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TO TEACH STUDENTS THE AUTOMATIC CONTROL OF TECHNOLOGICAL PROCESSES IN AN INNOVATIVE WAY

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Abstract:

The article is devoted to the issues of effective use of information and communication technologies and their future development in the in-depth study of their professions, in line with modern requirements. Here is an analysis of the literature published abroad and one of the teaching methods suggested by the authors. The main goal is not to prepare or use a programming package for a given subject, but for each lesson, the idea of using programs that can fully master this lesson.

Keywords: . Electronic textbook, teaching technologies, Distance learning, animation, video, downloadable file, graphic objects.

1.LITERATURE REVIEW.

Visual information is far superior to all other information channels in its ability to perceive information. Modern information technology allows you to create tutorials using only colorful illustrations, and various other types of video films (animated, documentary and feature films).

One of the most important components of the AMC for the training of engineers is the full-scale literature that allows the student to acquire practical skills on a specific subject being studied. A number of training courses work with specific instrumental computer programs (e.g., instrumental environment for creating expert systems, accounting systems, etc.), as well as object and process control systems (e.g., mastering traffic rules, demonstrating power plant operation, switching automatic devices) etc.) [1].

An e-textbook is an integrated didactic, methodological, and interactive software system that allows you to present complex points of educational material using not only an integral but also a rich arsenal of different information. Multimedia, on the other hand, is one of the ways in which scientific research can be carried out by imitating the real stage of the process. [2]

The main feature of the introduction of computers in education is the sharp expansion of the field of independent educational work, which is usually effective only in an active form.

The main innovation introduced by the computer in the educational process is interactivity, the ability to develop active forms of education. It is this new quality that allows us to hope for an effective, truly useful expansion of the field of independent learning. Thus, in the development of student activism, computer training should become the basis of the general theory of technology. The presence of teaching and observation systems in this process are the most effective ways to increase teaching effectiveness due to their interactivity, which has a strong branching ability of the cognitive process and allows the subject to be taught to deal directly with the topic of interest.

According to foreign experts, in the age of high and complex technologies, it is almost impossible to create something important alone. In addition, group teaching is one of the main teaching methods that develops creative engineering thinking, helps to increase the level of knowledge of students, democratize the learning process and achieve its educational goals. When working in teams, it helps to be as close as possible to real engineering skills as much as possible. Nowadays, lecture hours are reduced annually and time is allocated for group work. [3,4]

Distance learning is a type of open learning using computer and telecommunication technologies that provide interactive interaction between teachers and students at different stages of learning and independent work with information network materials, most of which are prepared by the teacher.

There are two ways to create conditions for a student's heuristic and creative cognitive activity. The first method involves students in constant contact with highly qualified teachers. In this case, the personality of the teacher, with his advice and expert functions, is at the heart of the process. New technologies are only used as a

means of delivering materials, and the task of intelligent interaction remains within human competence. The second method is the use of artificial intelligence technology. "A teacher in the classroom has very little opportunity to meet the educational needs of the individual student by directing his lesson to the average student. A program based on imitation of the process is able to pay special attention to each student in the teaching system, in each subject." (David Kaller)

Teaching methods: - More than a dozen fundamental studies in the theory of general pedagogy, especially in the methodology of teaching individual subjects, are devoted to teaching methods, which in many respects depend on the effectiveness of teaching in universities. However, despite the diversity of pedagogical research, the problem of teaching methodology remains relevant. So far, theorists-teachers are trying to create a scientific system of teaching methods and develop technological approaches to their application in higher education. The word method - translated from Greek - is research, way, way to achieve a goal. The etymology of this word also influences its interpretation as a scientific category. For example, in a philosophical encyclopedic dictionary, a method is understood in the most general sense as a method of achieving a specific goal, a set of techniques or operations for the practical or theoretical assimilation of reality.

Innovation in teaching methods, techniques and tools.

Particular attention should be paid to the consideration of the definition of information technology in education, which is important in the modern didactics of higher military school. Due to the rapid development of scientific and technological progress, the emergence of computers and other information technologies in universities, they stood out as an independent direction of technologicalization of the educational process. The main criterion for classifying this or that technology as information technology is the set of textbooks used by this teacher. Thus, it should be borne in mind that this definition is a product of teaching technology, one of its special cases.

In the scientific and methodological literature on the problems of informatization of higher education (B.S. Gershunsky, O.A. Kozlov, O. P. Okolelov, I. V. Robert, Yu. M. Tsevenkova, V. F. Sholokhovich Rusak A. D., Bankov N.V. et al.) The search for information showed that. a clear interpretation of the concept of computerized learning technology has not yet been developed. Along with this concept, new orderly synonymous expressions can be found in various sources - new information technologies (NIT), - computer-assisted learning technologies - computer-assisted pedagogical technologies, and so on. pedagogical sources are often. In this context, we are talking about innovation that radically changes the content of various types of activities, including pedagogy.

Learning using computer systems has a more individual character, it is more flexible, the student himself determines the speed of learning, can return to certain topics several times, skip some sections, and so on. Such a training system contributes to the formation of self-education skills, makes the learning process creative and individual.

It will be possible to fully document the learning process - recording information about all the student's actions, his / her achievements and shortcomings and using them in the learning process.

The use of computer graphics, animation, video, sound, and other multimedia components provides a unique opportunity to make the material being studied as visual as possible, and therefore understandable and memorable. This is especially true in situations where the student has to master a large amount of emotionally neutral information - for example, normative documents, guidelines, technological maps.

The shortcomings associated with psychological factors are, first of all, the lack of direct face-to-face communication between students and the teacher. When there is no one around to explain the knowledge emotionally, this is a very important shortcoming for the learning process. Deficiencies related to psychological factors include, first of all, the lack of direct face-to-face communication between students and the teacher.

The technical shortcomings of the use of computer forms of education include:

- Adequate interactivity of modern training courses;
- Many courses are based on knowledge management blocks in the form of text materials and lectures in the form of simple graphic objects (pictures, photographs), test text assignments;
- Insufficient computer literacy of students and listeners;
- Lack of experience in computer learning, many teachers prefer the classical method, as they are not yet ready for this method;
- Current curricula and courses are not well developed due to the lack of qualified specialists capable of creating such training courses;
- Lack of methodological materials for the preparation and conduct of such training;

2.THE MAIN PART.

It is known that, given the fact that many packages and software can now be found and widely used on the Internet, there is reason to believe that the shortcomings of their use in the teaching process are as follows:

- Review this package or software assumption;
- To determine the possibility of using it in the classroom;
- There is no need to change or add to it when necessary (protected by copyright);
- Taking into account the ability of the teacher to use the computer program (related to RAM);
- Compatibility of the computer operating system used by the teacher;
- Inability to use students remotely from the program;

- Determining whether the software is free or for sale;
- The program lacks the ability of the teacher to fully cover the topic being taught to the student.

Based on the above consideration, the idea is put forward that every teacher should be as programmable as possible or use a common programming language with the help of knowledgeable students.

To confirm the idea, we can cite the technological process currently shown in metallurgical plants, shown in Figure 1.2. The program algorithm is not complicated. The algorithm is summarized below:

1. Picture objects are created;
2. The created objects are moved on the basis of technological process taking into account unit of time;
3. If the movement of an object is based on a scientifically based law of a particular technological process, it is taken into account;
4. The technological process is controlled by the necessary control buttons to make it understandable to the user;

For the program to work fully, the motion of the pictorial object is controlled using units of analytical geometry, taking into account the unit of time. If the object is in a straight line:

$$\frac{x(t)-x_1}{x_2-x_1}=\frac{y(t)-y_1}{y_2-y_1} \quad (1)$$

Here x (t), x_1, x_2 are the position of the image object in units of time on the abscissa axes, respectively, the starting and ending points of the object.

y (t), y_1, y_2 are the position of the image object in the ordinate axes, respectively, the starting and ending points of the object.

It is performed using the linear motion equation. When the motion is curvilinear, the polar coordinate system is used, ie:

$$\begin{cases} x(t)=\rho(t)*\cos(\varphi(t)) \\ y(t)=\rho(t)*\sin(\varphi(t)) \end{cases} \quad (2)$$

Where x(t), ρ(t), φ(t) are the position of the image object in units of time on the abscissa axes, the value of the radius vector in polar coordinates per unit time, the angle of rotation of the object.

y(t), ρ(t), φ(t) are the position of the image object in units of time on the ordinate axes, respectively, the value of the radius vector in polar coordinates per unit time, the angle of rotation of the object.

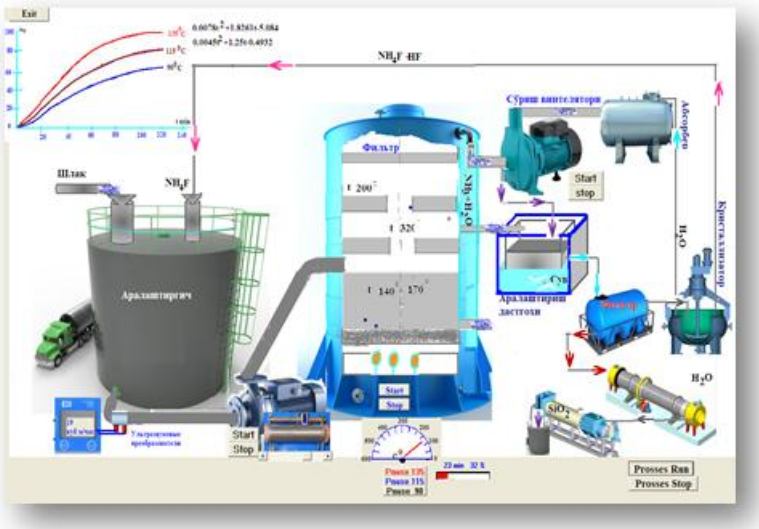
It should be noted that the coordinate axes are taken as the zero point, the left corner of the monitor (o axis) as the upper angle (x axis).

The control buttons are used for an event that needs to be started or stopped in the process.

In addition, the accounting of time involved in the technological process is available in all types of operating systems and is easily controlled by the Time command. When you need to create a moving element in a parameter unit to explain the tare, you need to use the graphical capability of the programming language. In the metallurgical process shown in Figure 2 [6], information input windows can also be used for situations where human intervention is possible.

1st picture

In this regard, we found it necessary to cite the procedure for animation of the oven temperature gauge Figure 1 [5].




```
procedure TForm1.Timer3Timer(Sender: TObject);
var ttiimm6:integer;
begin
```

```
tim2:=tim2+1;
if tim2<=50 then image17.Width:=97 else   image17.Width:=0;
if tim2=50 then begin tim2:=0; tg:=tg+2;    image31.top:=544+10*tg;
if stpaus=0 then begin ShowMessage('Prossess 153 or 115 or 90 no selected '+#13+'Auoselect 135'); stpaus:=1;
end;
end;
                                                                                    // 100
 if (tg>30) and ((stpaus=1) or (stpaus=2)) then begin image25.Height:=25-mat1; image26.Height:=25-mat1;
mat1:=mat1+1;
 if sttim<=120 then begin
 if (stpaus=1) or (stpaus=2)then begin tg:=30; sttim:=sttim+1; end;
 if       stpaus=1       then       begin       image51.Width:=102;       image56.Width:=sttim;       ttiimm6:=trunc(-
0.0078*sttim*sttim+1.8261*sttim-5.084);
 label3.Caption:=inttostr(sttim)+' min   '+inttostr(ttiimm6)+' %'; end;
 if       stpaus=2       then       begin       image51.Width:=102;       image53.Width:=sttim;       ttiimm6:=trunc(-
0.0045*sttim*sttim+1.2465*sttim-0.4932);
 label3.Caption:=inttostr(sttim)+' min   '+inttostr(ttiimm6)+' %'; end;
 end
 else begin sttim:=121; image51.Width:=0; image56.Width:=0; image53.Width:=0; label3.Caption:=''; end;
 end;
 if (tg>17) and (stpaus=3)  then begin tg:=18; image58.Width:=168; image55.Width:=100;
 if tim2=49 then sttim:=sttim+1;
 if sttim<=120 then
 begin image25.Height:=25-mat1; image26.Height:=25-mat1; mat1:=mat1+1; image31.Width:=0;
 image55.Width:=sttim;
 image51.Width:=102; image55.Width:=sttim; ttiimm6:=trunc(-0.0032*sttim*sttim+0.9158*sttim-1.6256);
 label3.Caption:=inttostr(sttim)+' min   '+inttostr(ttiimm6)+' %'; end
 else  begin sttim:=121; tg:=17; stpaus:=0;image55.Width:=0; end;
 end;
if tg>=40 then begin image27.Height:=25-mat2; image28.Height:=25-mat2; mat2:=mat2+1;end;
if tg>=25 then begin     Timer2.Enabled:=true;    Form1.Timer4.Enabled:=true;
image19.Width:=5; image20.Width:=5;image23.Width:=5;image24.Width:=5; image31.Width:=130;
image12.Width:=10;  image15.Width:=40;image16.Width:=40;image52.Width:=168; image57.Width:=168;
if (tg>=0) and (tg<=120) then begin image16.Width:=40;
end;
```

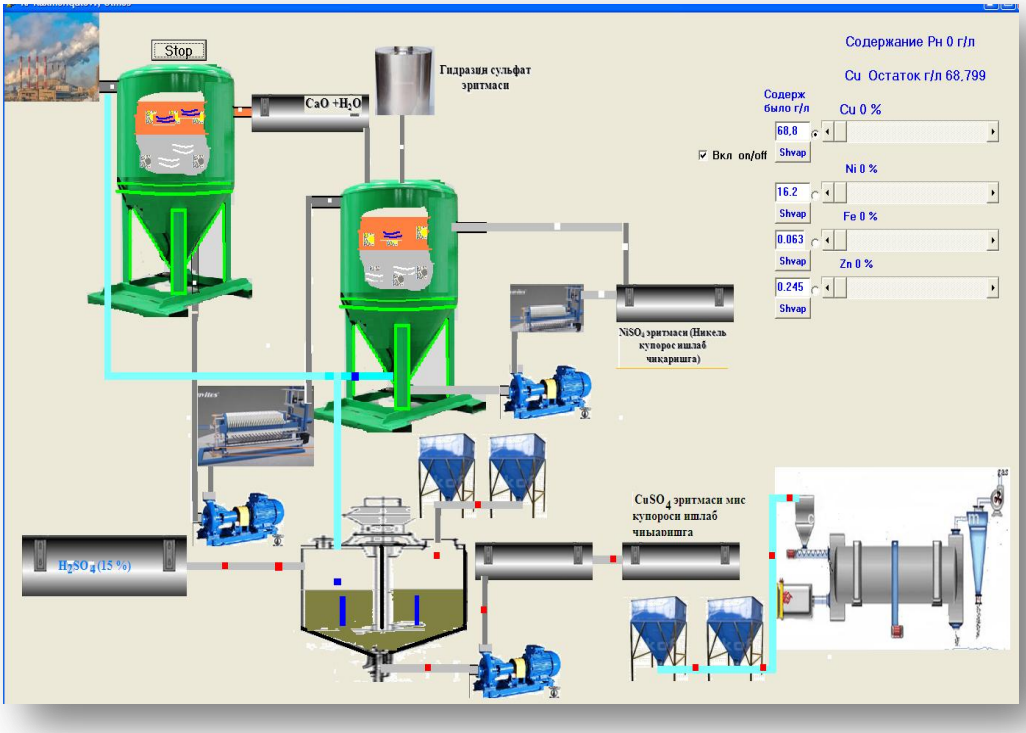
3.RANDOMIZE;

```
j:=RANDOM(528);   jj:=RANDOM(837);   jjj:=RANDOM(520);   jjjj:=RANDOM(412);
if (j>=394) and (j<=528)  then begin image18.Top:=j;  image19.Top:=j;
image23.Top:=j; image24.Top:=10+j;end;
if (jj>=620) and (jj<=852) then  begin image18.Left:=jj; image19.Left:=jj;  end;
if (jjj>=264) and (jjj<=520) then  begin image20.Top:=jjj;   end;
if (jjjj>=412) and (jjjj<=752) then  begin image20.Left:=jjjj;   image24.Left:=10+j; end;
 end;

// датчик
  with Form1.Canvas do begin   Font.Name := 'Times New Roman';
  Font.Size := 10;   Canvas.Pen.Color:=clwhite;
  Font.Color:= clred;    Canvas.Pen.Width:=2;
  x:=10*sin(pi*(tg-2)/180);   y:=10*cos(pi*(tg-2)/180);
  xx:=trunc(x); yy:=trunc(y);   moveto(742,752);lineto(752+3*yy,742-3*xx);
  x:=10*sin(pi*tg/180); y:=10*cos(pi*tg/180);
  xx:=trunc(x); yy:=trunc(y);     Canvas.Pen.Color:=clred;
  moveto(742,752);lineto(752+3*yy,742-3*xx);
  end;
  end;
```

2nd picture

The procedure can be seen from the listing that the process is presented in the corner of the monitor done with science-based management. For the reader who is familiar with programming languages, it is not difficult to determine in which language the program is written.



4.CONCLUSION:

There is reason to believe that the time has come for every professor and teacher to use the programming language, not the animation method, to take advantage of the opportunity to take into account the technological process.

In addition, at a time when the technological process requires extreme precision (production of drugs, toxic chemicals for use in agriculture), it is natural to be able to fully automate the workplace using process parameters using additional remote measuring instruments.

It should also be noted that many manufacturing companies have such an opportunity. This means that higher education institutions must take this into account in their training.

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