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DEVELOPMENT OF COGNITIVE INDEPENDENCE OF STUDENTS IN TEACHING INFORMATICS BASED ON NON-LINEAR TECHNOLOGIES OF EDUCATION

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Annotation
This article discusses the development of cognitive independence of students in the teaching of informatics based on non-linear technologies of education. In addition, the role of knowledge in modern conditions, the fact that it has become the main factor in the development of society. And in turn, it is noted that this serves as a strong incentive for the development of more effective educational technologies and their introduction into educational practice.

Keywords: education, nonlinear technologies, informatics, cognitive independence, information, development, principle, description, student, person.

Introduction

In modern conditions, the role of knowledge has increased so much that it has become the main factor in the development of society. In turn, this serves as a strong incentive for the development of more effective educational technologies and their introduction into educational practice.

Theoretical studies show that the logic of the construction of the variety of educational models can be divided into two types: linear, consistent, strictly defined (traditional), the purpose of which is the development of the individual at the level of state requirements, socialization, professionalization (making a profession); organization of the educational process in a non-linear (inconsistent, non-homogeneous, variable manner).

These two approaches differ in terms of goals, content of education, methods and ways of organizing students' learning process, and character of pedagogical management.

In the traditional system of education, the main goal of education is to acquire certain knowledge, skills and abilities, i.e. the standards given from outside.

Student activity is mainly related to the acquisition of "ready-made" knowledge

ISSN (E): 2980-4612
Volume 2, Issue 12, December-2023
Website: intentresearch.org/index.php/irsj/index

and is considered reproductive. The subject of understanding is knowledge, partly algorithms of activity, and rarely - actions or problems that require understanding and searching for solution methods and ways.

In this case, the quality of knowledge acquisition is mainly determined by what and how accurately and firmly the student remembers, tells, and performs according to the example. As it can be seen, reproductive activity is limited according to its resources, especially in the current era characterized by strong information flows and unpredictable changes of the labor market.

Traditional education is not focused on designing and constructing the process of personal self-development and does not take into account the factor of its spontaneity. In this case, students' cognitive activity and ability to choose remain outside the scope of teachers' attention. The motivation range of the student is not taken into account, the right to choose the preferred strategy of processing the educational material, the cognitive way of searching for the necessary information, the personal experience of the learners is not taken into account.

Traditional education requires learners to master subject knowledge, acquire certain skills and qualifications. In this case, according to the character of the activity of the learners, it is passive, aimed at perceiving, mastering and telling the information presented to the student. Within the framework of the traditional model of education, only the teacher remains an active subject of the educational process.

In the studies of O. V. Akulova, I. F. Berezhnaya, G. V. Gordiyanova, L. I. Vasiliev, L. O. Malenkova, the linear organization of the educational process is characterized by the following factors:

the learner is considered as an object controlled by the pre-planned actions of the pedagogue (teaching, developing, educating);

the sequential placement of parts of the studied subject content is based on a defined volume, these parts are logically connected to each other and represent a certain linear "construction", in which the process of acquiring knowledge is carried out in a defined period;

the rigidity of the traditional education system, in which the learner is assigned a passive, submissive role, and his psychological (spiritual) essence remains uniform (unified) without uniqueness;

the traditional educational process takes place in the closed environment of the auditorium within the framework of a constant composition of learners in a

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Website: intentresearch.org/index.php/irsj/index

group, limited by a fixed time frame;

informational support of the educational process is provided by the availability of basic and additional literature in printed form.

In the linear organization of the educational process, objective conditions are created for subject-object interaction to master the content of the subject.

In the process of linear education, the content of education is presented in curricula and textbooks, and it is a recorded plan without the possibility of independent choice of knowledge that students consider necessary, therefore, only one way to achieve educational results is offered to the student.

The rapid development of computer technologies, the rapid updating of knowledge, including the basic ones, dictates the need to form a person who has a set of necessary educational competencies, is able to regularly update his knowledge, develop new educational technologies suitable for the level of development of the information society. requires output and application.

From this point of view. non-linear, person-centered educational technologies are, in our opinion, the most promising.

Non-linear technologies of education are educational methods that are not based on the sequential learning of a course based on intuitive-subconscious knowledge methods, trial and error, but rather on the goals set by the learners, the problems being solved, envisages the construction of individual educational trajectories appropriate to the level of preparation and psychological characteristics.

Many scientists deal with the issues of non-linear education and see various non-linear technologies from the following different perspectives: non-linear technologies of education (N.I. Pak); mechanism for implementing the nonlinear process of teacher-student interaction in online and offline communication (N. M. Andreyeva); building a non-linear process of education in the information environment (O. V. Akulova, G. V. Gordiyanova, B. YE. Starichenko, A. P. Tryapitsina); principles of non-linear education (S. Avdeyev); computer as an element of the non-linear environment of education (A. Vakurov); non-linear logic of educational process organization (L. I. Vasiliev); Development of educational independence of students in the process of non-linear education of higher education institutions (G. V. Gordiyanova); non-linear thinking, readiness to choose independently from alternatives (S.P. Kudryumova, YE. N. Knyazeva, A. P. Ogursov); organization of non-linear educational process and

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Volume 2, Issue 12, December-2023
Website: intentresearch.org/index.php/irsj/index

connection of teaching (O.B. Dautova, N.G. Milovanova); technology of non-linear design of student individual educational route (V.D. Koldayev, L.A. Labunskaya, V.V. Lawrence, L.O. Malenkova, A.V. Slepukhin, N.N. Surtayeva).

Non-linear, person-centred education has become widespread thanks to ICT. The introduction of ICT in all spheres of life, the emergence of the Internet has had a serious impact on intellectual activity, knowledge and communication processes. The non-linear learning process is becoming a kind of "builder's kit", where students choose the modules themselves and create their own individual learning roadmap. The non-linear model of education perfectly supports the strategy of constructing an individual educational roadmap.

The non-linear educational process is distinguished by a special educational methodology, which forms the perception of the necessary information in the right place and at the right time in the subjects of education, that is, the student receives only the knowledge that is important for him at the same time, and the rest and can receive it in the form of an information module that can be used whenever necessary.

Non-linear education involves: creation of ATTs with the possibility of building individual road maps of education; the ability to freely form the content of one's own education, subject to compliance with the requirements of the federal state standards of higher education; designing individual educational road maps for students that provide the opportunity to independently choose a part of the educational content and the sequence of its acquisition.

In our opinion, we highlight the most effective non-linear technologies of education.

The concentric approach envisages a step-by-step, multi-level construction of the educational process for a given course. In the first stage (concentration 1), the learner assimilates the knowledge of the entire course at the general, conceptual, "intuitive" level. In this, the method of systematic dynamics is used - that is, the student independently searches for solutions to simple problems. At this stage, students acquire basic knowledge. A deeper level is the software level, which requires mastering knowledge at a theoretical and logical level. If necessary, it is possible to design concentrations that are suitable for creative, research degrees outside the program.

A parallel approach involves the creation of small working groups of students

ISSN (E): 2980-4612
Volume 2, Issue 12, December-2023
Website: intentresearch.org/index.php/irsj/index

within the framework of a project activity organized to solve a single complex problem. It is divided into relatively independent stages, which are distributed among small working groups. Each group works on its own part of the problem in parallel, and as a result, the whole team successfully completes a complex and voluminous learning problem in a short time. During the exchange of intermediate results, conclusion, discussion of the found solution, the algorithm of the method of solving the problem is fully mastered by all groups.

The method of projects (Dewey) is one of the main methods considered in the theory of developmental education (L.S. Vygotsky, P.Y. Galperin, V.V. Davidov), which consists in solving an initially unformulated problem by learners. This is a way of knowing, a way of organizing the process of knowing. When we talk about the project-research method, we mean the method of achieving a didactic goal through the detailed development of a real problem that should end with specific practical results.

The cognitive method of education is based on the conditions of cognitive psychology and involves taking into account various cognitive features of information perception and thinking during the educational process. Ideas of cognitive approach to education N.V. Baryshnikov, I.L. Beam, M.L. Weisburd, I.N. Vereshagina, A.A. Leontiev, I.Y. Mangus, S.F. Shatilov, A.V. It is presented in the works of Shepilova et al. One of the most effective tools of education based on the cognitive approach is mental maps. A mental map is a visual representation of the process of thinking or the structuring of information, which allows a person to understand the flow of information and convey it. This ensures that the visual perception ideally corresponds to the basis on which this information is built.

Designing the educational process as a system of temporary modules to make the educational content flexible, to adapt it to individual needs and the level of basic training by organizing independent cognitive activities in accordance with the individual education road map. allows.

N.V. Blokhin, I.V. Travinlar in their work entitled "Psychological foundations of modular vocational education" ("Psikhologicheskiye osnogo modulnogo professionalno orientirovannogo obucheniya"): - "...the final product - a modular program of specialization - about a hundred may consist of training elements, the number of which may increase depending on the current improvement of the program. ...and separate modular programs for some specialties can be

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Volume 2, Issue 12, December-2023
Website: intentresearch.org/index.php/irsj/index

distributed to some specialties under "open source" conditions, with the possibility of optimization in accordance with the specific professional characteristics of educational technology," they say.

Thus, modular education is an innovative high-tech type of education based on a person-centered approach, characterized by the non-linear construction and management of students' independent activities in the educational process organized in a specially created ATT.

Project-based education is aimed at forming and developing the learner's ability to independently extract knowledge from information, generate ideas and projects. The educational content is expressed as a project initiated and defined by the learners themselves, according to their needs and goals, abilities and capabilities. In this case, individual educational roadmaps are designed that provide an opportunity to take into account the educational needs of the learner. The organization of the educational process based on project education is a working open system, which is an educational project consisting of a set of separate components, and each of these components develops dynamically. Each student is given the opportunity to design his/her own individual educational road map, this map aims to pursue his/her goals in education, use different forms and methods of education, and the educational process at any time during the study period. allows to change the organization.

Project-based education allows for differentiated (differentiated) and individualized education in ATT conditions, as well as education that matches the needs and tasks of the student, that is, the logic of his interests and educational needs. provides an opportunity to choose an individual map. The educational process must be combined with research activities in order to meet the demands of society and the level of scientific knowledge. Project education involves the development of the student's ability to plan his activities in perspective, to create knowledge or extract it from the information he receives, to know how to work with information. In the process of learning to design, the student acquires the technologies to search for values and private knowledge that serves to create and implement his or her work, intentions, and projects.

Students have the opportunity to master the variable part of the curriculum within the framework of their choice, in most cases independently, based on the expediency in gaining knowledge, using ATT resources. The non-linear organization of the educational process, which provides variety in the selection

ISSN (E): 2980-4612
Volume 2, Issue 12, December-2023
Website: intentresearch.org/index.php/irsj/index

of the content, form and regulation of the work, is considered the most promising form of education for the development of independent knowledge-related activities of students.

Information technology, technical means, and information and communication networks that ensure the transmission of this information from communication lines Organization of educational activities along with learning is defined as the interaction of students and teachers.

For the implementation of e-learning, HEIs include electronic information and educational resources, as well as ICT complexes that help learners fully master the educational programs, regardless of where they are. ATT should be created. There are three models of educational process organization using e-learning: web-based learning, blended learning and online learning.

Web-based education assumes that 30% of the time allocated for mastering the educational program is intended for working on electronic ATT.

Mixed education is carried out in the conditions of the simultaneous use of daytime (attendance) and electronic forms of education, it is a system consisting of different parts, these parts operate in constant connection with each other, form a whole, in the classroom combines the most effective aspects and advantages of teaching and interactive or distance learning. From 30% to 80% of working time in electronic ATT is allocated to mastering the educational program.

According to A.S. Fomina, in mixed education "... the use of ICT tools not only complements traditional education and reduces the time students spend in the classroom. Electronic education is an integral part of the educational process, which is moving to a new level of quality through interaction and integration of traditional and electronic education.

We can identify the main advantages of blended learning, which are:

taking into account the individual characteristics of the perception of information presented in different forms;

diversity in the choice of forms of educational organization;

develop self-education and information-seeking skills;

choosing a convenient pace of education;

opportunity to reconnect with colleagues and teachers;

due to the increase in the flexibility and universality (availability) of education, the expansion of the educational opportunities of the students due to the

ISSN (E): 2980-4612
Volume 2, Issue 12, December-2023
Website: intentresearch.org/index.php/irsj/index

consideration of the individual educational needs of the students, as well as the pace and rhythm of mastering the educational material;

to stimulate the subjective position of the learner: to increase motivation, independence, social freedom, including in mastering educational material, reflection and self-analysis, and as a result, the overall effectiveness of the educational process increases;

transformation of the pedagogic style: transition to interactive interaction with the learner, which helps them to construct their own knowledge;

the possibility of creating e-learning environments in which the person is at the center.

In the mixed education environment, the teacher can effectively manage the joint work of students in the classroom and outside the classroom, encourage independent and group work, and create a variety of support for students. Students, in turn, on the other hand, have the opportunity to determine the final goal of education, to determine and develop a private style of education, to develop a private individual road map of education (development of a personal individual action plan). Thus, teachers and students work together and thereby ensure the quality of education.

Online education is characterized by a high level of interactivity of educational content, systematic interaction between all subjects of the educational process. 100% of study time is spent in electronic ATT.

Scientists say that the implementation of non-linear technologies of education requires a non-linear structure of the knowledge model and non-linear pedagogical tools of education. Therefore, the structure of ATT in modern ICT is built on the basis of a non-linear principle, and it has a hierarchical-network organization of information acquisition.

Systematic and effective formation of cognitive independence for the majority of learners today is possible only with the use of ICT in the educational process. Thus, ICT serves as a relevant means of involving students in independent learning activities.

ATT is a construct that supports the non-linear organization of the educational process using ICT, where there is a possibility of the integration of all sub-structures and the synchronization of the pace of their evolution.

That is why it is necessary to activate the research of the development of technological support of the construction of individual road maps of education.

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ISSN (E): 2980-4612
Volume 2, Issue 12, December-2023
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