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ANALYTICAL MODELING OF ADDITIONALLY ACQUIRED KNOWLEDGE OF THE LEARNING PROCESS WITH THE HELP OF AN INTELLECTUAL SYSTEM

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ABSTRACT

This work is devoted to the study of the quality of the learning process by management in the acquisition of additional knowledge using analytical modeling and the use of ergonomics. Where, the issue of the learning process is considered, with the participation of additional sources of information - an intelligent system (IS) in the acquisition of knowledge by the trainee.

Keywords and directions: development, creation, mathematical, ergonomic, modeling, calculation, quality, acquisition of knowledge, additional, source of information, TGO, IS.

The purpose of this research work is to develop and create an analytical model of the learning process, to calculate the quality of additionally acquired knowledge of the learning process using ergonomic modeling. Because in pedagogy the acquisition of knowledge using additional sources of information, such as intelligent systems (IS), has not yet been studied, and the technical means of teaching (TCO) are poorly studied.

The acquisition of knowledge has been and remains in demand in the learning process, in the form of additional knowledge, which is presented with the help of technical means of training (TCO) and intelligent systems (IS), as a source of additional information.

Today, new and different types of TCO and IP are being developed and created, with the help of which the learner reduces the time of acquiring knowledge, using it in the learning process, which will complement the studied material in the learning process.

Purpose: to study the learning process, in addition to the teacher's notes and literature, to give knowledge using TCO or IS, with the help of ergonomic modeling, which will present modern, necessary, demanded information on the discipline being studied.

In the process of research, from the analysis and synthesis of the learning process to acquire additional knowledge with the help of TCO or IS, the stages of model building were determined:

I.. Stage. Building a mathematical model of the learning process to acquire additional knowledge of one trainee.

II. Stage. Building a mathematical model of the learning process to acquire additional knowledge from a group of students in the classroom.

III. Stage. Building a mathematical model of the learning process to acquire additional knowledge of a group of learners in the classroom using IP.

IV.. Stage. Building a mathematical model of the learning process of additional acquisition of knowledge by a group of students in the classroom with the help of information systems of various types.

By analyzing and synthesizing the learning process with the help of systems theory [2], an ergonomic model of knowledge acquisition is built on the basis of the structural scheme of the location of trainees in the classroom for conducting classes.

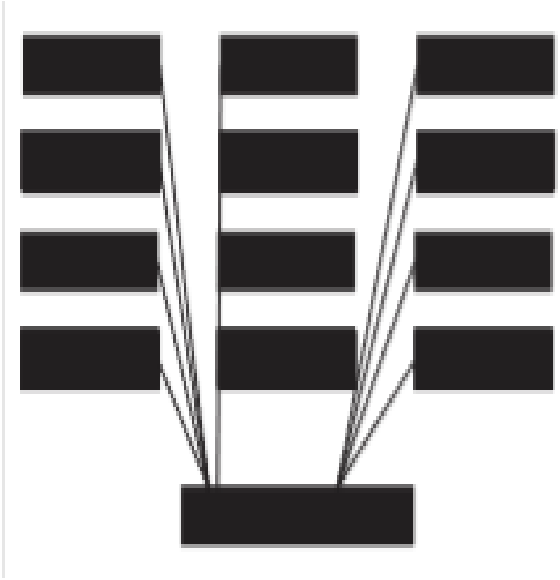

Figure 1. Ergonomic model of the learning process.

By definition [10,11]: **Ergonomics is a science that is designed and created for the study of various fields of science, technology, and education. It is used in: technical development/solutions, sports, mechanical engineering, medicine, pedagogy, etc.**

Ergonomics as a science of research and teaching.

Analysis and synthesis of the teaching process taking into account ergonomics.

Establishment of logical and informational interrelations of pedagogical ergonomics of the learning process in universities.

A systematic approach to conducting research on problems in the field of teaching ergonomics.

Selection of methods used to calculate econometric models of teaching ergonomics.

In the research papers [6-8], the tasks of acquiring knowledge of the learning process using mathematical modeling were considered, and in [10-13], partially, taking into account an additional source of information.

As this research paper deals with the acquisition of knowledge from additional sources of IP information, we need to identify the learning processes involved in the measurable parameters in knowledge acquisition. As we know, the measured parameters consist of two indicators: the first is the pedagogy, the psychological state of the student, and the second is the physical state. These indicators are involved in the process of calculating the quality of acquired knowledge as an initial condition of the calculation process. All these external indicators are determined and calculated continuously in the learning process. The disadvantage is their size, unit of measurement and quantity. Because the above-mentioned indicators and factors are different: in their physical magnitude - continuous or discrete, in volume, in size, in quantity, and therefore they cannot be calculated by the analytical method.

The function of managing the quality of the learning process in the acquisition of knowledge is presented in the following form [3]:

K = (Cuch.Percent, Cexpert., Cargon, Cecology, Ktest, Cuch.Met.Obsp., Kzn.Inostr.Language, Qual.Research, Cobesp.Org.Kult.Kinfor.Obsp., IM, W_n, IS, BD, BZ), (1)

Where is:

A subsystem that determines the quality of the educational process (taking into account the **Klec, Kprak Zan., and Klaborate work. Xamos. work**);

Expert – a subsystem that determines the qualities of the acquired knowledge of trainees with the help of the conducted examination of the educational process;

Safety is a subsystem that constantly (by accumulating and processing) provides information about the state of the training process in HEU to predict the safety of trainees;

Cargon. – a subsystem that determines the quality of acquired knowledge by means of an ergonomic model;

K TCO is a subsystem that provides additional knowledge with the help of various technical, electronic, software and intellectual developments in managing the quality of the learning process in the acquisition of knowledge;

Ecology is a subsystem that determines the quality of ecology in education;

Ktest is a subsystem that determines the quality of the tests performed;

Methodology is a subsystem that determines the quality of educational and methodological developments;

Kzn.foreign language is a subsystem that determines the quality of foreign language knowledge of students and teachers, taking into account the specification of the graduates of specialists;

Kqualim.iss. – a subsystem that determines quality by qualimetry;

Kobes.org.kult. – a subsystem that determines the quality of organizational and cultural events;

Kinfor.obesp. - a subsystem that determines the quality of information support of the educational process;

IM is a subsystem that determines the quality of innovation management, which is improved due to new methods, approaches, pedagogical technology, technical equipment and provision of the educational process;

Wn – matrices participating in subsystems, logically and informationally interconnected in the education system, organizing regular tables/matrices with the next acquired data in the acquisition of knowledge;

IS is an information subsystem that is designed, created and operated in the form of a Database: with initial, intermediate, acquired, preparatory and sorting data using the Knowledge Base in the process of functioning of the management system;

DB is an education-oriented database, where all the data "from the lower to the verbal level" of the learning process will be cataloged;

BR - Knowledge Base, is a subsystem that is systematized and created in the management of the learning process when assessing the quality of acquired knowledge with the help of a "dialogue", where the database is "enriched" by new "terms", such as: text, symbols, data and numbers in the learning process, which "yet" cannot be "digitized".

From the knowledge representation function - formula 1 [3], any source of information is denoted by the letter - D [11], depending on the type of information sources involved, formula 1 can be written as follows

$$K_{i,j} = A_{i,j} * Zi * D, \qquad (2),$$

Where, K i,j **are the** qualities of the acquired knowledge of the learning process;

A, $_{i,j}$ - trainees located in a radial classroom;

Zi - knowledge acquired by trainees in the process of learning;

D is the source of information, in our case, IS.

From the analysis of the source of information representing the knowledge is different, then for each case, based on its function of presenting information, it is necessary to describe and designate each separately, in order to determine the additional knowledge to be acquired.

From the point of view of ergonomic modelling and taking into account the type of additional knowledge D, which comes mainly from sources of information, various, for example, from:

- $D^{pr.}$ - Teacher;
- Dkl – lecture notes;
- DTSO - technical means of training;
- Dis - various intelligent systems (in the form of electronic devices, training systems, etc., depending on the disciplines, specialty or specialization).

If, additional knowledge – D [12,13], participates in the learning process with the following subsystems in the acquisition of knowledge, such as - ($D_n^{Ave.}$, $D_n^{coulomb.}$, D_n^{TCO}, $D_n^{Ip.}$), then, taking into account each of them, formula 2 can be rewritten as follows

$$K_{i,j} = A_{i,j} * Z_k * (D_{e.g.}, D_n^{cl.}, D_n^{tso}, D_n^{is.}) \qquad (3).$$

But, in turn, studying the learning process taking into account the participation of only additional knowledge, where additional knowledge will be acquired from the IP, designated $D_n^{is.}$, then, formula 2 can be written as follows

$$К_{i,j} = Ai, j * Z_k * D_n^{ис} \qquad (4).$$

Since, D_n^{is} one of the subsystems of the K Formula 1 system, which consists of the following sources of information, such as:

- $D^{rob.}$- Various and highly functional robots;
- $D^{man.}$ – many functional manipulators;
- Ed. – multi-functional electronic sensors;
- Duu. – IC control device of different functions.

Then, depending on the type of source of information used in the educational process, it will be possible to use only one from formula 4

$$K_{i,j} = A_{i,j} * Z_k * (D^{rob.}, D^{man.}, D^{ed.}, Duu.) \qquad (5).$$

Thus, in the process of researching the learning process in order to acquire additional knowledge with the help of IP in the field of education from formula 2, it is necessary to consider

the participation of other subsystems - D rob., D ман. , Ded., Duu.. Then they will have to be calculated separately, for example

$$К_{i,j} = A_{i,j} * Z_k * D_{роб.},$$
$$К_{i,j} = A_{i,j} * Z_k * D_{ман.},$$
$$К_{i,j} = A_{i,j} * Z_k * D_{эд.},$$
$$K_{i,j} = A_{i,j} * Z_k * Du.).$$

From the analysis of the additional acquisition of knowledge to the determination of the quality of the learning process, if it is necessary to calculate also for an intelligent system, e.g. - D Ip, then rewrite formula 3 as follows

$$К_{i,j} = A_{i,j} * Z_k * D_{ис.} \qquad (6).$$

That is, if this process is considered only with the participation of the IC, designated - D IS, then only the participating devices and equipment, and the parameters of the IC will be considered and taken into account who will participate in this learning process.

For example, consider the process of acquiring additional knowledge in the field of medicine with the participation of a group of trainees in the operating room using a video of the eye.

If, from formula 5, we need to determine the equipment and apparatus involved, etc., which consist, for example, of (Dnlab. Med.app., Dustr.upr., Drob, Dmanp., Dob.syst.) , i.e.:

Laboratory Equipment – Medical Equipment;

Structure – different process control devices;

Drob. – robotic systems used in medicine;

Dmanp. – manipulators used in medicine;

Dob.system – various electronic educational systems.

Then, the qualities of the acquired knowledge $K_{i,j}$, it will be necessary to calculate them cumulatively.

SUMMARY

Because this research is a new direction

In the study of the management of the quality of the learning process, through the additional acquisition of knowledge through the use of IP in the field of education, it is necessary to determine:

- Firstly, it will highlight the influencing indicators as a whole in the training system;
- secondly, changing parameters in quality management subsystems , where all types of information systems are used [3, 14];
- thirdly, changing parameters in subsystems;
- fourthly, the changing parameters of its elements participating in the subsystems;
- fifth, the quality of **control**, control parameters (or its subsystems) [8,9],

taking into account the identification of influences on the process of knowledge acquisition.

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