THE EFFECTIVENESS OF THE USE OF ICT IN THE TEACHING OF GENERAL ENGINEERING IN UNIVERSITIES IN UZBEKISTAN

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ABSTRACT

This paper presents a systematic review of models and methodologies that integrate information and communication technologies (ICT) and education. The starting point of the review is the research questions, then keywords, selection of the databases, definition of the inclusion and exclusion criteria, the definition of the search chains, search process and selection of papers, the analysis of the paper, and the results of the systematic review to answer the questions posed. In the systematic review, 316 papers were found in three academic databases and 75 relevant papers were selected. The work developed intends to know the different models and methodologies that integrate ICT and education. The article describes the solution of problems on the subject "Descriptive geometry and engineering graphics" using computer programs and the role of pedagogical information technologies in the process of teaching students in higher educational institutions. Peculiarities of teaching descriptive geometry and engineering graphics as part of the course of engineering graphics aimed at the mastering of AutoCAD and Compass graphic editors are considered by the authors. The authors recommend the incorporation of mini-lectures and computer workshops into the training process.

Introduction

According to the World Bank's Learning for All (Cabrol and Székely, 2012), investment in people's knowledge and promotes the skills development of the world's population. One of the main goals of education at the global level has reduced the educational gap by bringing education to all people around the world (Willcox et al., 2016). The Inter-American Development Bank (IDB), Education for the 2012 Transformation, indicates that education must focus on quality, preparation for global scenarios, and markets. Close the gap between education and the business world, it's real needs, and education in skills to provide real solutions (Cabrol and Székely, 2012). When Uzbekistan gained independence, wide paths of economic and social development and cultural and spiritual renewal were opened. Therefore, one of the pressing issues is the technical re-equipment, modernization of technologies and technologies in all areas of our country as well as the development of telecommunication and computer communication systems that meet modern international requirements. Yet nowadays, it is not possible to carry out educational processes without technology and more if they are oriented to the web (Ramírez and Collazos, 2016). When we speak about the importance of modern pedagogical technologies in teaching students, it is important to mention the words of the first president of Uzbekistan I. A. Karimov: "Teachers, who seek to introduce new information and pedagogical technologies in the educational process, educate our children as perfect people." It must be emphasized that further improvement in the quality of our education, as a whole, will bring the education system to a qualitatively new level (Narodnoe Slovo on December 6, 2009). Currently, education without ICT is not conceivable due to the impact and permeability of technology in all environments and areas of society (Behera, 2013). Whenever there is new ICT that may apply to education, it is possible to

develop new studies and research related to the impacts of technologies in educational processes (Zinny, 2015; (Anon n.d.). The growth of production capacities and the development of scientific technologies create great demands for engineers and it is one of the main tasks that higher education institutions face the development of deep theoretical knowledge and the provision of highly qualified practitioners. The main task of higher education institutions is to prepare competent specialists who can freely navigate in the modern information space and are ready to not only master the information culture but also constantly improve their professional skills. With the advent of new software tools, the study of graphic disciplines has become especially interesting and relevant, as their content and teaching methods change. The needs of education for new students are different and they need pedagogical and technological models, strategies, methodologies, and updated technological paradigms, allowing visualizing the education of the future to apply it in current education (Coto et al., 2016, Oliveira and Moreira, 2012). A full-fledged development of the vocational education system is currently impossible without the use of the latest computer technologies, which can be used not only in the educational process but also in the management system of the university and any of its units. Therefore, teachers are paying close attention to computer literacy (Y. P. Bezhenar 2008). Computer quizzes are to be held at the beginning of each class to consolidate the material, ensure preparedness for mastering new information, and to stimulate the process of learning. The Department of General Science developed a special methodology to ensure the efficient presentation of theoretical material that incorporates special computer techniques and an original structure and succession of computer slides to improve the information intensity of the computer graphics course that enjoys a small number of lecturing hours allocated within training programs offered by the university.

Literature Review

After analyzing the methodological literature as well as relying on personal experience, we can determine the subject of pedagogical technology - these are concrete practical interactions of teachers and students organized based on clear structuring in any field of activity, systematization, programming, algorithmization, standardization of methods and techniques of teaching and upbringing (Melnikova E.L.2002). As a result, a result is achieved in the students' successful mastery of knowledge, skills, and conditions are created for the formation of valuable social norms and behavior habits. Methodists identify about 100 definitions of the concept of technology; if you analyze them, you can highlight the general: technology is processed where actions are planned, constructed, and has a sequence (Shevchenko N.I. 2008). Model: Graphical or verbal representation or a simplified version of a concept, phenomenon, relationship, structure, system, or an aspect of the real world. A representation of a system that allows for the investigation of the properties of the system and, in some cases, prediction of future outcomes (Frigg and Hartmann, 2006). The steady increase of computers in schools and the potential applications of technology in teaching and learning make it necessary to expand the construct of PCK to account for the phenomenon of teacher s learning how to teach with technology (Angeli and Valanides 2005). Therefore, pedagogical technology is a planned method for creating, applying, and defining a holistic pedagogical process and mastering knowledge, taking into account the personal capabilities of students as well as technical equipment intended for the lesson. This is a rigidly built system of joint student and teacher activities in the design (planning), organization, orientation, and adjustment of the educational process to achieve a specific result while ensuring comfortable conditions for participants. We can say that pedagogical technology is a clear system of interaction between the student and teacher in planning, organizing, and adjusting the educational process, the purpose of which is to

achieve the goals and objectives for the successful assimilation of the material. Based on the above definitions, the tasks of pedagogical technologies are distinguished:

- To form sustainable knowledge, consolidate the skills acquired in the lesson;
- To consolidate social norms and features of behavior
- Contribute to the development of technological thinking, the ability to independently plan your activities (Melnikova E.L.2002).

Modern reality makes such a demand for the young generation as the ability to adapt to life in modern society (Kiani, M., at. all 2020). The effectiveness of training is inextricably linked with the development of students' motivation for learning. This can be achieved through the transition to personality-oriented technologies in training, which helps to build the competencies necessary for the adaptation of young people in the modern world. In the context of the modernization of higher education, new tasks appear before the system of higher professional education, and teachers, engaged in scientific, pedagogical, and methodological activities, are in constant creative search (Azhgibkova T.N 2004). A growing number of teachers (even the older generation) and students are convinced that because of their knowledge of computers, modern graphics programs, and acquired work skills, graduates will be better prepared for professional activities. This means that they can easily compete in the labor market. Computerization in the graphic education of university students is not an end in itself, but a means of achieving the goal. The role of the computer is growing with the goal of accounting and monitoring student performance in individual subjects. Computer support of subject disciplines allows you to individualize work with students, stimulate interest in the subject, and make learning at a higher school meaningful and effective (Voronina M.V. et.al 2017). The purpose of teaching engineering graphics is to provide students with all kinds of

graphic information, such as drawings, diagrams, and diagrams, from engineering and special subjects in two-dimensional or three-dimensional engineering graphics programs, such as Compass 3D and AutoCAD MEP 2018 (Randy H). Three-dimensional computer modeling tools are now becoming the object of increasing the attention of users, and this is no accident (T. A. Stelman). Their use allows you to effectively carry out design work, provide the user with the designer the ability to quickly and efficiently execute drawings with a high coefficient of accuracy, and display drawings on paper. Lectures on descriptive geometry, as a rule, are accompanied by presentations developed on all topics of the discipline (R. U. Sindarov 2013). PCs allow you to qualitatively prepare methodological and didactic materials for the educational process and teaching materials. Summaries of lectures on descriptive geometry, practical classes on engineering graphics, cards with individual options for independent work in various graphic disciplines, and electronic textbooks - this is not a complete list of teaching materials. Theoretical knowledge during the training phase, necessary to perform tasks such as drawing primitives of graphic information components of a computer screen, changing them, creating additional options, and writing images on a screen is very important (B. Barchard, 2000). With practical exercises, skills, and crafts are improved with the help of practical commands, such as drawings, editing, sizes, and linking objects. Autodesk's AutoCAD program is currently the world's first computer-aided design standard. The subject "Descriptive geometry and engineering graphics" is also important in the training of engineers (A. L. Kheyfes 2005). The main content of the section "Descriptive geometry and engineering graphics" is as follows:

- Creating methods for creating flat images in phase;
- The study of methods for solving and researching spatial issues from the figures

shown in the figures (Monakhov B.E., Tel'noy V.I. 2011).

Research Focus

The purpose of the article - is to prove that design and research activities contribute to the development of motivation for students and to solve the problem on the subject of descriptive geometry in the program of engineering graphics, developing strategic directions for improvement in the graphic education of university students. Moreover, to study the effectiveness of the use of pedagogical information technologies (PIT) with the use of engineering, graphic software in the process of teaching students of a technical university. Prospective modern educational technology has characteristics of the system: the logic of the process, the relationship of its parts, integrity. Pedagogical technology can be controlled, we can plan, design, training, conduct a phased diagnosis that can be varied by means and methods of training (Asset, Darkhan Gabdyl-Samatovich, and Balkiya 2015). The objectives of the article - analysis of problem-solving on the subject of "Descriptive Geometry" using computer programs of engineering, computer graphics like "AutoCAD" and "Compass", evaluating the effectiveness of design and research work, the solution to the problem of plot geometry in engineering graphics. The scientific novelty - is determined by the practice-oriented empirical basis of research. The relevance - lies in the growing social and economic importance of education as a strategic resource for the development of the individual, society, and the state. To improve the quality of training of specialists, the level of development of the educational-material and educational-methodical base of education is essential (V.D. Simonenko et. Al. 2005). It makes it possible to organize educational and cognitive activities of students at a higher level, to increase the intensity of teachers' work and students' interest in the process of obtaining the necessary education (Azhgibkova T.N.2004). The subject of the study - is the impact of project activities on the motivation of students to study descriptive geometry.

The problem posed in this article is the development of the motivational sphere of learning through the design and research activities of students. The systematic review is a literature search process to analyze, evaluate and interpret all relevant studies on a question or several research questions in a particular, specific area or phenomenon of interest (Kitchenham and Charters, 2007). "Technology" is not a new concept in the XXI century. It has come with a long and thorny path, so Y. A. Cominsky 400 years ago said that training is "technical", i.e. So that nothing that is taught could fail. Based on this, the most important idea of technology should be formed - guaranteed results.

General Background

The study of the problem of the formation of readiness of higher education institutions' students with the introduction of pedagogical information technology (PIT) has been carried out with the help of theoretical and empirical methods (Alexander and Vladislav 2016; Ulugov Bazar Dzhumaevich 2020a). Theoretical methods include analysis of scientific sources on the research problem, which made it possible to determine the object, subject, and the content of the study, to formulate its objectives, to clarify the essence of the key concepts of the study (Asset, Darkhan at. all. 2015; Revilla-Cuesta et al. 2020). Modeling method: to develop a model for forming students' readiness to the introduction of pedagogical information technology (PIT) (Osipov et al. 2016; Ramirez, Collazos, and Moreira 2018). Empirical methods: conversation – a dialogic method in which a teacher, with the help of well-posed questions, prompts students to reproduce previously acquired knowledge (Gros, Kinshuk, and Maina 2016; Moreira et al. 2017). Testing is a method that allows revealing the level of knowledge, skills, and abilities, abilities, and other personality traits (Hew and Kadir 2016). Questionnaire-receiving information using respondents' written answers to the system of standardized questions. Pedagogical experiment – recording, forming, control, for checking the hypothesis of the study. Observational methods –

direct and indirect pedagogical observation, self-evaluation, and evaluation. Statistical – methods of mathematical statistics to process the statistical data, to prove the statistical reliability of the results of experimental research.

Instrumentation and Procedures

The scientific novelty of the results is to develop a model for the formation of the readiness of higher education institutions' students with the introduction of pedagogical information technology (PIT). An empirical study has been conducted based on the Termez branch of Tashkent State Technical University named after Islam Karimov. There were 120 students in the control groups. The methodological basis of formation of readiness of higher education institution's students to the introduction of pedagogical information technologies establish such methods as methodological-target (purpose, tasks, approaches, principles); content-technological (stages, content, forms, methods, technologies, means, pedagogical conditions); productively-estimated (components, levels, criteria, and indicators). By the ethics of organizing and conducting the research, the procedure of participation of first-year students and teachers of professional departments in the experiment has been considered and discussed at the meetings of the professional chairs. The discussion procedure was recorded in the minutes of the meetings of the Department of General Professional Sciences of Tashkent State Technical University named after Islam Karimov (Minutes № 2 of September 3, 2018). With this approach, respondents agreed to work in control and experimental groups, and the teachers of these educational institutions to work as experiments.

Materials and Methods

We analyzed the indicator of the quality of comprehensibility of the material passed (IQCMP) and the results of the independent work of students who studied at the Department of General Professional Subjects of the Termez branch of Tashkent State Technical University in the subjects of "Descriptive geometry and engineering graphics" for 1 year. The IQCMP indicator was calculated based on the following formula:

IQCMP index = (AKG + IS + FG + AS) / 100.
AKG - the average current grade (the sum of daily grades/school days);
IS - interim estimates (total amount of interim estimates/number of interim polls conducted);
AS - the average score for independent work;
FG - final grade;

Given that the assessment is based on a 100-point system, in the end, 100 divided the amount received. A good result of the assimilation of the consumed material was considered when the index of IQCMP was from 0.8 to 1. Average - from 0.7 to 0.79. Unsatisfactory - from 0.69 and below.

The "Descriptive Geometry and Engineering Graphics" is a discipline that allows the most widely and varied use of various elements of informatization in the learning process. One such tool is application software. Educational technologies are complex, intricate systems, and as such, they cannot be classified linearly, i.e., by one classifier (Alexander and Vladislav 2016; Jimoyiannis 2010; Schuck et al. 2013). To enhance feedback with students at the beginning of each lesson, it is advisable to carry out automated test control. A system of test tasks has been developed for its implementation. The main advantage of using tests. When testing knowledge is to obtain an instant objective result and the ability to compare your result with the results of others. Previously conducted written surveys assumed time-consuming verification. By the time the results are announced, questions may have already been forgotten, and the mark is not associated with a specific topic. When performing test tasks on a paper basis, there is always a desire to check your answers with those of your comrades. These negative aspects of paper-based test items can be avoided by using computer technology (Figure 1).
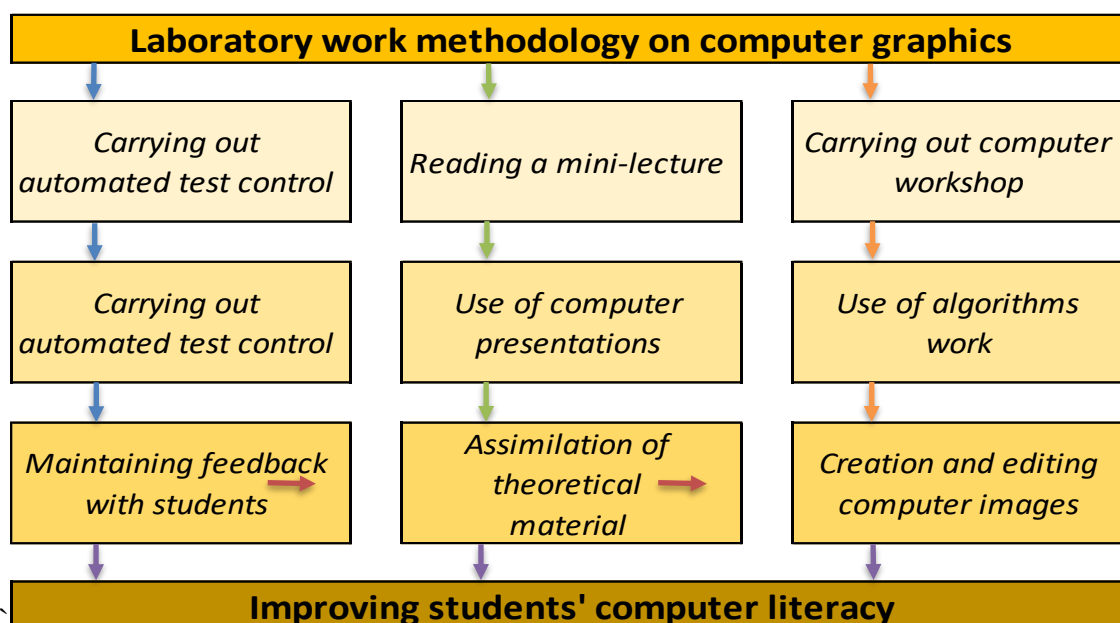
Figure 1 The technique for laboratory work on "Descriptive Geometry and Engineering Graphics".

The system automatically calculates the test result and forms the base data for each student. Tests allow the teacher to observe the progress of the educational process and on-time provide students with the necessary assistance since he can analyze the statistics of answers to test questions and the amount of time spent on answers. Test results are of great importance for consolidating the studied material, stimulating students in learning, as well as for quickly adjusting them to the perception of new educational material. When presenting new material in laboratory work, it is recommended to use mini-lectures and computer practice. Teaching material, depending on the specifics of the images under construction, is arranged in blocks, each of which covers one of the sections of computer graphics. Each lesson begins with a one-hour lecture. During the mini-lecture, the teacher brings to the students the necessary minimum of theoretical material, for example, methods and means of computer graphics, commands, and features of the algorithms used methods of constructing images, etc. The effectiveness of the impact of educational material on the student audience largely depends on the degree and level of illustratively of the oral material (Monakhov B. E., Tel'noy V.I. 2011; Smarkola 2008; Srisawasdi 2015). The visual richness of the educational material makes it bright, convincing and contributes to the intensification of the process of its assimilation. Therefore, in the classroom, computer slides are used, developed by teachers of the Department of Descriptive Geometry and Engineering Graphics (Ulugov Bazar Dzhumaevich 2020b, 2020a). Taking into account the specifics of teaching computer graphics, in presentations, illustrative and schematic material is predominant over text. The text content is given in the abstract and formatted point by point. When demonstrating a presentation to students, the expanded texts are pronounced by the teacher aloud, like explanations to the slide. There are many programs equipped with application modules designed to solve the problems of descriptive geometry and engineering graphics. As an example, let's consider solving the problems of the "Descriptive Geometry and Engineering Graphics" discipline using the AutoCAD and Compass software packages. Let's look at several works from the computational and graphic works performed on the subject "Descriptive geometry and engineering graphics" using graphic software. As a computational experiment, it was proposed to solve science-based problems based on AutoCAD and Compass. Currently, this program is widely used by

universities in the educational process. In particular, depending on the direction of preparation, this program can be studied in different disciplines: computer science, engineering graphics, CAD; therefore, as a rule, starting with the study of "Drawing Geometry and Engineering Graphics," students already have the skills to create three-dimensional models. The direction of education - "5630100", 1st course, 1st semester, "Descriptive geometry and engineering graphics". Methods of reconstruction of diagrams. Exchange method. The algorithm calculated in the Compass 3D.V16 and AutoCAD MEP 2018 applications is performed as follows:

(Example 1) - Solving a problem in the AutoCAD engineering graphics program as follows: (ABDS pyramid, ABD true base size, and actual height size S). We are launching the AutoCAD MEP 2018 program, providing a new drawing using the create-drawing commands. In these coordinates, we make the H-horizontal and V-frontal projections of the pyramid ABDS. By replacing the projection plane, find the true size of the base of the ABD pyramid. The actual height is "n" (from point S to base ABD) (Figure 2).
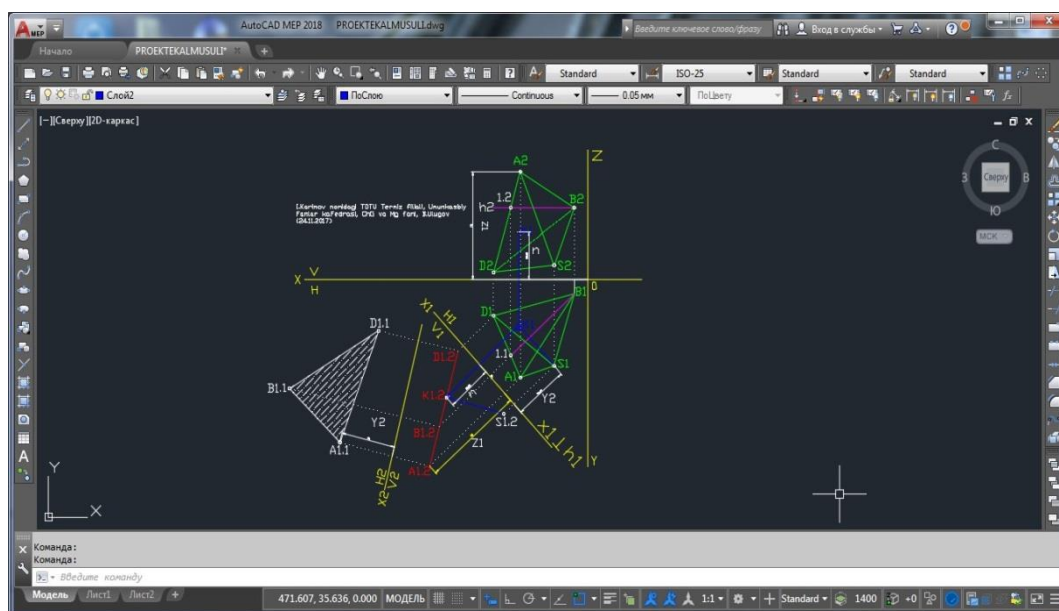

Figure 2 (ABDS pyramid, ABD true base size, and actual height, size S (AutoCAD).

(Example 2) -Solving a problem in the engineering graphics program "Compass 3D.V16" is possible in the following form: (ABCD pyramid, ABC true base size, and actual height size D). When you start the Compass 3D.V16 program, you can create a new drawing using the File-Ctrl + N menu, select the toolbar-geometry-line button, and enter the coordinates of the pyramid ABCD. The result is an H-horizontal projection of the pyramid ABCD and a V-frontal projection. The following on the steps that must be completed (Figure 3):
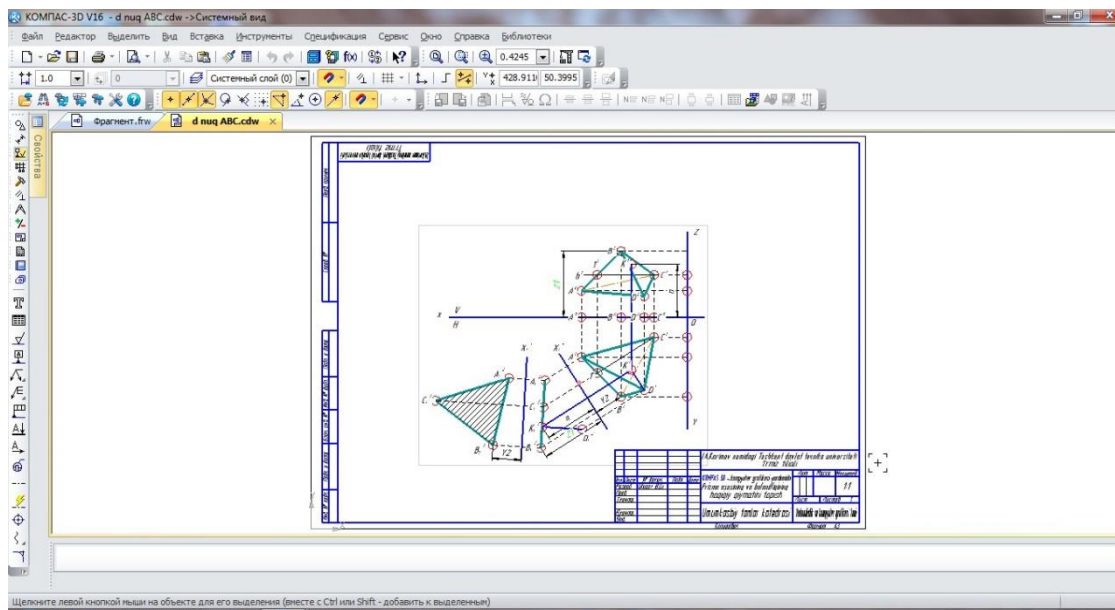
Figure 3. ABCD pyramid, ABC true base size, and actual height, size D (Compass 3D)

Creating projections of point, A:

From the zero points in the X-axis, insert the value of point A, and determine the points Ax. Etc. Thus, in this scheme, the true size is $A_1^2 B_1^2 C_1^2$ (ABC base) and the actual height n (from D to ABC base).

(Example 3) -Let's look at one of the computational and graphic works performed on the subject "Descriptive Geometry and Engineering Graphics" for the 1st semester using the graphics software "Compass 3D V16":

The ABC and DEF data ($A^1 B^1 C^1$ and $D^1 E^1 F^1$, $A^2 B^2 C^2$ and $D^2 E^2 F^2$) are the intersection lines of the triangle and find visibility using Compass 3D V16 engineering graphics software (Figure 4).

Figure 4. The intersection of bodies and visibility

We analyzed the indicator of the quality of comprehensibility of the material passed (TPMM) and the results of independent work of students who completed training at the Department of General Professional Subjects of the Termez branch of Tashkent State Technical University in the subjects "Descriptive Geometry and Engineering Graphics" for 1 year. The TPMM (Teaching performance-monitoring material)

indicator was calculated based on the following formula:

TPMM index = (ACG + IS + FG + ASIW) / 100.

ACG - the average current grade (the sum of daily grades/school days);

IS - interim estimates (total amount of interim estimates/number of interim polls conducted);

ASIW - the average score for independent work;

FG - final grade;

Given that the assessment is based on a 100-point system, in the end, 100 divided the amount received.

A good result of the assimilation of the consumed material was considered when the index of TPMM was from 0.8 to 1.

Average - from 0.7 to 0.79;

Unsatisfactory - from 0.69 and below;

Result

The use of modern technical means of creating, storing, processing, exact graphic solutions to problems for bodies of descriptive geometry with boundary conditions on the surface, obtained using the graphic software "AutoCAD" and "Compass 3D" is becoming more and more simple and affordable methods in the learning process, thanks to the rapid development of new information technologies. There was an opportunity for the wider use of information and technology in the process of training students and advanced training of engineers. At the same time, the group of pedagogical information technologies (PIT) using engineering graphics software includes:

- Educational audio and video materials;
- Internet resources on the subject and direction of the educational process;
- Electronic textbooks, teaching aids, and educational materials;
- Interactive tests, etc.
- Computer engineering programs like "AutoCAD" and "Compass 3D"

We have analyzed the indicator of the quality of digestibility of the consumed material and compared the results of independent work of students who completed training at the Department of General Professional Subjects of the Termez branch of Tashkent State Technical University in the subjects "Descriptive Geometry and Engineering Graphics" for 1 year (Table-1).
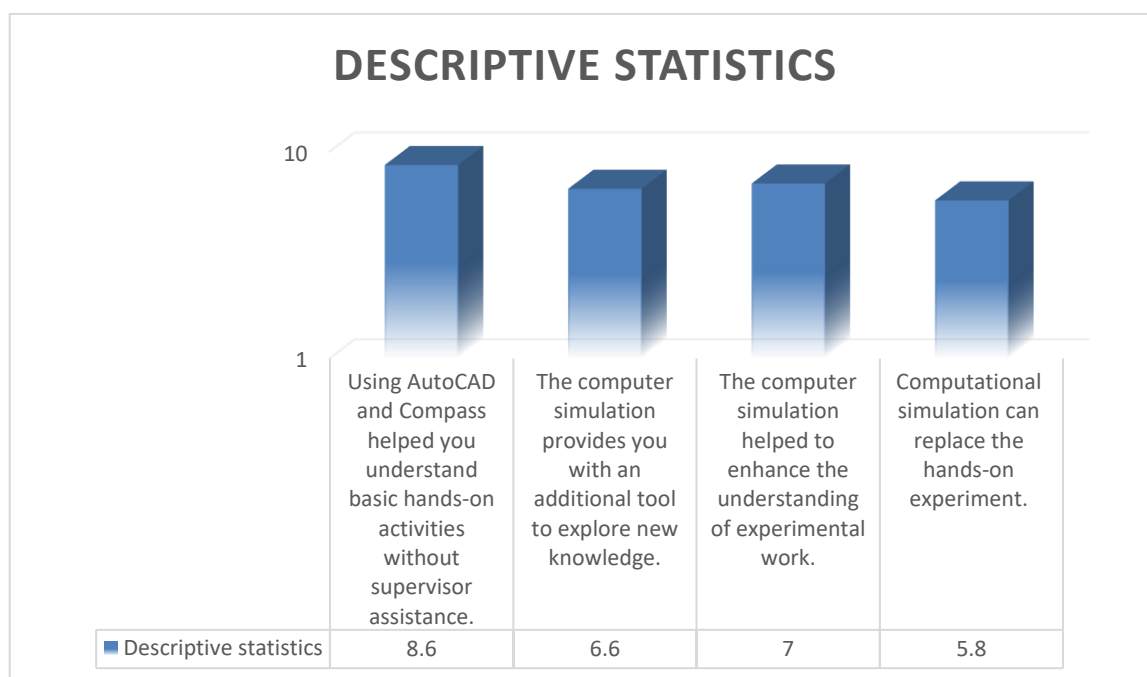

DESCRIPTIVE STATISTICS

	Using AutoCAD and Compass helped you understand basic hands-on activities without supervisor assistance.	The computer simulation provides you with an additional tool to explore new knowledge.	The computer simulation helped to enhance the understanding of experimental work.	Computational simulation can replace the hands-on experiment.
■ Descriptive statistics	8.6	6.6	7	5.8

Table-1 Student's feedback: descriptive statistics.

Based on the approved standard and work program for each subject, specific hours are given in the classroom (practical, theoretical) and independent work of students, which are assessed by the teacher, and summarized in the final grade:

Final grade = (sum of daily grades / days of class) + sum of intermediate grade + grade of final control.

When comparing the results of the student's digestibility of material consumed by students, based on testing, our results showed that the wider use of IPT tools using application software contributes to the higher achievement of the PMC index.

Discussion

When comparing the results of the students' digestibility of material consumed by students, based on testing, our results showed that the wider use of PIT tools using engineering graphics software contributes to the higher achievement of the TPMM (Teaching performance-monitoring material) index. In particular, with the daily use of PIT using engineering graphics software in practical exercises or in the process of conducting ASIW, the TPMM index reached an average of 0.86. When using PIT only during the organization and conduct of practical exercises - an average of 0.83. When conducting practical exercises, without using PIT using engineering graphics software, an average of 0.75. When analyzing the results of the independent work of students without the use of PIT, the TPMM index did not exceed 0.72 (Table-2).
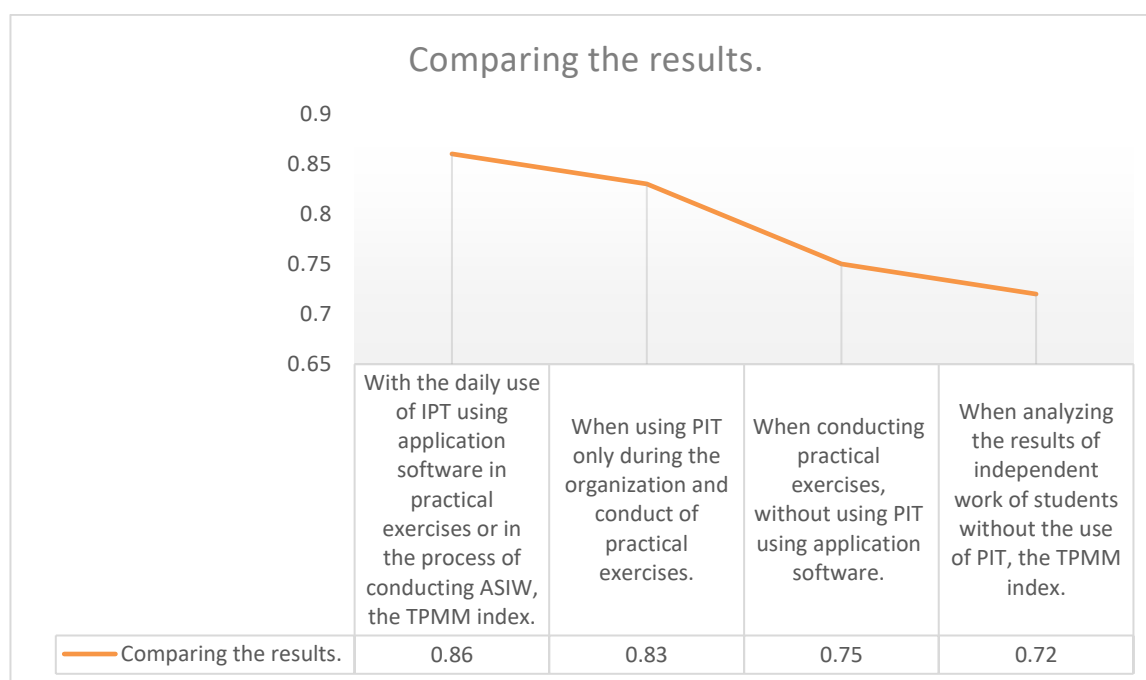

Comparing the results.	With the daily use of IPT using application software in practical exercises or in the process of conducting ASIW, the TPMM index.	When using PIT only during the organization and conduct of practical exercises.	When conducting practical exercises, without using PIT using application software.	When analyzing the results of independent work of students without the use of PIT, the TPMM index.
Comparing the results.	0.86	0.83	0.75	0.72

Table-2 Comparing the results of the students.

As our observations have shown, the role of IPT tools with the use of engineering graphics software is to intensify the work of teachers, which makes it possible to increase the pace of students studying learning material, relying heavily on their independent work. The results of the study show that before the organization of the scientific-experimental work, the students of the experimental and control groups were at almost the same level, but after the experimental work, the students of the experimental group showed higher results, and we can conclude so. With the use of pedagogical information technology and engineering programs "AutoCAD" and "Compass" in teaching the subject "Descriptive Geometry and Engineering Graphics" to university students, their level of knowledge has increased significantly.

Conclusion

As our research results showed, the effective use of PIT using engineering graphics software requires the search for appropriate organizational forms, methods, technologies that adequately reflect the capabilities and features of new teaching aids aimed at a specific educational and creative process. At the same time, learning tools are a set of subjects that embody training information or perform training functions designed to build students' knowledge, skills, and abilities, managing their cognitive and practical activities to comprehensively develop professional quality.

According to our observations, with the help of PIT tools using engineering graphic software, the student's consciousness imprints the solution to the problem of descriptive geometry of the plot in engineering graphics, the teacher's tactics, provide more accurate information about the phenomenon, object, and process being studied and thereby helps to improve the quality of education. Therefore, with their help, training becomes visual, which makes the most complex material available.

When interviewing students, it was noted that, unlike printed educational materials, PIT tools using engineering graphics software act on students' emotions, activate them, thanks to which they help to solve educational problems, strengthen interest in educational work, and develop cognitive activity. Moreover, the use of information and computer technology is effective at all stages of the pedagogical process:

- Presentation of new training information;
- Assimilation of educational material in the process of interactive interaction with information carriers;
- Repetition and consolidation of acquired knowledge and practical skills;
- Mastering the work when calculating problems on the subject "Descriptive geometry and engineering graphics" graphic solutions to the problem;

- Intermediate and final control and self-monitoring of the achieved learning outcomes;
- Adjustments to the learning process itself and its results by improving the volume of educational material, its systematization (Goktas, Yildirim, at. all 2009).

Thus, this is a practical application: Compass 3D.V16 and AutoCAD MEP 2018 provide the following benefits:

1. Solving the problem accurately, quickly, and efficiently.
2. Developing skills for working with application operators Compass 3D.V16 and AutoCAD MEP.
3. From a practical point of view, the obtained solutions can be used in calculating problems in the subject "Descriptive Geometry and Engineering Graphics" using engineering computer graphics.
4. The relevance of the solution problems in the calculation obtained in this work in Plot reconstruction methods. Exchange method. The algorithm computed in the Compass 3D.V16 and AutoCAD MEP 2018 applications consists of the fact that there is a possibility of a sufficient degree of accuracy for solving problems by determining the true size and actual height.
5. In this work, we obtained exact graphical solutions to the problem for bodies of descriptive geometry with boundary conditions on the surface, obtained using the graphic software "AutoCAD" and "Compass 3D".

Concludes that knowledge in the modern world is transformed by the development of revolutionary (El-Hussein and Cronje 2010).

Finale

Modern information technologies, being an integral part of the educational process at

higher educational institutions, can increase interest in the educational process of students, and on average up to 97% increase the comprehensibility of the material. Therefore, when organizing the educational process, it is desirable to use IPT using engineering graphics software, taking into account the specificity and the duration of the educational process.

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