управляемость, коректированость, результативность, диагностическую целесообразность, анализ действующих факторов, эффективность методов, системность и целостность. Отмечено, что к ведущим факторам технологического подхода относится мотивация самостоятельной работы по приобретению знаний, истоки которой находятся как в контексте практической, так и в учебной деятельности.

Ключевые слова: *педагогическая технология, технологический подход, обучение, высшее образование.*

SUMMARY

Samoylenko O. Features of technological approaches to teaching.

The article deals with the concepts of technology and teaching, technological approaches of foreign scholars to the teaching in higher education; the historical aspect is also analyzed. The article highlights the main features of the technology: projecting, performance, manageability, results, diagnostic expediency, analysis of existing factors, effectiveness of methods, consistency and integrity. It is indicated that the leading factors of technological approach include motivation of individual work for gaining knowledge; the sources of this work are in the context of practical activity and studying.

In Ukraine the increase of necessity in highly qualified specialists is caused by technological progress in the society. Modern experts must be efficiently and professionally prepared. The problem of teaching efficiency has always been important.

Pedagogical technology gives a description, project of the process of student's individuality formation and it must include diagnostic purposes and content of education, didactic processes and organizational forms of teaching. The components of the didactic process are: motivation as a forming of stable student's interest to studying activity and transformation of external purposes into internal needs; cognitive activity of the student, the result of which is knowledge comprehension; teacher management depending on the purpose of study.

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diagnostics; the effectiveness of results and economic parameters; reproducibility by other teachers and departments.

One of the leading factors of technological approach is motivation of individual work with the obtaining of knowledge. Its sources are in the context of practice and lerning activity. The other important factor is flexibility of the technology and its ability to adapt quickly and flexibly to the learning environment, to the students, to time budget and to other circumstances. The cognitive teaching technology is also effective, it is based on the subjective quality of erudition and problem-modular studying and activity-based approach.

Key words*: educational technology, technological approach, learning, higher education.*