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Kazakh Innovative Humanitarian Juridical University

Y.NABI

SCIENTIFIC PRINCIPLES of GRAPHIC TRAINING in E-LEARNING CONDITIONS

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Reviewers:
G.Skabayeva – Head of professional pedagogy department of Kazakh national agrarian University, candidate pedagogical Science, Associate professor
E. Kurmanbayev - Head of the Department of mathematics and Informatics of Kazakh Innovative Humanitarian Juridical University, candidate of physical and mathematical Sciences

Nabi Y.
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The definition of innovations in education and characteristics of philosophical, educational and pedagogical approaches to the definition of goals, forms and methods of e-learning in the Republic of Kazakhstan are given. The genesis, functions and levels of e-learning in the Republic of Kazakhstan are considered. The model of innovative activity is developed. The competence approach in e-learning is characterized. The practice of graphic learning in the conditions of e-learning inculcation is shown.

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ABBREVIATIONS

DER – Digital Education Resources
DLT– Distance Learning Training
ICT – Informatization Communication Technologies
MEP – Modular Educational Program
MES RK – Ministry of Education and Science of the Republic of Kazakhstan
NCI – National Centre of Informatization
SES RK – State Compulsory Educational Standards of the Republic of Kazakhstan
STST – State Standards

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1 THEORETICAL and METHODOLOGICAL PRINCIPLES of GRAPHIC TRAINING in E-LEARNING INCULCATION CONDITIONS

As indicated in the State Program of Education and Science Development in the Republic of Kazakhstan on 2016 - 2019, "In order to realize of the Program will be concentrated the financial resources in the picked out framework for the development of e-learning and ICT, ... for implementation of the innovative projects". Therefore, e-learning will be further developed. This phenomenon is a prerequisite for practical application of the e-learning resources potential in the course of graphic disciplines: there are the electronic textbooks "drawing geometry" and "drawing" for students of high schools and schools of 9th form, the digital educational resources for students of technical and vocational education system. Many universities use electronic learning tools.

The analysis shows that at the present stage of science development new scientific knowledge is often based on interdisciplinary approach. A problem of the development of the methodological aspects of graphic training in post-graduate education in the in conditions of e-learning inculcation is also submitted to this law. In this case, interdisciplinary approaches can be realized through the potential of innovatics. Innovatics is an interdisciplinary sphere of knowledge on the essence of innovative activity, organization of it and management of innovation processes. Innovative processes converge new knowledge into commercial base (commercialization of scientific and technical and creative activities), as well as noncommercial base (for example, innovations in the social sphere).

Nowadays, as a result of the study of graphic training, there are some contradictions:

- between by the completion of the solution of the problem of graphic training in the system of secondary and vocational education and the lack of any researches in the field of graphic training in the postgraduate education (master's, PhD doctorate, advanced training of graphic disciplines);
- between by availability of practical experience in e-learning in the system of secondary and vocational education and the inadequacy of such practice in postgraduate education;
- between by availability of a new object of the methodological study (graphic training in postgraduate education) in the new conditions (e-learning) and a need for a new, especially interdisciplinary approach to its study.

In this regard, the main idea of the research is that the innovatics potential is used to create of methodological aspects of graphic education in the new conditions. For the implementation of the idea, the following problems have been settled:

- characteristics of methodological principles of graphic training in conditions of e-learning inculcation;
- characteristics of theoretical principles of graphic training in conditions of e-learning inculcation;

- characteristics of theoretical and methodological aspects of innovativeness of graphical training process in the conditions of e-learning inculcation.

1.1 Innovations in education

Innovatics is an area of knowledge about the essence of innovative activity, its organization and innovation process management. The cognitional roots of innovatics are such sciences as philosophy, economics, engineering design, business, finance, sociology, psychology, computer science, marketing, logistics, management, and pedagogy. Innovatics is theoretical and methodological principles of description and modeling, organization and management of innovative activity. Then the object of innovatics will be innovative activity, and this activity will be considered as a process of realization of innovation in social and economic systems. The subject of innovatics is bases, laws and regularities of innovation processes in social and economic systems, models and methods of research, organization and management of innovation activity.

In one of our earlier works, we have suggested that "innovation is a novelty realized in action", so we explain the concept of "educational innovation" as creation of inculcation of pedagogical innovation, mastering of the pedagogical collective, and inculcation it at the educational process.

Innovatics is interdisciplinary sphere of knowledge on innovation activity. Innovative processes converge of new knowledge to news necessary for society. In this connection there is a scientific partition of pedagogy called "pedagogical innovatics". Pedagogical innovatics is a science that studies the emergence and development of pedagogical innovations in relation to subjects of education, as well as the link between pedagogical traditions and future education. Educational innovatics should examine the laws and mechanisms of the education system modernization, and make relevant recommendations. Unlike other scientific fields, it can be said that the process of progressive development of a social and economic object, as well as a stable state of the social and economic system, will allow the study of the parameters of service to become higher, the use of intellectual labor results and the growth of intellectual capital. In innovatics the innovation is explained by the use and dissemination of the results of the scientific- technical and creative activities based on systematic scientific research or intuition.

We take this as a basis for the definition of the concept of educational innovatics, which states that "it is the motivation, goal, process and outcome of transformational educational activities of the educational process subjects at the direction of assurance of the quality and effectiveness of education".

1.2 Philosophical, educational and pedagogical approaches to the definition of goals, forms and methods of e-learning in the Republic of Kazakhstan

UNESCO provides e-learning to play a part a key role in up gradation and development of the national systems. To reduce the consequences of the educational crisis, e-learning technology has been identified as the most effective technology for

direction of the trainees to a new style of education and for development their skills and acquired habits for further learning throughout the lifetime. At the same time there is a number of actual issues that have not been solved in the theory and practice of e-learning. There is no uniform, generally accepted, stabilized conceptual and categorical apparatus, there are not many unions in definitions of concepts "e-learning", "informational and educational environment", etc.; there is many sets of e-learning products. Therefore, it is necessary to identify the true way of electronic learning and prepare its concept.

Significant progress in the electronic technology development gives good technical capabilities to implement different didactic goals. But the methodological aspects of e-learning are behind the development of technical tools. The backlog in the working out of methodological problems, the "non- manufacturability" of existing psychological and pedagogical techniques is one of the main reasons for the gap between the potential of e-learning and its real possibilities. In order to use the e-learning possibilities, it is necessary to consider some aspects of it inculcation methodology. The first issue in this case is the selection of methodological approaches to this process. Let's first compare these approaches (Table 1.1).

As you can see from the analysis, the considered approaches are one of the main philosophical approaches that led to the different aspects of the dialectic approach. A dialectical approach to research is to use principles that are objectively agreed, scientifically-based, practical, and most effective in the real world. For example, they include the principles of relationship between the general and the specific, the quality and the quantity, the whole and the part.

Table 1.1 - Comparison of the considered approaches

A approach name	His strongest advantages	His weaknesses
Systematic	It can be applied to any system that is a systematic, continuous social pedagogical system	If these is an external influence on a system then from theoretically position the result is taken as a single and direct consequence, but the result is not exactly the same
Dynamic	A research object is considered to be a dialectical developmental perspective	retrospective analysis of 5-10 or more years cannot be performed for newly created objects
Complex	The need to account the technical, environmental, economic, organizational, social, psychological and other aspects	the research process will be complex because more factors need to considered

Table 1.1 (continuation)

Behavioral	learning is an activity, so this approach is a basic idea of studying of pedagogical phenomena	some researchers believe that, in view of the universality of the approach, it is possible not to consider other approaches

As can be seen from the analysis, the approach under consideration arose as a result of one of the main approach of philosophy – the leadership of various aspects of the dialectical approach. Dialectical approach to research is the use of principles that are objectively agreed, scientifically formulated, proven in practice and most effective in specific conditions. For example, these include the principles of General and distinctive attitude, quality and quantity, integrity and parts.

1.3 Genesis, functions and levels of e-learning in the Republic of Kazakhstan

The philosophical dictionary gives a comprehensive definition of" Genesis - (from the Greek language genesis – origin) – the origin, the process of occurrence, creation, and in a broader sense – the moment of occurrence and the process of development, which led to a certain condition, type, phenomenon."

Consideration of the genesis of some phenomena requires retrospective analysis. Thus, the dynamic approach considered above shows its effectiveness in this case. In fact, in the process of development of this phenomenon, in connection with cause-effect relationships and in conditions of subordination to each other, that is, for more than ten years it is possible to verify the work done and determine the tasks.

For the first time in Kazakhstan, the task of implementing an e-learning system is defined by the terms established by the President of the Republic of Kazakhstan N. Nazarbayev in State program of education development [1]. The purpose of the system is to ensure equal treatment of all participants of the educational process to the advanced educational resources and technologies aimed at mass quality education. Regardless of age and social status, all people will be provided with opportunities to improve and acquire basic competencies through technical and vocational training, various forms of higher education and private providers of educational services (including distance learning). In cooperation with educational institutions and social partners, on-the-job training will be provided. A person can independently choose the form, rhythm and terms of training, the level of independence of the educational process. The independent agencies issuing certificates will develop effective measures aimed at recognizing the results of training of public and private providers of educational services by assessing the

level of preparedness of students in the specialty. Lifelong learning will include education from pre-school age to retirement age (6-65 years) include normal and abnormal forms of education.

The objective of the programme would not have been possible if e-learning had not been started in the country. In this regard, let's make a retrospective analysis of the genesis of e-learning.

Information communication infrastructure of secondary schools in the field of secondary General education is connected with the adoption of the state program of Informatization of secondary General education (1997-2001). Since 1997 it began to be formed consistently. For 5 years in the course of the program computerization of schools was 100%. Computer equipment was mainly equipped with computer science offices.

In 1997, the school informatization programme "Basic plan for the development of IT in education" was adopted, providing for the use of computers as teaching means. The challenge for the government is that every student – his or her family can get a computer or not – must have access to modern ICT and learn how to think and create with it.

In order to introduce multilingualism, since 2005 schools of Kazakhstan will be provided with multimedia language laboratories. A joint Kazakh-Singapore project "Multimedia Education Resource Interactive Teaching System (Merits)" is being implemented. St Electronics (Training & Simulation Systemms) Pte Ltd took part in the implementation of the project on the party of Singapore, and on the Kazakh party − the Republican center of Informatization of education (now the national center of Informatization).

MERITS COURSEWARE contains many animations, voiced texts, interviews, interactive tasks, games, crossword puzzles, testing exercises, etc. therefore, it ensures the inclusion of school students in the leading types of speech activities: sound, speech, reading, writing. Kazakhstan has not yet such licensed software. Thanks to this project, teachers received a ready didactic preparation of lessons, which are practically associated with the direction of their lessons and are able to organize creative independent work of students in the existing information set.

The project also provides for simultaneous training of language teachers as users and Informatics teachers as system managers. Training courses were conducted by employees of SIC and ST Electronics (Training & Simulation Systemms) in all regions of the Republic (about two and a half thousand teachers trained).

According to the Intel program, tablet laptops, wireless network equipment, software "e-learning class for Classmate"were installed in several schools of Astana and Karaganda.

As a result of this system of government and sponsorship, the ratio of students to computers in schools is 13:1. 98% of schools of the Republic are connected to the Internet. However, only 74.9% of schools have broadband Internet access.

The state programme for the development of education for 2005-2010 set priorities for the preparation of a unified information environment, including the improvement of the regulatory framework for the introduction of ICT in the educational process; the development and implementation of distance learning technologies at all levels of education; the creation of information resource centers of education in the regions and the educational portal of the Ministry; the provision of electronic textbooks to secondary education institutions in accordance with educational programs; development of a unified network on the basis of existing communication channels to unite the resource centers of the portal and regions on the basis of integration with the unified transport environment of the electronic government of Kazakhstan, etc.

A strategically important document was the program to reduce information inequality in 2007-2009, approved by the Government of the Republic of Kazakhstan dated October 13, 2006 № 995. In the program "Information inequality" was indicated the following: the citizens of Kazakhstan have equal skills in the use of computer and other digital, communication technology and computer technology; unequal access of the citizens to Internet resources, etc. The main objective of the program was to conduct large-scale activities to educate the population of computer literacy, training of teachers who own their business.

We believe that the adoption of this program has become an important prerequisite for the development of society and Informatization of education, as conditions have been created to improve the level of computer literacy of teachers.

Within the framework of the program to reduce information inequality in the Republic of Kazakhstan, the national center for Informatization of teaching means, electronic textbook prepared and programs, as well as training of the population as an initiative basis, and the population in the on-line mode as an opportunity to test, training of the population of computer literacy http://www.compobuch.kz prepared the Portal.

Informatization of education was fixed as an important mechanism for the implementation of the state educational policy in the Law of the Republic of Kazakhstan "On education" (2007) ([2]). Among the main tasks of the education system, new technologies of training are defined by the Law of the Republic of Kazakhstan, including the introduction and effective use of credit, distance, information and communication technologies that contribute to the rapid adaptation of vocational education to the changing needs of society and the labor market; developing a lifelong learning system that links general learning, on-the-job

learning and training to the needs of the labour market and helps everyone to maximize their own potential in a knowledge society.

As of January 1, 2010, President N.Nazarbayev in the future economic benefits adopted in the strategic development plan of the Republic of Kazakhstan until 2020, significantly improving the quality and durable productivity of the labor force in education refers to the relationship with investment. Among the priorities of the education sector to expand the provision of quality services is the task of creating an effective education infrastructure that allows to get modern education and use advanced technologies. The strategic plan sets out guidelines for further information and the widespread introduction of e-learning in all areas of education.

The introduction of e-learning in the education system involves the solution of a complex of interrelated tasks that provide regulatory, legal, infrastructure, software, content and personnel and methodological basis.

E-learning, as well as the learning process in general, is focused on the implementation of the tasks of education, upbringing and development.

The distribution of these tasks of the learning process was carried out conditionally, as the parties between the processes of education, upbringing and personal development should be considered relatively, and some of them are common. These tasks are aimed not only at the student, but also at the teacher in terms of e-learning.

The educational task of e-learning involves mastering the scientific activity of the individual, the formation of special and General educational skills, and among them should be universal skills that help to live, successfully learn or work not only in the subject, but also in the information society.

The developing task of e-learning determines the development of general and special abilities of the individual – spiritual, physical and labor abilities, as well as behavioral processes, forms a reasonable, communicative, social and cultural development of the individual without personal, emotional pressure, reasonable physical and personal development of each student through the systematic use of interactive forms of learning. It should be noted that e-learning triggers the mechanisms of personal development through the creation of learning situations, which helps students to take an active position, then they consciously make decisions, determine their learning path, express their point of view, take responsibility for the proposed solution. Due to this, students acquire personal experience.

The upbringing task of e-learning is to form a system of value-emotional relations of the individual to the world, information, interaction, the use of ICT in their educational and cognitive or professional activities, which creates conditions for the education of a citizen of the world, having a planetary system of thinking, world point of view, humanity, creatively active and socially mature person.

The described tasks of the learning process can not be considered as implemented in a separate form. They are in a complex braided cause-and-effect relationships, one of the tasks is a consequence of the other and at the same time the cause of the third. Thus, education of value attitude to ICT, on their basis, creates conditions for the effectiveness of e-learning. And e-learning contributes to the education of these qualities. All these tasks contribute to the formation of information literacy, competence, culture and mentality of the individual.

E-learning levels can be classified into several sings. The most important of them is the classification according to the levels of education accepted in the country ([2]), so the following levels can be distinguished:

1) e-preschool education;
2) e-learning in general secondary education;
3) e-learning in technical and vocational education;
4) e-learning in higher professional education;
5) e-learning in postgraduate education.

Educational content at each level can be different, depending on the level of pedagogical and information and communication technologies. According to forecasts, if the activity approach is under the guidance, the main form of digital content is determined depending on the leading type of activity of students, namely: in preschool education-a computer educational games, in high school – electronic textbooks, colleges – virtual simulators, universities – electronic research laboratories.

In preschool age, the leading activity is the game. Within the framework of the research project on the development of methodology and technology of computer games for adolescents, made by the national center in 2012-2014, 10 games in Kazakh and Russian languages were developed. They were focused on the educational areas of "cognition" and "society", but then they were expanded with the help of interactive tasks. The reason is the need to prepare children for school in accordance with the SES RK and the development of communicative, linguistic, cognitive, creative and health-saving competencies [1].

E-learning in the most complete and different areas is being implemented in the general secondary education system. The national center has developed electronic textbooks in Kazakh and Russian for most subjects for all classes.

Also on the portal of MES is an electronic library (Fig.1.1). It contains a large number of subjects of humanitarian and natural science cycles and digital educational resources (DER) on the history of Kazakhstan (Fig.1.2).

And there is DER for technical and vocational education, but they cannot cover all curricula and all specialties.

Here we should note the difference between electronic textbooks and digital educational resources. DER is didactic material on the topic of a specific lesson. The electronic textbook systematically sets out the content of education for the entire course of the discipline, does not duplicate the content of the DER. Electronic textbooks have a large volume, are implemented on CD/DVD and are not placed on the Internet.

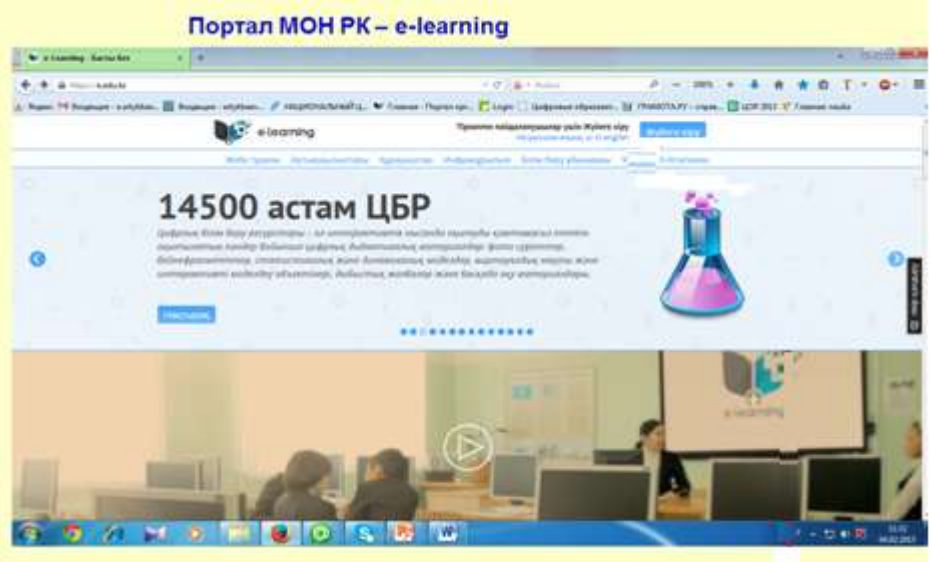


Fig. 1.1 - Electronic library interface

Fig. 1.2 - Library home page

In the system of higher professional education e-learning is primarily implemented. Almost every University has a set of electronic textbooks in accordance with its specialization, educational portal, equipment and content for the implementation of distance learning technologies. This is what we can say about the institutions that provide training in the field of postgraduate education.

The following classification can be made according to the level of interaction carried out in e-learning. We believe that it is possible to distinguish the lower levels:
1) single-channel e-learning;
2) two-channel e-learning;
3) multi-channel e-learning.

Single-channel e-learning is based on the fact that the training information is replaced by the student using e-learning tools, and feedback (advice, analysis of control results, etc.) with their help. For example, in electronic textbooks, which are

analogous to paper textbooks, the student gets acquainted with the content, but refers to the student for advice; when testing using a computer, he knows the test results and does not know in which cases he made a mistake.

In two-channel e-learning, educational information can be transferred to the student and feedback via e-learning tools, as well as receive information about the mistake made by him when performing test and interactive tasks using a computer; get advice on chat or via regular e-mail. As an example of the implementation of two-channel e-learning, you can get the CBR created by the national center. For example, in the technical drawing center, the following tasks are available: parts of the text should be inserted in accordance with the logic of construction or find the correct continuation of the proposal in accordance with certain definitions or laws (Fig.1.3). The student must find the correct answer, and if he can not find it, he gets about it at one point mark.

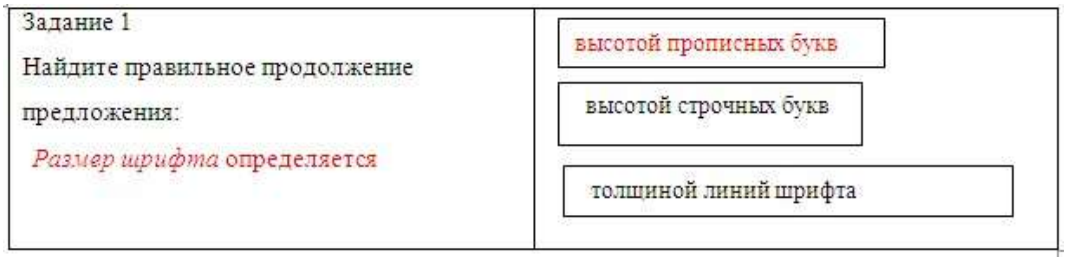


Fig. 1.3 - Extract from the interactive task

In addition, the student participates in drawing, only receives such assistance: in this scheme there are points that gradually blink, and he continues the process of drawing by clicking on these points (Fig. 1.4), then he felt himself a participant in the drawing,and the task of the computer is to show the continuation of the construction.

But in most created DER learner completes the drawing is not using, and in accordance with the shape of a given format or geometric body. For example, the required format must be composed of elements to the right of the drawing.

By multi-channel e-learning, we understand that learning information does not come to the learner only through learning content or directly from the learner, as well as himself. This can be done in the "forum" mode, i.e. all people registered in the system exchange educational information. An example can be obtained in the practice of NCI: the opportunity to discuss the DER developed in the electronic methodical system of history teachers, to get answers from moderators, to present their experience.

The third type of classification of e-learning levels, in our opinion, can be done by the degree of remoteness of the student from the place of content creation:

1) stationary e-learning;
2) distance e-learning;
3) mobile e-learning.

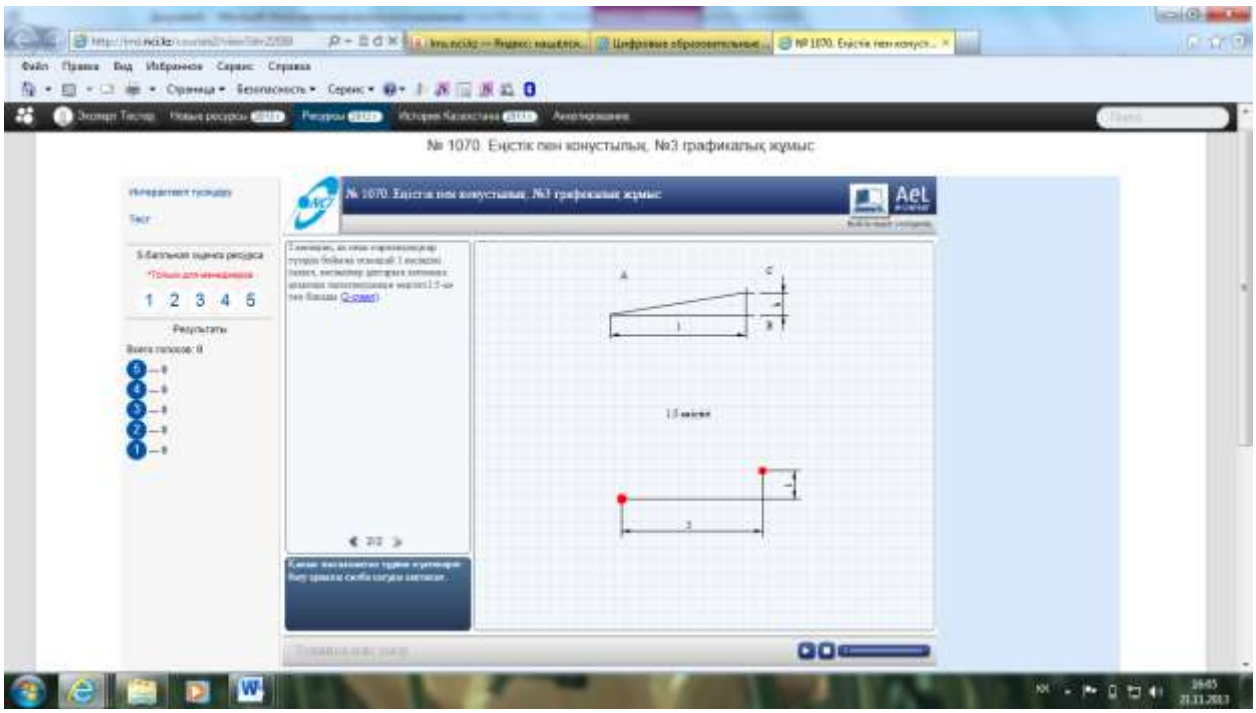


Fig. 1.4 - Extract from interactive tasks

Of course, in stationary e-learning learner uses content directly in the place of its creation. Distance learning technologies allow the learner to "not get attached" to the place of creation of content that can remotely use the content, only during the examination control it should be in contact with the teacher.

Mobile e-learning continues to develop distance learning ([3]). Kazakh scientists intend to introduce mobile learning ([4]).

Thus, consideration of the genesis, function and levels of inculcation of e-learning in the Republic of Kazakhstan will be the epistemological basis for the consideration of theoretical and practical issues of its inculcation.

1.4 Modeling of innovative activity

1.4.1. A brief categorization of models

M. V. Jadrovskaya believes that the preparation of an adequate and unambiguous classification models, as the model performs the functions of both educational tool and may not be clean [5]. Therefore, the classification of models is quite a lot, but on the basis of all of them is the division of models into subject (material) and ideal (represented). In fact, most scientists divide models as ideal and real, and ideal models, for example, depending on the method of their creation, as figurative, symbolic and figurative-sign. The presence of the presented models is explained by the fact that before any model in the idea is a vision. The peculiarity of such models is the lack of the possibility of their implementation in the form of things, in some cases, their implementation is not necessary.

A. Tulbayev developed a scheme drawn in Fig. 1.5. As we can see, there are design models along with subject and ideal models. This is very important for us, because in our case we combine three different modules and blocks for one model, that is, we create a complex model

The modeling problem consists of three tasks [6]:

1. General provisions creating a model (this task is less formalized and structured, since there is no algorithm for building a model);

2. study of the model (this problem is formed to a greater extent, there are methods for studying different classes of models);

3. using the model (structural and specific task))

Based on these tasks, we list their execution.

1.4.2 Creating a model

As shown in our writings published earlier, the model can be represented in the integrity of input, modification (service, process parameters, etc.) and output parameters, and the feedback between input and output parameters should be expressed as a reflection condition.

In General, each model consists of the following set, except for some: components, variables, parameters, service dependencies, constraints, objective function. Component parts form a system when combined in an appropriate manner, and in some cases, a system element or subsystem is understood to be component parts. Parameters are those values that the researcher chooses at his discretion, which do not have a certain value, as mirror. Service dependencies define properties and settings, or reflect the relationships between the components of the system. Limits are assigned by ranges of values of the variables.

In our opinion most effective structure of the model is the structure presented in Fig. 1.6.

Login options include the following:

Module 1: characteristics challenges of quality of education. The need for this module is to find innovative approaches to improving the quality of education. These issues have been identified in several of our works, for example in a monograph ([7]), in an article published in the journal included in the base of Scopus [8]. However, we want to take a list of questions from the official document ([9]). In the present document in the section" graduate and post-graduate education " are listed the bottom of the problem:

- educational programs do not meet the expected expectations of employers;

- low rate of employment of graduates of higher educational institutions in the first year, including in rural areas (71%);

- graduates of pedagogical specialties are not focused on the use of new learning technologies in educational practice and others.

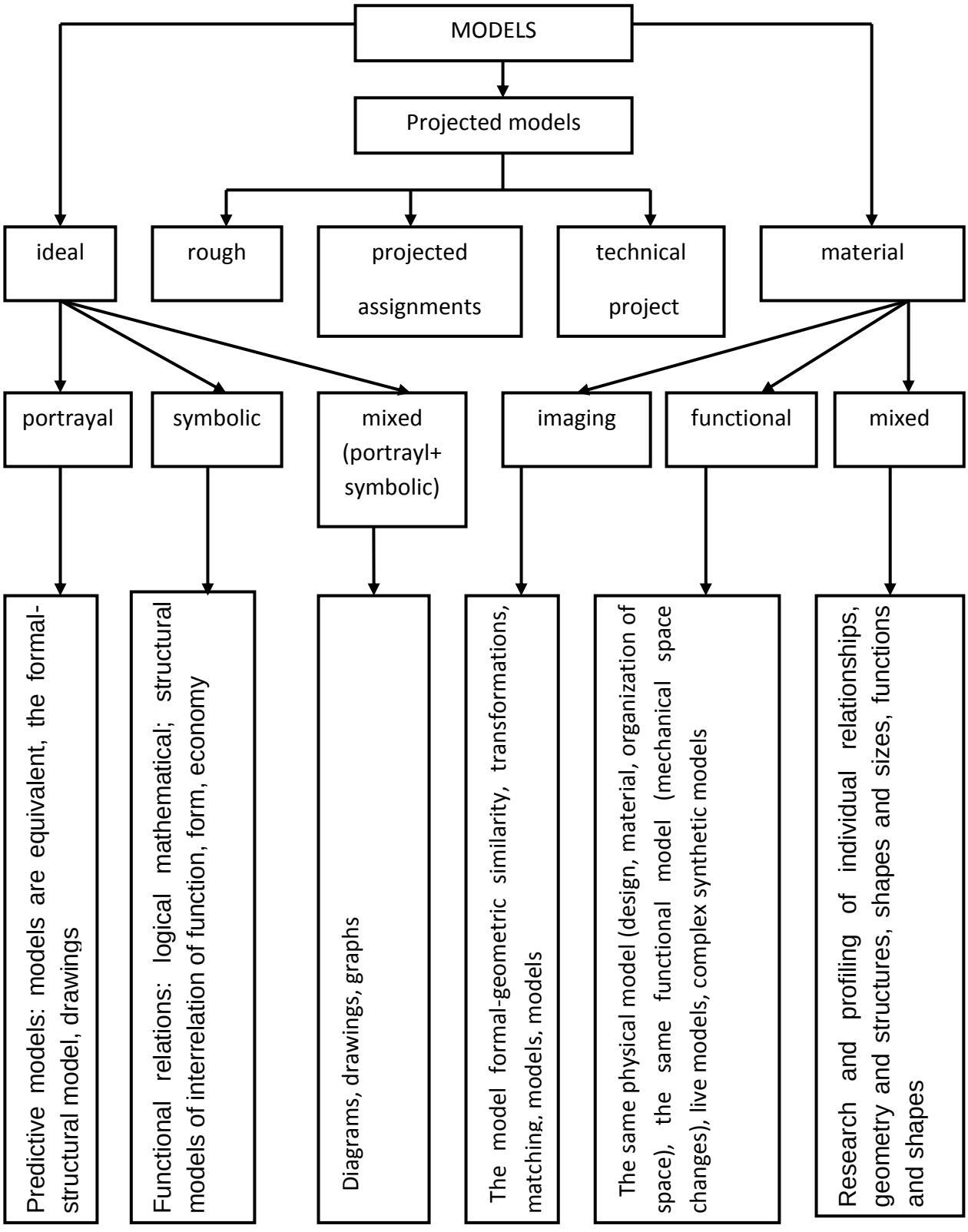


Fig. 1.5- Classification of models

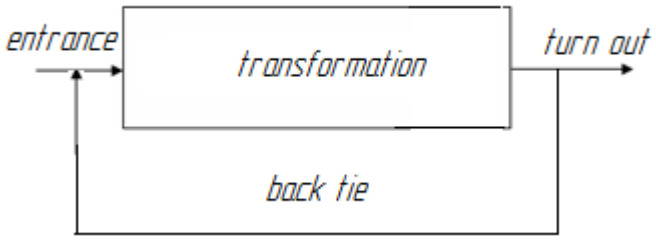


Fig.1.6-Structure of the model

Module 2: models of competence of graduates of educational institutions in the profiles of graphic disciplines. These models are given above. Their features-they are formed on the basis of bloom's taxonomy and Dublin descriptors.

Module 3: model of innovative activity of subjects of educational process. This model (Fig. 1.7) contains a list of components in accordance with the definition of education innovation in the vertical direction: motive, goal, process and result of transformative educational activities. In the horizontal direction we have placed the characteristics of these components of innovative activity of the subjects of the educational process (teacher and student).

As you can see, the goal and the result of innovation are the same for the two entities, it is an indicator of joint and interrelated activities. As for the motive and the process, they, of course, will be different.

1.5 Competence-based approach in e-learning

In any case, the methodology of science requires accurate and uniform terminology. Terminology there is an importance for scientists and practitioners, because uniform, precise terminology is an important tool of mutual understanding and efficiency when considering science problems.

1.5.1"Competency" as a stable term

Terminology - a set of terms in the field of production, service, education, which constitutes a specific sector of easy-to-use vocabulary that is easy to adjust and regulate terms. Polysemy in terminology leads to the non-understanding or different interpretation of the considered pedagogical phenomena and processes, whereas uniform, precise and uniform terminology is an important tool of mutual and efficiency when considering pedagogy processes. The terms are words which give the clearly definition by terms, show semantic boundaries. Usually any word in the language is multi meaning word, and semantic boundaries are not clear and movable. It is also a word-for-word definition of the notion of a particular system of vocational education. Each term of science and industry constitutes their own systems, which are

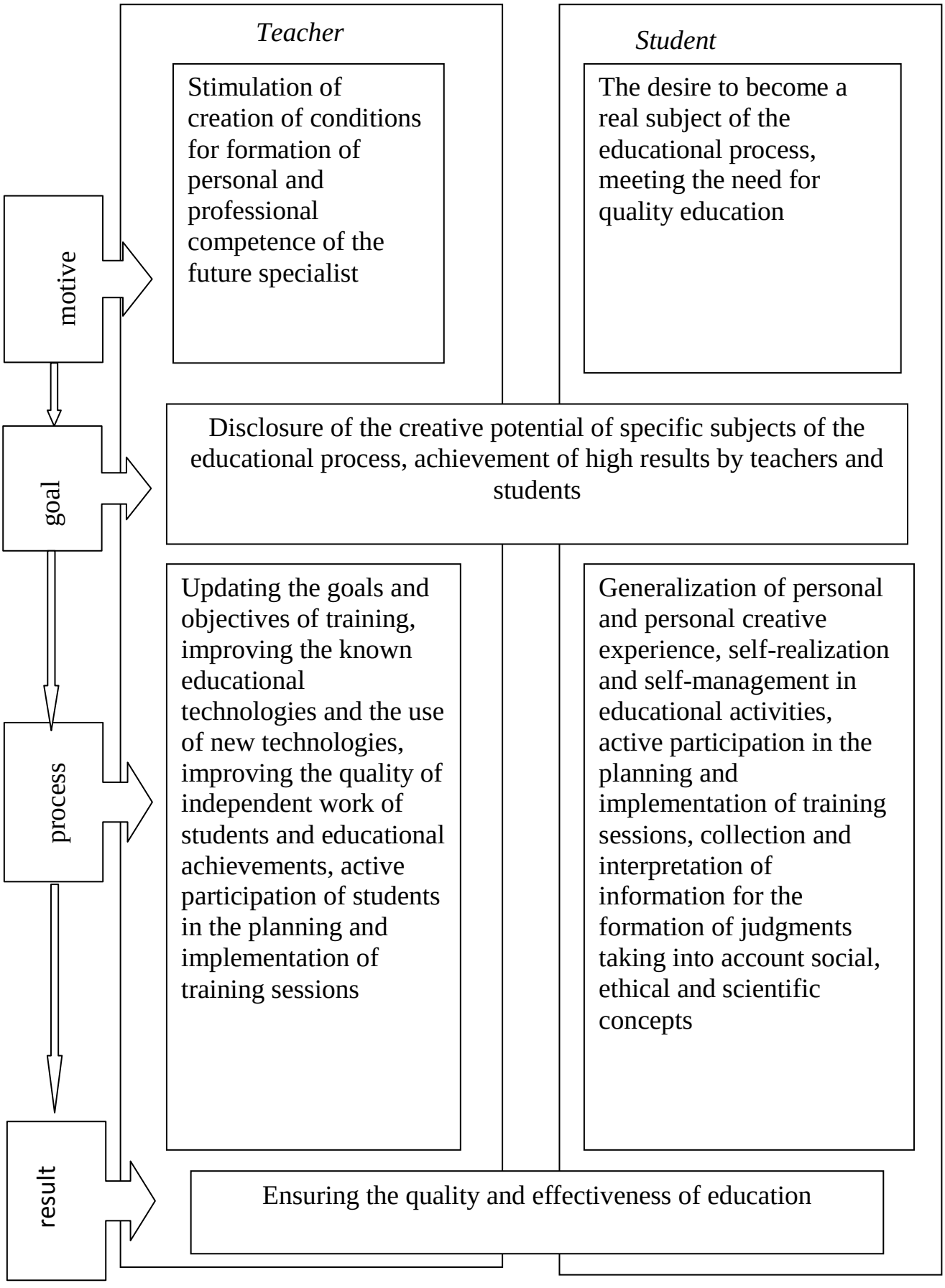


Fig. 1.7-The model of innovative activity of the educational process subjects

most primarily intended for visual representations of vocational education through language tools.

Terms may be controversial in any case because a definition that satisfies each person it is difficult to find. The main reason for this is that each word has different meanings, which in turn creates inconvenience. In our opinion, instead the introduction of a new term, instead of the terms being considered, it is desirable to use originals, not originally translated, namely the originals − "компетенция" and adapted to the laws of the Kazakh language “компетенттілік”. An example can be given below.

The competence-based approach originated in England, but it appears out outside of education sphere as a response to the real needs of the professional sphere and includes in consciousness. In the 70s of the last century in the United States the notions "competence" and "key competence" has been used in the business sphere in connection with the problem of determining of the qualities of a successful professional. Initially, the competencies were set against special professional knowledge and skills, i.e. they considered as the universal components of successful professional activity. Of course, there was a question: “can one learn by competencies?” Therefore, the problematic of the competencies has gone up to the educational system gradually and takes a leading place in it. From Ya.A.Komensky the education sphere worked with basic units − knowledge, skills and acquired habits. Professional sphere worked with other units – the competencies. From this position, it answers the questions "What is a professional person?" and "What is his competency?". Thus, the professional sphere operates with competence, and education − with knowledge, skills and acquired habits. If the professional sphere is formulated unambiguously its demands to the education sector, then the education sector problem is a transformation to knowledge, skills and acquired habits of the specific competencies required in the professional field.

It is obvious that the terms considered in the extract are of the majority character. Specifically, the term origin (genesis) of the term well defined, the content described (the competency’s are an independently universal components of successful professional activity), the scope defined ("competency", "key competency", "professional competency"), the place indicated (a person should be what kind and what is his field of competency’s), the application areas defined (professional and educational spheres), the application borders described (they are intended for unambiguous formulation of requests at the order level).

Thus, if we take the term as a means of professional scientific communication, we will understand it as a special tool that identifies the content of the special text, structured and coded special information so that it is necessary to use the terms of competency / competence in our research.

1.5.2 Competence and competence: analytical analysis of definitions

SES RK is developed on the basis of competence-based model of training, this model should ensure the mobility of graduates in a changing labor market. But the

essence of the model is not disclosed, only in the" Basic provisions "it says about what set of competencies should have a graduate of the University, to what professional activity he should be ready and what should be the degree of his readiness to solve specific problems in a certain field of activity". This raises the question of the definition of competency/competence. The significance of the problem lies in the fact that the language of competencies is the most suitable for describing educational results. But we do not aim to define the content and relationship of the concepts of "competency" and "competence"; it seems to us valuable to review the definitions in the absence of an established definition to the content of these concepts, in particular, when some researchers consider them as personal qualities of a person, when others distinguish the composition of its activities, when they stand out. The variety of definitions gives a wide range of materials for analysis, but we can get from official documents (encyclopedias, reference books, conference materials, etc.) we consider the definitions obtained and presented with only a new beginning of understanding of these concepts. Familiarity with the works written later on this issue, showed the following: scientists often repeat the old definitions or explain them in another way. For example, there is a clear and comprehensive definition: "Competence is a potential dimension of an individual's intellectual, spiritual, cultural and creative capabilities; competence is the definition of these capabilities through the following actions: problem solving (task), creative activity, project development, argumentation of one's views, etc." [10]. But these reference elements are found in the writings of other scientists, which we will see later.

According to the logic of the study, first you need to define the term "definition". Kazakh scientist A.Azamatova writes that "in modern society, the definition has a certain importance in human communication and is one of the conditions for its successful implementation. In scientific communication, the definition is not only the most important part of the scientific language, which fixes the state of knowledge at a certain moment of existence. The definition is considered as a special form of intellectual activity. The existence of different approaches to the knowledge of the definition testifies to the diversity of this phenomenon. First, the definition is traditionally the subject of study of logic and beyond the scope of logical problems since Attica. The definition is considered as an animated approach used in the process of disclosing the content of the concept. The second approach to the knowledge of the definition is to consider it as a full verbal, including scientific, attitude" [11, P. 256]. The representative of the scientific school of the scientist a.m. In her dissertation work A.Akhmetbekova as the main definition received the following: "Definition is one of the types of definition of the dictionary, which is an equivalent relationship consisting of the defined concept (definiendum – Dfd) and the defining concept (Definiens – Dfn). In accordance with the rules of formal logic, the definition should be equal to the value of an objective, short, accurate, definable concept and should not be within the logical circle [12]. T.Matveyeva somewhat repeats the requirements for the above definition, but complements their list:

"interpret the meaning of the definition – the term with the words, the meaning of which is considered known; definition in accordance with the rules of formal logic:
- it should be clear, that is, it is necessary to refer to the generic symbols and a unique look.;
- the defined term should be equal to the volume;
- only need to contain the necessary and sufficient characters;
- including there should not be a logical circle (definitive words should not be included in the defined term or its synonyms)" [13]. The dictionary implemented a two-way translation. The concept of "objectivity" and "transparency" in the logical reference dictionary [14, P. 141] is revealed: "Definition is a sentence that reflects the important and specific features of which or discloses the meaning of the corresponding term. The definition often refers to the closest kind, which includes something given, the difference of this subject from other components. The definition can not cover the subject comprehensively and completely, does not reveal all the richness of the content of the concept. However, if you want to describe the value of some things more densely, should clearly define its boundaries, that refers to definitions. The first requirement for any definition is that it must be objective, that is, definable, emerging from the development of something and reflecting the essence of something."

In our opinion, the meaning of the defined concepts (competence/competency as well as professional competency) is well described in the paper used at the beginning [10]. From this description it is possible to open requirements to definitions of the considered concepts. Then formulate so:
- definition becomes objective if competence/competency is considered as an independent, universal component of any successful professional activity;
– the definition becomes obvious if it specifies the role of the sphere of education (it is a generic sign); the specific sign of competence should be called the normative character relating to its educational training, and the specific sign of competence should be understood as "redistributed" knowledge, skills necessary in the professional sphere, that the competency is to have the relevant competence. A special sign of professional competence is special professional knowledge and skills that determine successful professional qualities. As a result, it is possible to complete the Table 1.2.

Table 1.2- Signs of considered definition

Definition object	Needful sign	Generic sign	Special sign
Competence	Objectivity	A role of education sphere is shown obvious	The acquisition of normative character in relation to educational training
Competency			Have the appropriate competencies
Professional competency			Special professional knowledge and skills that determine successful professional qualities

On the basis of this, in expressing our opinion, let us draw up Table 1.3. As can be seen from the table, the definitions under consideration meet the established requirements, only some of them had to be supplemented with their opinion and look for some specific symbols in them. In the notes we tried to express our attitude to the content of the given definition, but we do not recommend using one of them, because each researcher will find a subject that corresponds to his research [15].

Table 1.3- Analysis of conformity of definitions by requirements

References	Definition content	Definition characteristics	Our comment
1	2	3	4
Competence			
Толковый словарь русского языка: В 4 т. Т. 1 / Под ред. Д.И. Ушакова. М., 1935	круг вопросов, явлений, в которых данное лицо обладает авторитетностью, познанием, опытом, кругом полномочий *the range of problems, phenomena in which a well-known person has authority, knowledge, experience, plenary powers*	short, exactly	it is not shown that due to what the prestige, knowledge, experience is formed
Большой энциклопедический словарь (М., 1997)	1) круг полномочий, предоставленный законом, уставом или иным актом конкретному органу или должностному лицу; 2) знания и опыт в той или иной области *1) plenary powers granted by law, statute or other act to a particular body or official; 2) knowledge and experience in a particular field*	short, exactly	the concept reveals of essence at the two directions
С.М. Вишнякова Словарь. Профессиональное образование. Ключевые понятия, термины, актуальная лексика. — М. НМЦ СПО, 1999. - 538 с.	1) Круг полномочий, прав и обязанностей конкретного государственного органа; 2) Круг вопросов, в которых данное должностное лицо обладает познаниями, опытом *1) plenary powers, rights and duties of a particular state body; 2) the range of issues in which the official has knowledge, experience*	short but not accurate because only a reference to a state body	the range of competencies, rights and obligations extends to an individual

Table 1.3 (continuation)

1	2	3	4
Хуторской А.В. Ключевые компетенции как компонент личностно-ориентированной парадигмы образования// Народное образование. – 2003. - №2	- совокупность взаимосвязанных качеств личности (знаний, умений, навыков, способов деятельности), задаваемых по отношению к определенному кругу предметов и процессов и необходимых, чтобы качественно, продуктивно действовать по отношению к ним; - наперёд заданное требование (норма) к образовательной подготовке ученика *a set of interrelated qualities of the person (knowledge, skills, methods of activity), setting down in relation to a certain range of objects and processes and necessary to qualitatively, productively act in relation to them;* *- pre-seting down requirement (norm) to the educational training of the student*	obvious (knowledge, abilities, skills and specific sign – a reference to rationing), but there is no need sufficient evidence	
Обучение в течение всей жизни – требования и вызовы: Отчет о семинаре с участием представителей стран СНГ и Монголии. – Европейский фонд Образования, 2002. – 39 с./ стр. 19.	качество действий в их соотнесенности со стандартами и общественными ожиданиями *quality of actions in relation to standards and public expectations*	there is no need sufficient evidence	there is a guide at only an action

Table 1.3 (continuation)

1	2	3	4
Байденко В.И. Компетентностный подход к проектированию государственных образовательных стандартов высшего профессионального образования (методологические и методические вопросы): методическое пособие / М.: Исследовательский центр проблем качества подготовки специалистов, 2005. -114с./ стр.6.	качества личности, которые характеризуют готовность, способность интегрировать полученные знания, умения, навыки в жизненный опыт для достижения цели в определенном контексте *qualities of personality that characterize the willingness, ability to integrate the knowledge, skills, skills, acquired habits in life experience to achieve the goal in a certain context*	obviously (knowledge, abilities, skills, acquired habits and specific sings – a link to the regulation), but there are no the necessary and sufficient characters	
Глоссарий терминов Европейского фонда образования (ЕФО, 1997)	1. Способность делать что-либо хорошо или эффективно. 2. Соответствие требованиям, предъявляемым при устройстве на работу. 3. Способность выполнять особые трудовые функции. 1. *The ability to do anything well or effectively.* *2. Compliance with the requirements for employment.* *3. The ability to perform specific job functions.*	objectively (reference to employment and labor functions), but not obviously, since the connection with the sphere of education is not specified, so the necessary and sufficient signs are absent here	

Table 1.3 (continuation)

1	2	3	4
Competency			
Толковый словарь русского языка: В 4 т. Т. 1 / Под ред. Д.И. Ушакова. М., 1935	осведомлённость, авторитетность; *knowledge, authority;*	short, exactly	
Обучение в течение всей жизни – требования и вызовы: Отчет о семинаре с участием представителей стран СНГ и Монголии. – Европейский фонд Образования, 2002. – 39 с./ стр. 19.	качество деятельности, обеспечивающее достижение целей, получение результатов *quality of activity, ensuring the achievement of goals, results obtaining*	Short, defined concepts are not equal to the volume, so the necessary and sufficient features are absent here	attention is paid to the direction of actions to obtain results
С.М. Вишнякова Словарь. Профессиональное образование. Ключевые понятия, термины, актуальная лексика. — М. НМЦ СПО, 1999. - 538 с.	мера соответствия знаний, умений и опыта лиц определенного социально-профессионального статуса реальному уровню сложности выполняемых ими задач и решаемых проблем. *measure of compliance of knowledge, skills and experience of persons of a certain social and professional status to the real level of complexity of the tasks performed by them and the problems solved.*	objectively, it is clear, since the connection with the educational field is presented and with reference to the tasks and problems to be solved	If "dosage", how it is measured?
Компетентностный подход как способ достижения нового качества образования: материалы программы «Модернизация образования: перспективные разработки». – М.: Институт новых технологий образования Национального фонда подготовки кадров, 2002. – 96с./ стр.82.	общая способность, основанная на знаниях, опыте, ценностях, которые приобретены благодаря обучению *General ability based on knowledge, experience, values acquired through training*	obviously, because the connection with the sphere of education is shown, but not objective (not related to the professional sphere), so the necessary and sufficient signs are absent here	

Table 1.3 (continuation)

1	2	3	4
Равен Дж. Компетентность в современном обществе. - М: КОГИТО-ЦЕНТР, 2002.	специфическая способность, необходимая для эффективного выполнения конкретного действия в конкретной предметной области и включающая узкоспециальные знания, особого рода предметные навыки, способы мышления, а также понимание ответственности за свои действия *specific ability required to effectively perform a specific action in a specific subject area and including highly specialized knowledge, special kind of subject skills, ways of thinking, as well as an understanding of responsibility for their actions*	obviously, because the connection with the sphere of education is shown, but not objective (not related to the professional sphere), so the necessary and sufficient signs are absent here	perhaps the word "unusual" implies a professional sphere?
Европейские квалификационные рамки для. образования в течение всей жизни, 2008 г	способность использовать знания, навыки, умения, личностные, социальные и методологические качества в работе и учебе, в профессиональном и личностном развитии *ability to use knowledge, skills, acquired habits, personal, social and methodological qualities in work and study, in professional and personal development*	obviously, because with the sphere of education the link shows the objective (shown in connection with the professional sphere), therefore there are the necessary and sufficient signs	professional and personal development importance called
Weinert F.E. (2001). Concept of Competence: A conceptual clarification. In: Defining and Selecting Key Competencies/Rychen D. S. & Salganik, L.H. (Eds.). Göttingen, Germany: Hogrefe & Huber,pp.70–101	slightly specialized system of aptitudes, abilities or skills necessary for achievement of a specific goal. It can concern both the individual abilities and the distribution of abilities within a social group or establishment	the defined concept is not equivalent to volume, as additional explanation was needed	

Table 1.3 (continuation)

1	2	3	4
Education – Lifelong Learning and the Knowledge Economy: Key Competencies for the Knowledge Society (2002). In: Proceedings of the DeSeCo Symposium, Stuttgart, October 10 –11, Stuttgart.	system of internal mental structures and abilities assuming mobilization of knowledge, cognitive skills, practical skills, and also social and behavioral components such as attitudes, emotions, values and ethics, motivations for successful realization of activity in a particular context	obviously, because the relationship with the field of education objective (link to actions) therefore, the necessary and sufficient conditions are present here, but not equal to the volume of defined concepts	
http://www. businessdictionary.com/definition/ competence.html#ixzz3uCC9g5if	A cluster of related abilities, commitments, knowledge, and skills that enable a person (or an organization) to act effectively in a job or situation.	objectively (link to action), but not obvious, since the connection with the field of education not specified	
http://www.yourdictionary.com/ competence#QiX6udDOJ0wYL6zJ.99	The definition of competence is your skill or ability in a specific field or subject, or being able to do something well or to being sane enough to stand trial in court.	are not equal to the volume of the defined concept, since the use of the word "or" puts each other against (skills or abilities)	
Құдайбергенова К. «Құзырлылық – тұлға дамуының сапалық критерийі» (ғылыми-практикалық конференция материалдары).-	Құзыреттіліктің латын тілінен аудармасы «competens» белгілі сала бойынша жан-жақты хабардар, білгір деген мағынаны қамти отырып, қандай да бір сұрақтар төңірегінде беделді түрде шешім шығара алады дегенді білдіреді	obviously, because the connection with the field of education is expressed, but not objective, therefore, necessary and sufficient conditions do not exist here, not equal to the volume defined concepts as	

Table 1.3 (continuation)

1	2	3	4
Алматы, 2008	*Competence is "competens" in Latin and means authoritatively take decisions in the field any issues, encompassing the meaning is clear, skilled in a certain area.*	authoritative is limited by the decision	
Б.А.Тұрғынбаева «Мұғалімнің шығармашылық әлеуетін біліктілікті арттыру жағдайында дамыту: теория және тәжірибе».- Алматы,2005	…өзінің практикалық әрекеті арқылы алған білімдерін өз өмірлік мәселелерін шешуде қолдана алуын – құзырлылықтар деп атаймыз *We called competency as apply by teacher of the acquired knowledge in their practical activities in solving their life problems*	obviously, because the connection with the educational sphere, but not objective (not a Reference to the professional sphere), so the necessary and sufficient signs are absent here	Knowledge is not taken only through practical activities
Таубаева Ш. Педагогика әдіснамасы: оқу құралы.- Алматы. Қарасай баспасы, 2013.- 432 б.	тікелей өлшеуге және «құзырлылық» бағасы толық дәрежеде стандарттауға жатпайтын оқушының сапалы дайындығының көпсатылы, көпқұрылымды сипаты деген түйін түйеміз *we understand that the assessment of "competence" is a multi-structured, diverse nature of quality training of students, not subject to direct measurement and standardization in full.*	obviously, because the connection with the educational sphere, but not objective (not a Reference to the professional sphere), so the necessary and sufficient signs are absent here	This description represents the value in which it is prescribed that it is not fully standardized and measured

Table 1.3 (continuation)

1	2	3	4
Бұзаубақова К.Ж. Құзыреттілік тұрғыдан білім берудегі білім сапасының мәні //«Шаяхметов оқулары» атты Республикалық ғылыми-практикалық конференция материалдары. – Павлодар, 2009. –237-243-б.	Құзыреттілік – танымдық, кәсіптік, шығармашылық қызмет атқарудың және өзгелермен эмоциялық-құндылық қатынастар жасаудың әлеуметтік тәжірибелерін меңгеріп, азаматтық қоғам жағдайында өмір сүруге қабілеттілік болып табылады Competency − the ability to exist in a civil society, to master the social experience of cognitive, professional, creative activity and emotional and value relationships with others	objective (reference to the professional sphere), but not obvious, since the connection with the educational sphere is not specified, so the necessary and sufficient signs are absent here	
Professional competency			
(Вишнякова С.М. Профессиональное образование: Словарь. Ключевые понятия, термины, актуальная лексика. М.: НМЦ СПО, 1999. – 538с.)	качество высокопрофессионального работника, способного максимально реализовать себя в конкретных видах трудовой деятельности и способного адаптироваться к изменяющимся условиям рыночного механизма, управляющего профессиональной мобильностью, планированием карьерного роста, профессиональной самоактуализацией. *the quality of a highly professional employee who is able to realize himself as much as possible in specific types of work and is able to adapt to the changing conditions of the market mechanism, managing professional mobility, career planning, professional self-actualization.*	objectively, obviously, because it has a specific symbol (with reference to the ability to self-knowledge))	

Table 1.3 (continuation)

1	2	3	4
Rahmenlehrplan fur den Ausbildungsberuf Berufskratfahrer/ Berufskratfahrerin. B1BB,2000.	готовность и способность целесообразно действовать в соответствии с требованиями дела, методически организо-ванно и самостоятельно решать задачи и проблемы, а также самооценивать резуль-таты своей деятельности *willingness and ability to act appropriately in accordance with the requirements of the case, methodically organized and independently solve tasks and problems, as well as self-assess the results of their activities*	objective, obviously, because it has a specific symbol (reference to the action according to the purpose)	
Доклад международной комиссии по образованию, представленный ЮНЕСКО «Образование: сокрытое сокровище». - М.: ЮНЕСКО, 1997.	своего рода «коктейль» навыков, свойственных каждому индивиду, в котором сочетаются квалификация в строгом смысле этого слова ..., социальное поведение, способ-ность работать в группе, ини-циативность и любовь к риску *a kind of" cocktail " of skills peculiar to each individual in which combines qualifications in the strict sense of the word ..., social behavior, ability to work in a group, initiative and love of risk*	objectively, it is obviously, because it has few distinguishing features (reference to the diversity of skills and other properties)	
Запрудский Н.И. Научно-педагоги-ческое обеспе-чение повышения квали-фикации учителей естес-твенно-математи-ческих предметов. Дисс. в форме науч. доклада… докт. пед. наук. – Минск, 1993. – 36с./ стр.11	система знаний, умений, навыков, профессионально значимых качеств личности, обеспечивающих возможность выполнения профессиональ-ных обязанностей определен-ного уровня *system of knowledge, abilities, skills, professionally significant qualities of the person providing possibility of performance of professional duties of a certain level*	objective, obviously, because it has a special symbolism (reference to the properties of professionally significant personality)	

Table 1.3 (continuation)

1	2	3	4
Адольф В.А. Профессиональная компетентность современного учителя: Монография/ Краснояр. гос. ун-т. Красноярск, 1998.	сложное образование, включающее комплекс знаний, умений, свойств и качеств личности, которые обеспечивают вариативность, оптимальность и эффективность построения учебно-воспитательного процесса complex formation including a set of knowledge, skills, properties and qualities of the person, which provide variability, optimality and efficiency of the educational process	objectively, obviously, because it has a specific sign (a reference to a variability, optimality and efficiency)	the reference to the educational process limits professional competence to the range of pedagogical activity
Веснин В.Р. Практический менеджмент персонала: пособие по кадровой работе. М., Юрист, 1998, С. 59.	способность работника качественно и безошибочно выполнять свои функции, как в обычных, так и в экстремальных условиях, успешно осваивать новое и быстро адаптироваться к изменяющимся условиям *the ability of the employee to efficiently and accurately perform their functions, both in normal and extreme conditions, successfully learn new things and quickly adapt to changing conditions*	objectively, obviously, because it has a specific symbol (with reference to the ability to accurately and accurately perform their activities)	
Лебедев. О.Е.. Компетентностный подход в образовании. -http:// www.nekrasovspb.ru/publication/cgibin/publ.cgi?event=3&id=22	способность действовать в ситуации неопределенности *ability to act in a situation of uncertainty*	short, no objectively and no obviously, because it does not introduce generic and special signs	

Table 1.3 (continuation)

1	2	3	
Зимняя И.А. Ключевые компетенции – новая парадигма результата образования. – http://quality.petrsu.ru/file/74	основывающийся на знаниях интеллектуально и личностно обусловленный опыт социально-профессиональной жизнедеятельности человека *knowledge-based intellectually and personally conditioned experience of social and professional life of a person*	objective, obviously, because it has a specific sign (reference to experience, which is intellectual and conditional from the point of view of personality)	

2 PRACTICE OF GRAPHIC TRAINING IN CONDITIONS OF E-LEARNING INCULCATION

2.1 Competence-based model of educational institutions graduates in graphic disciplines profile

V.I. Baidenko speaks about the terms of competence-based approach: "The results of education described in the language of competence, as Western experts say, are the way to compare and harmonize academic and professional recognition and mobility, diplomas and qualifications.... If we analyze many of the definitions of learning outcomes, they can be consistently distinguished by the words "competence", "measurable achievements", "demonstration", "make" ... We can assume that the phrase "description of learning outcomes in the language of competence" will be fair"[16].

Based on these conclusions, we described the results of education in the graphic disciplines profile, provided for the undergraduate, with the help of terms of competence on the basis of Bloom's Taxonomy (Table 2.1)

Table 2.1 - Description of learning outcomes by the graphic disciplines

1	2
a) in the cognitive field	
Knowing	*Understanding*
Remember the main elements of the spaces which you learnt in school geometry subject. Remember the theorem for school geometry subject, used in graphical disciplines. Describe the types of projections of elements of the space on a plane surface Name projection and metrical tasks Name the ways of pre-building projections Determine on a design position of the elements of the space relating to planes of the projections or relating to each other Remember the general rules of doing designs Name the types of connections and mechanical transmissions and the rules of doing their imagines Name the stages of reading and detailing a design of general kind Show in a design a correct reply from some givens for reply to question	Determine the difference between the types of projections of elements of the space on plane surface Explain the meaning of dividing the tasks into projection and metrical ones Compare the ways of pre-building the projections Determine signs on which in a design is determined position of elements of the space relating to planes of the projections or relating to each other Illustrate with examples the general rules of doing designs Classify the types of connections and mechanical transmissions on different bases Name some criteria, on which are differed designs of items Solve typical tasks of descriptive geometry Solve some tasks on reading of the design of detail

Table 2.1 (continuation)

1	2
Application	*Analysis*
Solve non-typical tasks of descriptive geometry Solve tasks for building of imagines of items Use the knowledge for building assembly drawing of bolt and steeple connection Work out some details of drawing of general kind Construct items by description Work out the construction of the item by taking into account it's disadvantages Prepare massage of differences between assembly drawing and a drawing of general kind	Determine advantages and disadvantages of different kind of the projections of the elements of the space on plane Analyze a work content of salvation of the same tasks by different ways of the projections Classify the plane by different signs Find out similarity and differences between the types of imagines of the detail Compare the drawing of general kind and a assembly one
Estimation	*Creative work*
Explain the meaning of graphic disciplines for mastering a specialty Estimate a role of geometric mediators for solving tasks of descriptive geometry Choice more rational method of solving tasks	Use the obtained competence for solving creative tasks Plan the process of development of facilities of a construction Make up a task having got some solvencies as a result of non-providing reversibility of the imagine Work out a construction of facilities by its description

b) in the affective field

Perce ption	*Response*	*Mastering value orientations*	*Organization of value orientations*	*Description*
Realize a need for studying graphic disciplines for mastering a specialty	Be interested in studying graphic disciplines	Value readiness for working on their own	Be ready to work on your own	Demonstrate your ability to independent work

c) in psychomotor field

Imitation	*Manipulation*	*Accuracy*	*Articulation*	*Naturality*
Observe how a teacher uses drawing tools	Do motions of a teacher, who uses drawing tools	Use of drawing tools when a teacher is absent	Coordinate series of acitons with drawing tools by joining two or more habits (skills)	Demonstrate a high level of use of drawing tools

The next stage is the presentation of the "computer graphics" discipline, which will be taught at the magistracy. It is known that in Kazakhstan the master's degree belongs to the level of postgraduate education. In our country the national descriptors have not been created yet, because we rely on the Dublin descriptors. The Dublin descriptors indicate what the student needs to know when he completes the learning process, what he needs to understand and / or be ready to do. The learning outcomes using the Dublin descriptors are given in Table 2.2. As we see, in the competence-based model of education system graduates in the graphical disciplines profile, these descriptors were distributed across the learning spheres identified by B. Bloom.

Table 2.2 - Description of learning outcomes by the course "Computer Graphics"

Dublin descriptors	Learning outcomes
A. Knowledge and understanding	*In a cognitive sphere* A. Remember the main stages of computer graphics, its technical facilities, and functions of computer graphics. Define the basic method of drawing technical drawings, illustrate them.
B. Practical use of knowledge and understanding abilities.	B. In the “Compass” graphics system: use the knowledge to draw the drawings and assembly units and the solid body model; design of the product with help of specification; upgrade your product structure, taking into account it deficiencies
C. . Approaches, ideas, and ways to formulate conclusions	C. Compare graphics capabilities of Word, Paint, PowerPoint, Exsel editors. Compare the advantages and disadvantages of graphics systems AutoCAD and “Compass”
D. Skills in the area of communication	D. Make a report on selected topics. Make sure that the designed items and advanced devices work.
E. Skills in the area of study	*In the sphere of Affectiveness* E. Understand the importance of computer graphics for mastering a profession, readiness to work independently, and ability to work independently. *In a psychical motor sphere* E. Specify a high degree of computer usage to make a drawing.

2.2 Analysis of methodological aspects of graphic training in the conduction of e-learning with account of "traditional" learning potential

The methodology implements a real function in science. According to scientists, the most important of these types of functions is normalization.

Normalization is determines of the quantity, part and integral, goals orientation, so it is separate against the produces guidance, regulation and other functions. Pedagogy, like other sciences, is based on a certain regulatory framework. All of the history of this science has shown that: braking of science will then when it basis is declared as absolute, inviolable. According to many authors, the cause of the education system crisis is due to the fact that it is based on the binary methodology, which produces binary polarity and gives a certain kind of teaching and upbringing categories: "right - wrong", "good - bad" etc, i.e. the clarity is transformed into accuracy, overcoming the contradictions through the elimination of each other. The conclusion from these reviews is that there is no place in the binary methodology for nonlinearity, independence or indecision.

To classify objects associated with graphic training, let's focus on classifying objects classified as: "form and content", "internal and external", "general and only" and others.

The content is the determined side of the whole, the set of parts (elements), the form is the internal organization of the content. The graphic training is the determined side of the whole; the content is the set of component elements of the considered object. At the moment, it shape can be in the form of continuous graphic training, and then, when taking into account the change of knowledge paradigm, a new form can be obtained. But e-learning is also the determined side of the whole, so it can be by content.

The "external" defines the properties of object as a whole thing and the character it relationship with the surrounding environment. An "internal" defines the object structure. In logic, it should be said that the graphic training is external to the other members of the classification because it represents the object properties that are recognized as the whole thing. If we will be consider the relationship of the graphic training in postgraduate education and e-learning, there are two variants:

- graphic training in the context of e-learning;
- implementation of graphic training on the basis of electronic learning.

The appearance of the first variant connected with the widespread use of electronic learning tools in graphic training of the continuous education system, thereby promoting by opening of the realization way of the educational content diversity, mobility of trainees and teachers, the possibility of creating autonomous educational programs of higher education institutions, and the diversity of teaching forms. The second variant is based on the assumption that e-learning in education will improve the quality of education automatically. However, it does not take into account the fact that the education quality is a multi criteria phenomenon, and assurance it is a serious problem.

Thus, it is difficult to determine what is "external", i.e. whether the graphic training is external relatively to electronic training or vice versa? In other words, this time, the contradictions will be eliminated by fighting. We conclude that the binary methodology should be abandoned.

The trinary methodology is opposed to some kind by binary methodology. Contradictions here are eliminated by means of complementarily, coordination,

mutual recognition. Therefore, it is necessary to follow other categories of philosophy, such as "general", "specific", "single". The philosophical categories of "general", "specific", "single" reflect the world's objective relationships and describe the process of it recognition. “General” is a property distinguishing of similar but specific and single phenomena; it is attribute of association of things and phenomena into a particular class, type or group. “Specific” is the integrity of the single and the general, the determined general and the single which is not inferred from the interconnection. "Single" is the form of reality in the general. “Specific” is the general which is realized in the single.

If we go back to logic graphic training is a general because it is part of the education that implements the role of an attribute relies on which it. If we take e-learning as a graphic-training tool, and if consider the continuous education in the context of e-learning, that is, if we do not remove e-learning goals from continuing education, then the goal of continuous graphic training is the integrity of the goals of postgraduate education and e-learning objectives can be accepted. Then the integrity of e-learning and graphic training takes place as a whole and the integrity of the whole.

Thus, the hierarchy of composite of graphics training can be structured as follows: graphic training as the general, post-graduate graphic training as the specific, graphic training in conditions of e-learning inculcation as the single.

In general, we systematize the considered philosophy categories, tied them up with the specifics of "traditional" graphic training, and on a basis of Kazakhstan scientists works presented as a matrix (Table 2.3).

One cell is not filled in this table. Its contents will be known at the final of the study. In the above, we have the definition of educational innovation as the motivation, goal, process and outcome of transformational educational activities of the educational process subjects at the direction of assurance of the quality and effectiveness of education.

Table 2.3 - A matrix of philosophical categories associated with components of graphic training

Philosophical category	General: graphic training	Specific: post-graduate graphic training	Single: graphic training in conditions of e-learning inculcation
1	2	3	4
A goal	graphic training is a system of educational and training activities that provides graphic knowledge, skills and acquired habit .	to train highly qualified specialists, advanced training of teachers of graphic disciplines	Development of postgraduate graphic training

Table 2.3 (continuation)

1	2	3	4
The tools	the formation of geometrical knowledge in accordance with the learning stages, the assimilation of the practical methods of drawing up and decoding of graphic images of geometrical bodies and products, the development of textbooks and educational-methodological tools (including electronic versions) for graphic disciplines, the development of students' cognitive activity and its ability to independently work	the development of the ability to do postgraduate study and doctoral studies on specialty "05.01.01 - Engineering Geometry and Computer Graphics" (Kazakhstan until 2010), the use of the introduction of e-learning opportunities for professional development	use of e-learning opportunities
The results	is laid the foundations of graphic disciplines in the "traditional" condition, is developed the quality teaching aids on graphic disciplines, the methodology of stage-by-stage forming of graphic thinking, the methods of activation of cognitive activity of students using electronic teaching aids; is proved that the principle of gradual, graphic concepts formation in the educational process is the basis of continuity in graphic training, the condition of credit technology of training the ways of designing the independent work of the student on the discipline of geometry and engineering graphics, the problems of compiling the computer graphics course as a separate subject, etc. were solved.	highly skilled specialists were trained through postgraduate and doctoral studies, qualifications of teachers and teachers of graphic subjects were regularly traced	–

Using the potential of educational innovation in the future, we will define the ways to ensure the quality and effectiveness of the graphic education of the subjects of the educational process, in the context of this new definition, in the electronic education conditions. Specifically, we study the process innovativeness, because in accordance with our definition we understand the impact of innovations on the quality and effectiveness of education as innovativeness.

2.3 Use of electronic textbooks and distance learning systems

2.3.1 Use of electronic textbooks

In the Y.Nabi's electronic textbook under designing of the material much attention was paid to the combination of paint colors, the size of fonts, their style, one image of the material. Navigation tools (buttons, rotary rulers, keys) provide free movement of students on the materials of the course.

A summary of the training material is presented in the form of a course diagram, that is, in the form of a block diagram. This gives an excellent orientation to the consideration of the read material. Text learning features hyperlinks highlighted in a special (red, font "italic"). They allow you to get additional or explanatory information that is not visible due to the fact that the screen at the time it is too overloaded with basic information. Another reason for using hyperlinks in the text is the repeated return to one information object in different parts of the textbook.

All sections of the electronic textbook presents a system of self-control: test questions that allow you to instantly check the correctness of the given answer, tasks for self-fulfillment, allowing the student to assess the degree of mastering the theoretical material and questions for self-control.

Test questions are given in sufficient quantity. A set of test questions includes all the content of the electronic textbook. It should be noted that these questions can be used in the examination testing.

After studying each topic the test questions are divided into topics so that the student can check the level of assimilation of educational material (as well as organize midterm control). This distribution of questions by topic is very useful for the establishment of an examination system. Because it allows you to evenly cover all the topics of the textbook with fewer questions than self-control.

Test questions are on-screen items and their controls: the area the issue area of the image, the area with control button (Fig.2.1).

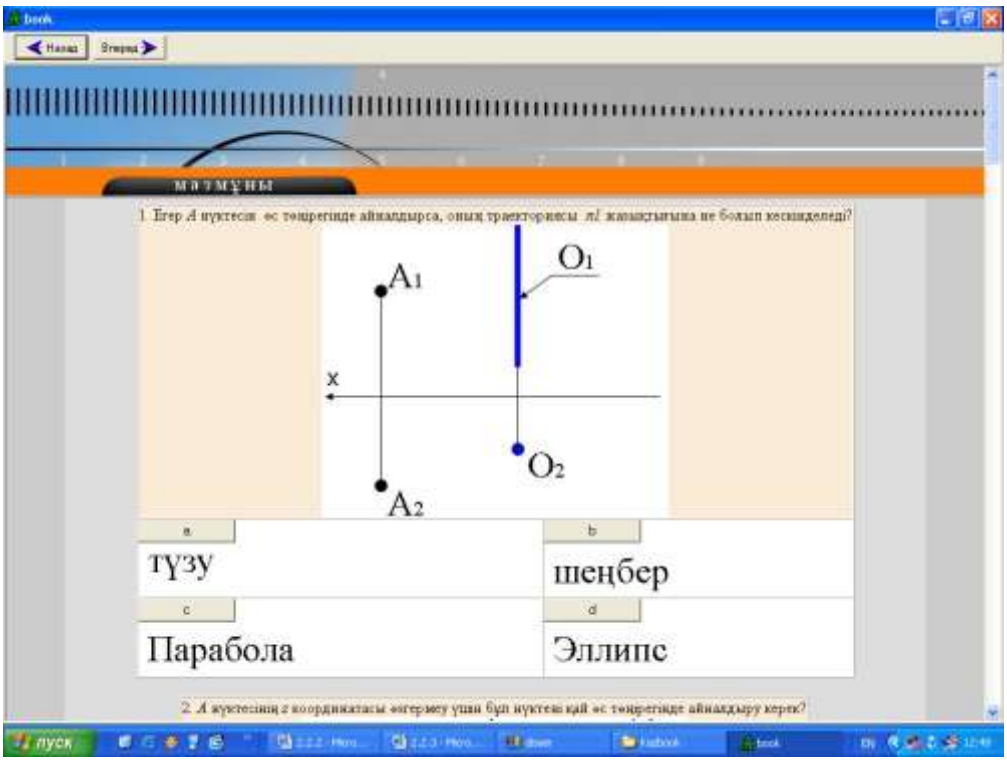


Fig. 2.1 - Tested questions

Tested questions do not start with a number or any image. The subject should always read the question and study it, i.e. memorize the questions depending on the given sequence or meaning, and not on the characteristics of the display.

Ease of application to the preparation of tests (buttons to control the minimum on the screen); requirements that are clear both on the content of test questions and answers.

2.3.2 Use of distance learning systems

Distance learning technologies (DLT) are intended for distance learning. For this purpose, programmes such as" Web Server Apache2"," PHP5 interpreter"," the database of the Data server MYSQL5" are used.

Programs for the DLT provide reliable protection against unauthorized access to them.

The DLT system has a subsystem that decides the ability to access it. It restricts access to system resources according to role permission. The subsystem provides the functions of the author's recognition and perception of the user. The DLT system provides backup and restore functions in the event of a system failure.

All user interfaces are made in the state and Russian languages.

Hardware and software systems of the DLT system are located in the computer class of distance learning connected to the Internet. DLT has Internet access to the system (Fig. 2.2).

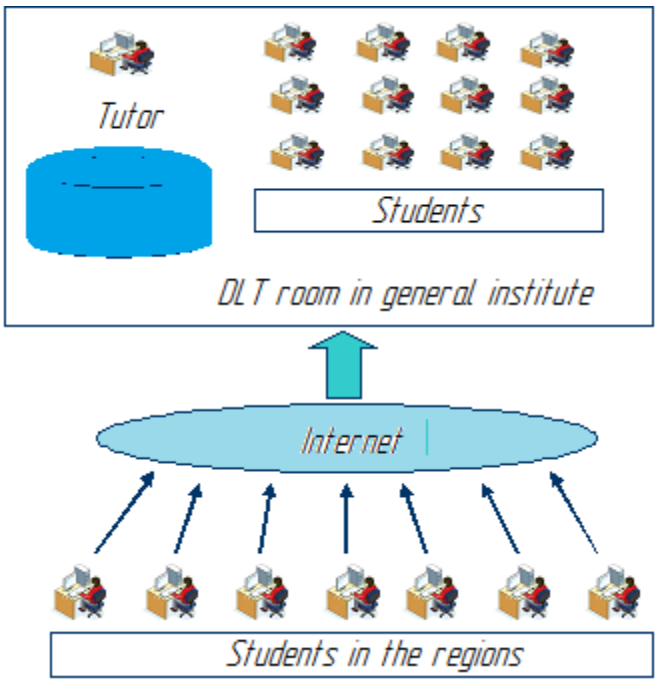


Fig. 2.2-Scheme of DLT in the Kazakh National Agrarian University.

Create content and tests using a tag label in a Microsoft Word document

1) content preparation

A Microsoft Word document that contains text materials (books, lectures) is tagged:

Examples of the insert tag:

[gl] 1.1 essence of the projection method [:]

The text of section 1.1 will then be recorded.:

At the heart of the construction of various images is a projection. He performs the operation like this. Point S in space (Fig.2. 3) is perceived as the center of the projection, and some planes π', not passing through the point S, are perceived as the projection plane (the plane of the figure).

Access to the Internet, the bandwidth of 512 Kbit/s. Is carried out through The KazRENA channel.

Create content and tests using the tag label in a Microsoft Word document

1) content preparation

In a Microsoft Word document containing text materials (books, lectures), the tag is affixed:

Examples of the insert tag:

[gl] 1.1 the essence of the projection method [:]

Then the text of section 1.1 will be recorded.:

The basis of the construction of various images is the projection. He performs the operation like this. The point S in space (Fig.2.3) is perceived as the center of the projection, and some planes π' that do not pass through the point S are perceived as the plane of the projection (the plane of the figure).

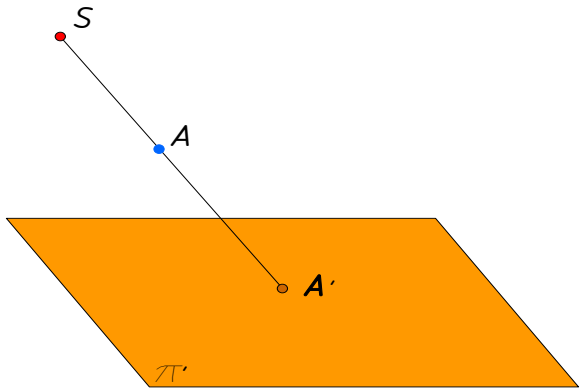


Fig. 2.3-Central project of a point

For projecting of point A in the plane π ' conduct the center through of projection S a straight line SA to the intersection at point a' with π'. Point A' is called central projection of point A. The projection of a certain geometric shape is called the set of projections of all its points. However, a straight line is defined by its two points, so in order to draw its projection, it is sufficient to draw the projection of two points lying along it, since the projection of a straight line will be straight, and this projection will pass through the projection of two points. In order to draw projection of a triangle, you need to draw the projections of its apexes and connect them to each other (see Fig.2.4). Fig. 2.5 shows the construct of the curve line *l* .

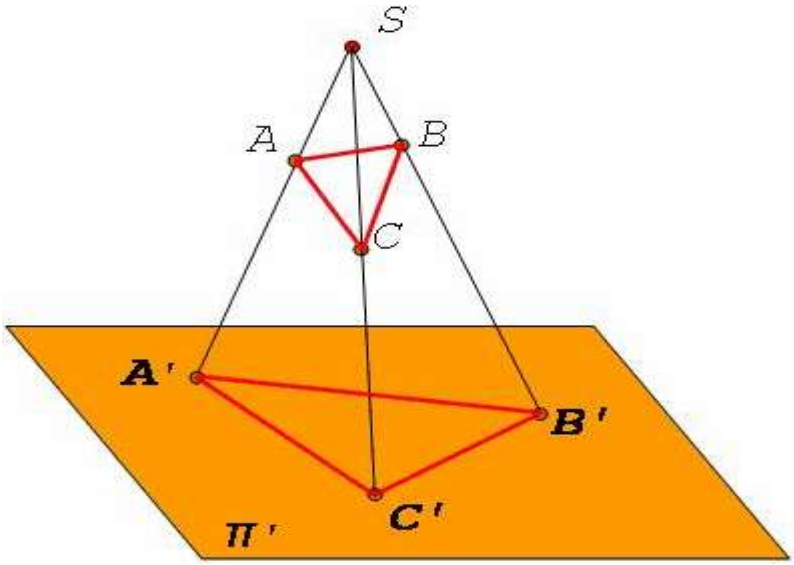


Fig. 2.4. Central projection of the plane of triangle ABC.

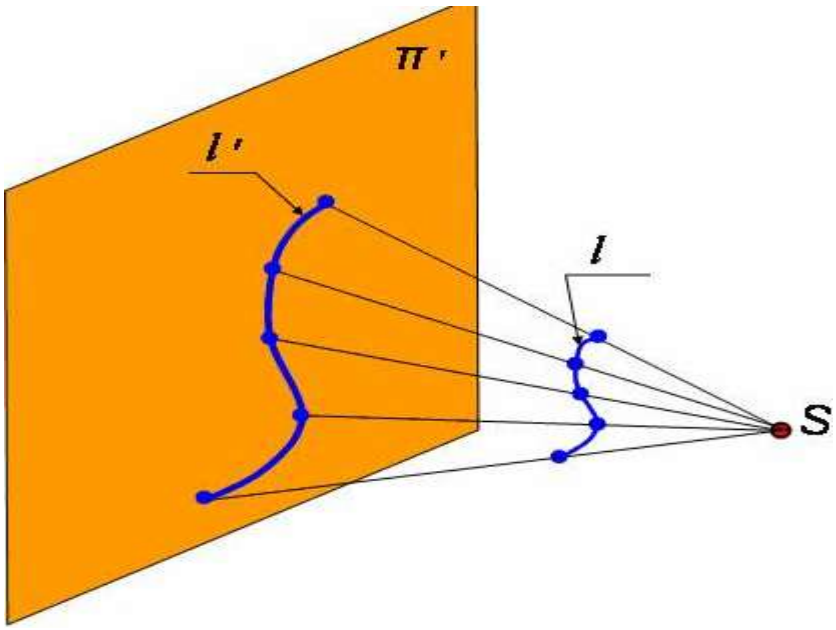


Fig. 2.5- Central projection of curve *l*.

The end of the text view.

Fig. 2.6 show the first page of the content. It shows the content and interface of the discipline (descriptive geometry and engineering graphics).

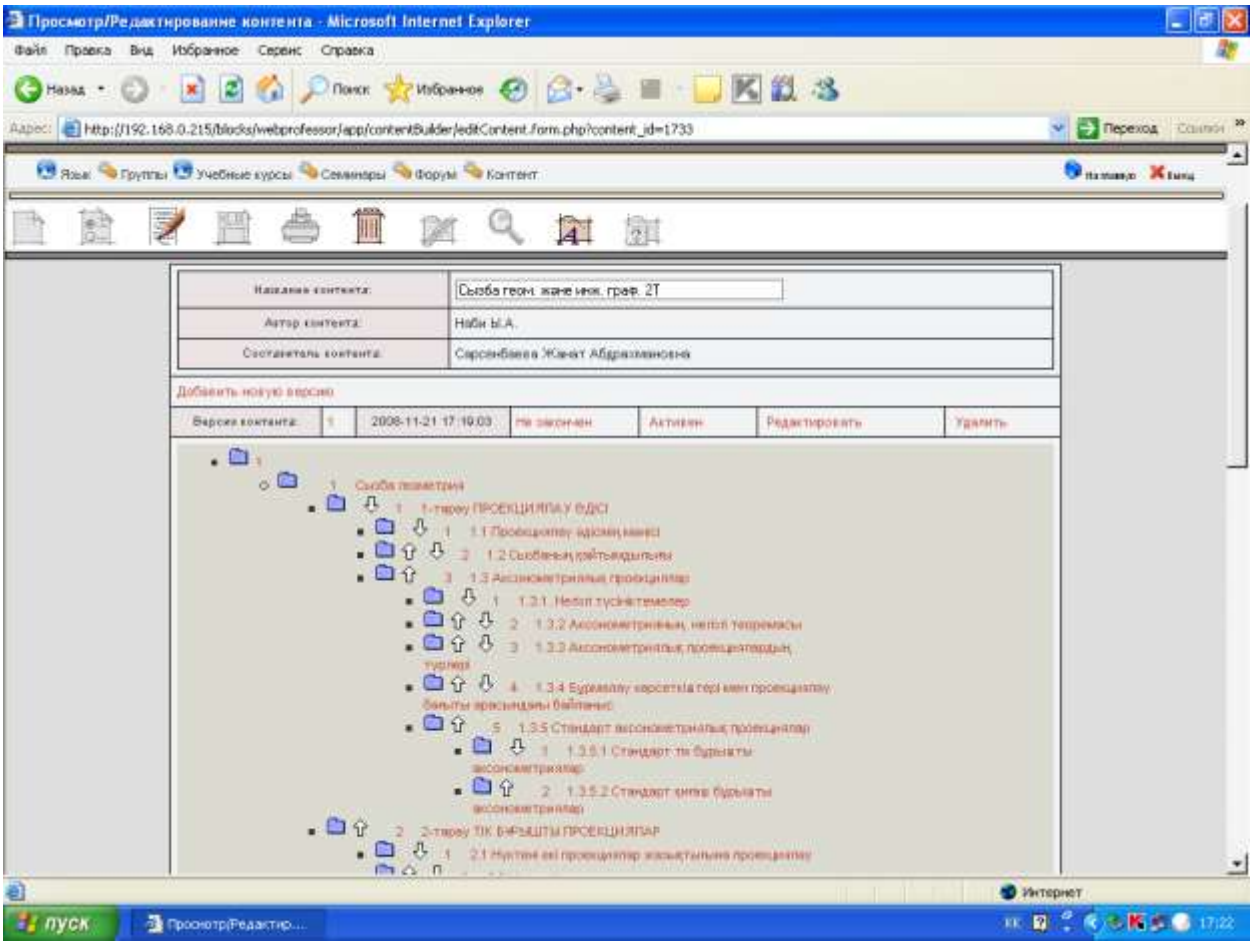


Fig. 2.6- First page of the content

An example in the Chapter is given after setting the tag as [pr] (Fig. 2.7), for example:

[pr]

We need to find the exact value of the segment AB.

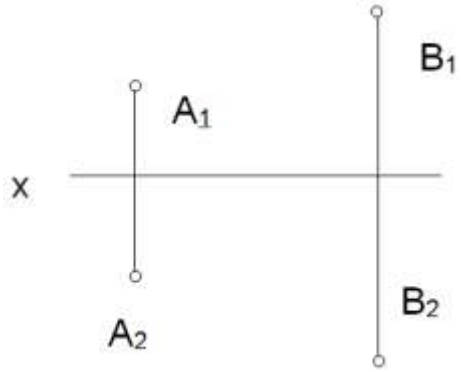


Fig. 2.7- An example in the Chapter.

The task in the Chapter is given after setting the tag in the form of [z] (Fig. 2.8), for example:

[z]

ӨЗІНДІК ЖҰМЫСҚА АРНАЛҒАН ТАПСЫРМАЛАР

1 «Нүкте, түзу, жазықтық», «Проекцияларды түрлендіру тәсілдері» тақырыптары бойынша тапсырмалар.

1.1 Есеп шарттары.

I – есеп. *ACD* үшбұрышы жазықтығына параллель және осы жазықтықтан 30 мм қашықтықта орналасқан жазықтықты өзінің кез келген екі өзара қиылысатын түзулерінің көмегімен жүргізу қажет.

II – есеп. *ACD* және *BCD* үшбұрыштарының арасындағы екі жақты бұрыштың шамасын жазық-параллель орын ауыстыру тәсілімен анықтау керек.

III – есеп. Горизонталь немесе фронталь төңірегінде бұру тәсілін қолданып, *ACD* үшбұрышының нақты шамасын табу керек.

IV – есеп. *AB* түзуі мен *BCD* үшбұрышының арасындағы бұрышты проекция жазықтықтарын алмастыру тәсілімен анықтау қажет.

Fig. 2.8 - Task in Chapter.

If in the process of creating content, you need to enter the questions for self-control, then enter a text block for issues of self-control, operable in accordance with the tags [vop] and [kvop]. Then on questions of self-control tags are put.

If you want to enter an image, you must use the "Insert image" button on the HTML editor panel.

If there are no other materials to be divided, it is closed with the [kgl] tag, for example, :

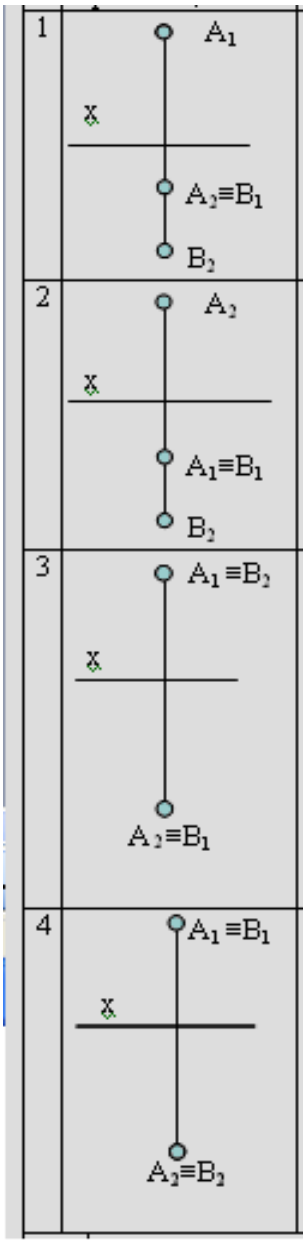
[kgl]

2) preparation of tests
The system considers several types of test questions:
1. General selection of the answer sequentially and consistently-it is recommended to specify one or more correct answers to the student;
2. for demonstration of sequence, that is questions of ordering of answers – it is recommended to specify the correct sequence of answers to the trained;
3. open question (input is video series) – the learner is proposed to introduce a version of their response.
The Microsoft Word document in which the tests are written also has a tag label. For example:
1) for the first sample questions:
[q][+]4: 1: question text,
[a] the text of the response,
[a] [+] text of correct answer,
where:
[q] – question mark,
[+]- mandatory question mark,
4: - Rating of the question (the colon is to insert necessarily),
1: - question type (double insertion required),
[a] - response label,
[+]- correct answer.

2) for the second sample questions:
[q][+]4: 2: question text,
[a]1: answer text,
[a]2: response text,
[a]3: response text;
here
[q] – question mark,
2: - the question type (colon, insert definitely),
4: - Rating of the question (the colon is to insert necessarily),
[a] - answer choice label,
1: - answer option Number (insert colon required).

3) for the third typical question:
[q]3: question text,
[+]- mandatory question mark
[a] the text version of the response,
[a] the text version of the response,
[a] the text version of the response,
where:
[q] – question mark,
3: - question type (double insertion is required),

[a] - answer choice label,
[kvop]
[kgl]



After compiling the test questions with the appropriate tag tags, the document "Web page (*htm; *.html)".
In our case, two typical questions are used – the first and the Second, which are used.

A typical example of the first issue (Fig. 2.9):

In what scheme a and b Points are symmetrically located relative to the plane of projection π_1?

Fig. 2.9-The first typical question.

Example of the second typical question (Fig. 2.10):

You must specify the correct order of the plane traces.

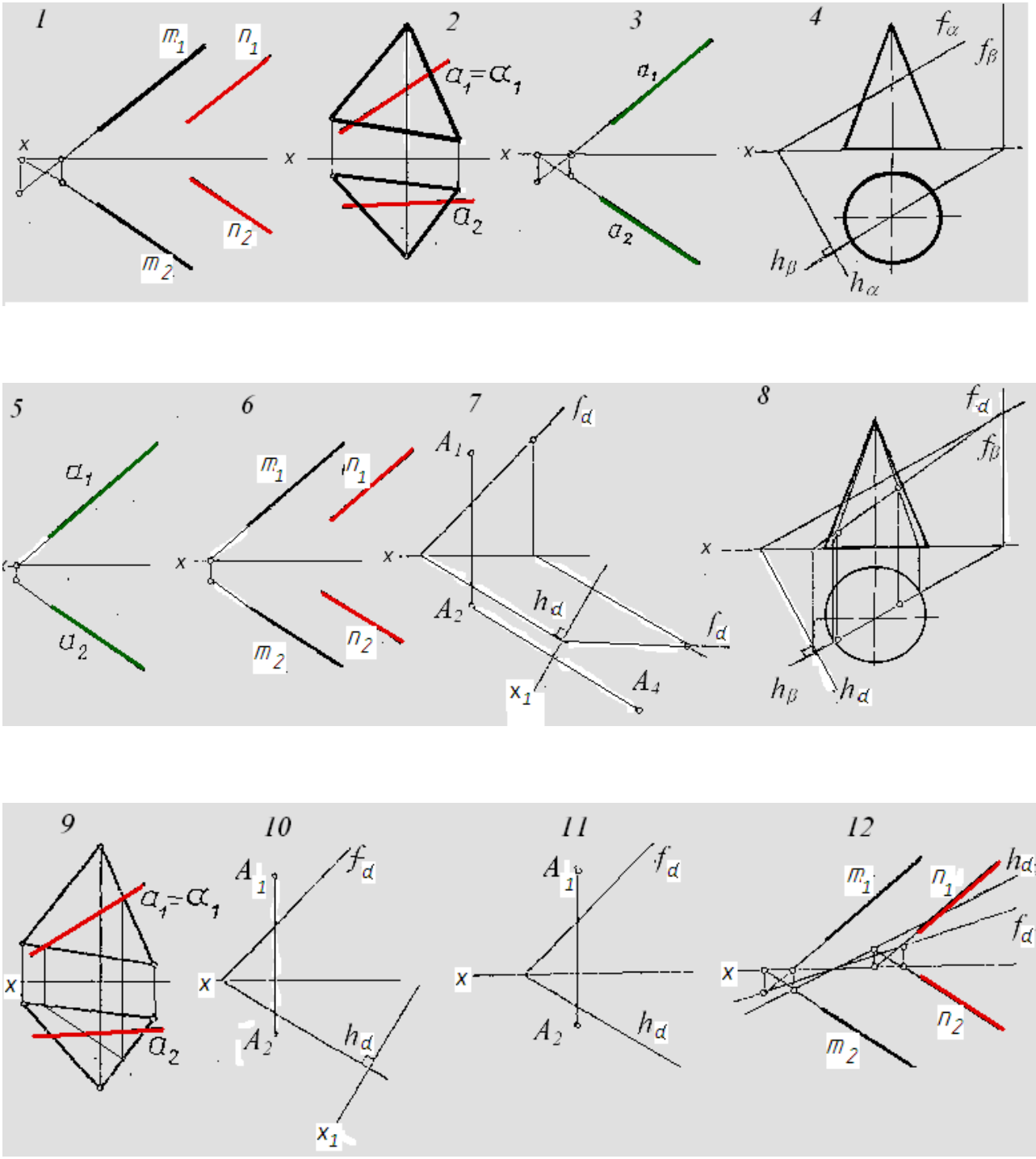


Fig. 2.10- The second typical question.

An example of affixing tags to control issues:
[gl] Chapter name [:]
Text of chapter,
[vop]
1) for the first typical question:

[q]1: question text,
[a] [+] text of correct answer,
[a] the text of the response,

[a] [+] text of correct answer,
where:
[q] – question mark,
1: - question type (double insertion required),
[a] - response label,
[+]- correct answer.
2) for the second typical question:

[q]2: question text,
[a]1: answer text,
[a]2: response text,
[a]3: response text,
here
[q] – question mark,
2: - the question type (production double points necessarily),
[a] - response label,
1: - Number of answer (affixing double points necessarily),
[q]3: question text,
[a] the text version of the response,
[a] the text version of the response,
[a] the text version of the response,
where:
[q] – question mark,
3: - the question type (production double points necessarily),
[a] - answer option tag (for comparison with the user's answer),
[kvop]
[kgl]

So, the educational portal on graphic disciplines, developed by Y.Nabi allows to organize distance learning, i.e. to prepare educational materials, to convey the content to students, to control the level of knowledge of students.

2.4 Laboriousness of Assignments by Graphic Disciplines

The problem of designing students' independent work on graphic disciplines is a special object of our perennial researches. Low level of student's self-learning activity formation leads to shortcomings in their professional activities in the future. Failure to do so is that future specialists are a consequence that the use of scientifically proven and practice-tested approaches in higher education institutions activity is insufficient. That's why the organization of students' independent work is one of the most important directs in the learning process. We aim to realize this direction on the example of designing the independent work of the student on disciplines "Descriptive Geometry and Engineering Graphics" and "Computer Graphics". To achieve this goal, we set ourselves the tasks: 1) to determine the

volume of students' independent work showed on discipline "Descriptive Geometry and Engineering Graphics"; 2) to determine the time expenditure on 1 format A4 and indicate how to use this index to design the volume of students' independent work. It is well-known that drawing on the computer reduces the amount of work and improves the drawings quality. But there is no real data about how much time is spent. Also, there is no information about the difference in time spent while draw using a computer in 2D or 3D systems. That is why we have to set the following tasks additionally to specified one: 3) to determine how much time is reduced the expenditures to show the drawings using a computer; 4) to compare the 2D and 3D systems by the index of time expenses.

The methods of students' time fund research are:

i) questioning: the tested person answer the question the result is determined the amount of time expenses on different activities;
ii) a method of the past remembering: the amount of time expenses is determined on the memory of the tested person;
iii) motion-time study: the researcher determine the time expenses of the tested person by the visual examination;
iv) self-registration of time expenses: the tested person enter the necessary data on the chronometry card. There are two types of chronometry cards: closed (reduced in conventional form) and open (not reduced in conventional form). Using the first chronometry card type the registration is carried out according to the structure established by the researcher. In this case you can easily find the amount of time expenses. The second chronometry card type gives a possibility to the tested person to easily register the time expenses.

These methods have advantages and disadvantages. When answering the questions in the questionnaire, the time expenses by the tested person on other types of activities are ignored. Data on the method of remembering the past is quickly collected, but their accuracy is doubtful. The motion-time study provides high accuracy, but requires a lot of effort and time and it is not always effective.

It is difficult to fill in a chronometry card with a conventional form, but the researcher will be able to process the data. When processing the second type of chronometry card the laboriousness will be higher because obtained data necessary enter in table with the conditional form.

The self-registration of time expenses method allows many people to participate in the test therefore is provided the study representativeness and the obtained data accuracy. In this regard, often used in statistical research. For example, this method was used to determine the student's time budget in Kazakh National Agrarian University [17]. The results of the study show that the student's time at the classroom is 4.52 hours per day and is approximately the same for all faculties; and the time expenses on a student's independent work depends on the student's future profession, so students of technical faculties (engineering, energy and information systems) work more in the library and at home therefore the time budget is more than students of biological specialty, namely 10.2 ... 9.2 hours and 8.2 hours ... 6.8 hours accordingly.

Prof. Y. Nabi used the described method for extensive and profound research. The results of this study are shown in his monograph [18]. The general idea was derived from the dissertation [19]). The author of this dissertation has developed a method of determination the norm of the student's independent work and made the experimental research at the Kiev Institute of Food Industry. The basis of the methodology is dividing work on topics for certain periods. For example, the algorithm to show tasks on the drawing subject is:

1) acquaintance with the task, its analysis;

2) mastering the theoretical material in the textbook;
3) organize the workplace, prepare tools;
4) fill out the main inscription and draw the field frame;
5) define the main view of the object or the detail and the images minimum number;
6) assign a scale, arrange the images;
7) draw given data of the task;
8) draw required images;
9) draw the dimensional lines and mark the numbers;
10) mark the surface roughness designation;
11) final decor of the drawing (hatching, writing and so on);
12) draw the main lines of the drawing;
13) check the drawings, make necessary corrections.

The expert method is a complex of logical and mathematical procedures aimed to obtain information, analyze it and generalize it with the purpose of preparing and accepting a competent managerial decision. The essence of the method consists of conducting by expert's analysis of the problem with qualitative and quantitative evaluation of judgments and formal processing of the results by individual expert assessments. The expert assessments method allows you to analyze complex pedagogical processes, phenomena or situations, which are characterized mainly by qualitative, non-formalizable signs, which makes their analysis and evaluation difficult. This method has logically interrelated stages, which are the main stages of pedagogical expertise. The initial stage (organization of expertise) includes: the definition of the purpose and objects of the expertise, the formulation of the problem, the selection of experts, etc.
The main stage of the expertise is related to the collection of data, the conduct of research work and expert evaluation, an analysis of available material. The technology of expertise is to use the methods and evaluation criteria which depend on the character of the expertise, fill the application field [20].

For the pedagogical expertise often requires the development of questionnaires, interrogations, tests, control and diagnostic tasks. The final stage of the expertise is the questioning by experts (individual or group, personal, internal or external, oral or written), document processing (report, reference, review, etc.), and acceptance of expert opinion.

In our case, it is advisable to use individual expert assessments, because we wanted to know the opinions of experts from different universities so that they did not contact to each other. Therefore, we used questionnaires and appealed to experts with this request:

"*Assess the justification of the methodology of determining the time expenses on the work of the student out of the classroom*

a) The methodology is well-founded and applicable;
b) The methodology is valid, but it requires a lot of time and efforts to implement it;
c) The methodology is valid, but there are the doubt because it is based on experimental data collection;
d) The methodology is valid, but it must be strictly theoretically grounded;
e) *The methodology is not applicable*".

An importance of an idea of the proposed methodology is to show that work is divided into periods. However, according to Y.Nabi, the given task shows that algorithm is based on small operations adapted to each topic, so he suggested his own algorithm. This algorithm consists of six stages, suitable for any task. The order of these periods, as well as the amount of time expenses by the students, show tasks for self-study out of the classroom by Descriptive Geometry is shown in Table 2.4. That they will need for comparison.

In the 80-th years of the last century information on all topics was collected. For this work was used the questionnaires on form shown in Table 1 and were distributed by students of the Kazakh Agricultural Institute. The results of this data processing are shown in paper [21].

We did the same research in 2006-2009 at the Kazakh National Agrarian University. The questionnaire form for determining the time expenses on a student's independent work on graphic disciplines and the received information data are shown in Table 2.5 It is important to note that the questionnaire form has changed. If earlier a questionnaire was given for each task, then they were merged and distributed in one questionnaire. The reason is that earlier such tasks were carried out during three semesters, and now, in the credit technology conditions, showed in one semester.

Table 2.6 shows the sum of time expenses per hour on each topic, according to the task topic, the number of A4 formats and laboriousness which is found by means of division this sum on the A4 formats number. In the previous ("linear") system and in the current system, i.e. in the undergraduate, it is possible to notice that there are some laws and differences as well.

Table 2.4 - Time expenses for performing and share of each task

Performing stages	Time expenses for performing							Per cent to summary time
	of assignment #1				of assignment #2		on full work stage	
	of task #1	of task #2	of task #3	of task #4	of task #1	of task #2		
Getting acquainted with the task, reading literature on the topic	31	27	29	30	126	51	294	15
Drawing on the drafting paper	45	54	43	52	196	34	424	22
Consultation	17	9	13	12	58	32	141	7
Drawing on the whatman paper	44	39	42	51	291	98	565	29
Revising after checking	22	15	23	19	244	58	381	19
Decor of the drawing	22	23	22	24	40	20	151	8
SUM	181	167	172	188	955	293	1956	100

Table 2.5 - Time value spended for work type (in minutes)

Assessment topic	Assessment task name	Getting acquainted with	Drawing on the drafting paper	Consultation	Drawing on the whatman paper	Revising after checking	Decor of the drawing
Section "Descriptive geometry"							
Assignment #1	task #1	14.12	29.48	5.70	37.86	5.07	14.35
	task #2	12.61	26.36	3.39	37.49	4.80	13.32
	task #3	11.41	26.36	3.70	34.86	4.25	12.91
	task #4	10.77	25.46	4.42	36.17	4.20	13.20
Total		48.90	107.67	17.20	146.38	18.32	53.78
Assignment #2	Construction of the intersection line	7.42	30.68	5.39	39.78	3.59	13.38
	Construction of the development	7.71	26.10	5.23	33.68	4.61	10.59
Total		15.13	56.78	10.62	73.46	8.20	23.97
Total by section		64.2	164.42	27.82	219.84	26.52	77.75
Section "Engineering graphics"							
Decor of drawing	Lettering	15.75	51.67	3.64	113.26	9.71	16.83
	Dimensioning	10.01	32.49	3.33	80.84	13.75	15.16
Geometric constructions	taper	12.29	33.68	4.71	73.30	12.54	19.78
	conjugating	16.06	47.07	4.80	85.32	12.32	20.71
Total		54.12	164.91	16.48	348.52	48.32	72.48
Images on a drawing	1. axonometry	12.72	48.74	6.20	79.91	7.43	22.07
	2. simple sectional view	11.91	40.58	5.72	67.54	7.58	19.99

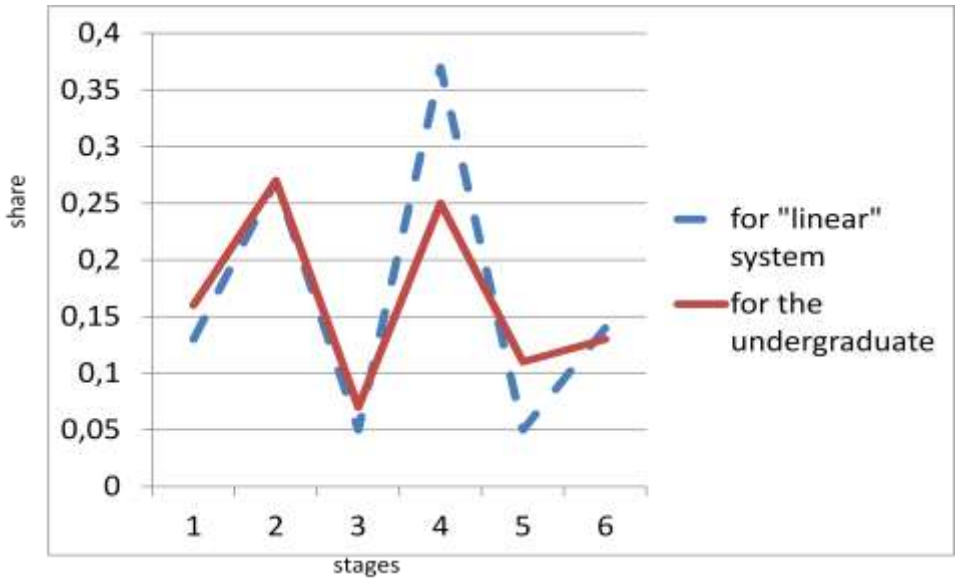
	3. local sectional view	8.41	42.19	6.16	67.12	6.80	20.57
	4. broken sectional view	13.46	60.83	7.67	98.70	8.75	20.46
	5. stepwise sectional view	12.71	56.78	8.04	96.01	7.84	18.67
Total		59.22	249.12	33.80	409.28	38.41	101.75
Connections	bolt	10.49	27.30	6.87	36.68	4.81	20.26
	bolt connection	6.26	24.35	4.51	39.12	4.97	22.06
	stud	9.00	23.52	4.49	34.90	4.39	19.23
	stud connection	6.51	24.32	4.51	38.80	5.06	21.23
	welded joint	9.45	31.93	6.52	44.00	5.81	22.29
Total		41.71	131.42	26.90	193.49	25.04	105. 1
Sketching out	Detail #1	1.06	28.75	2.78	32.32	3.81	15.70
	Detail #2	0.96	30.96	3.52	34.61	4.28	15.83
	Detail #3	0.80	30.14	3.16	33.46	5.12	15.84
	Detail #4	0.81	24.59	3.48	31.42	4.26	15.99
	Detail #5	0.75	29.68	3.71	37.25	5.46	16.78
Total		4.38	144.13	16.65	169.06	22.93	80.13
Reading and detailing of the general drawing	Detail #1	2.74	24.97	3.41	30.96	4.07	17.52
	Detail #2	2.77	24.07	3.25	29.23	4.52	17.36
	Detail #3	2.71	23.68	3.32	28.25	4.00	16.86
	Detail #4	2.41	22.35	3.22	26.97	4.25	16.20
	Assembly drawing	4.28	40.14	4.61	57.57	6.41	19.45
Total		14.90	135.22	17.80	172.97	23.25	87.39
Drawing by specialty		6.65	12.25	4.16	25.06	3.77	11.72

Total by section	180.8	837.08	115.78	1318.36	161.71	458.55
Total by course	245.0	1001.5	143.6	1538.2	188.23	536.3

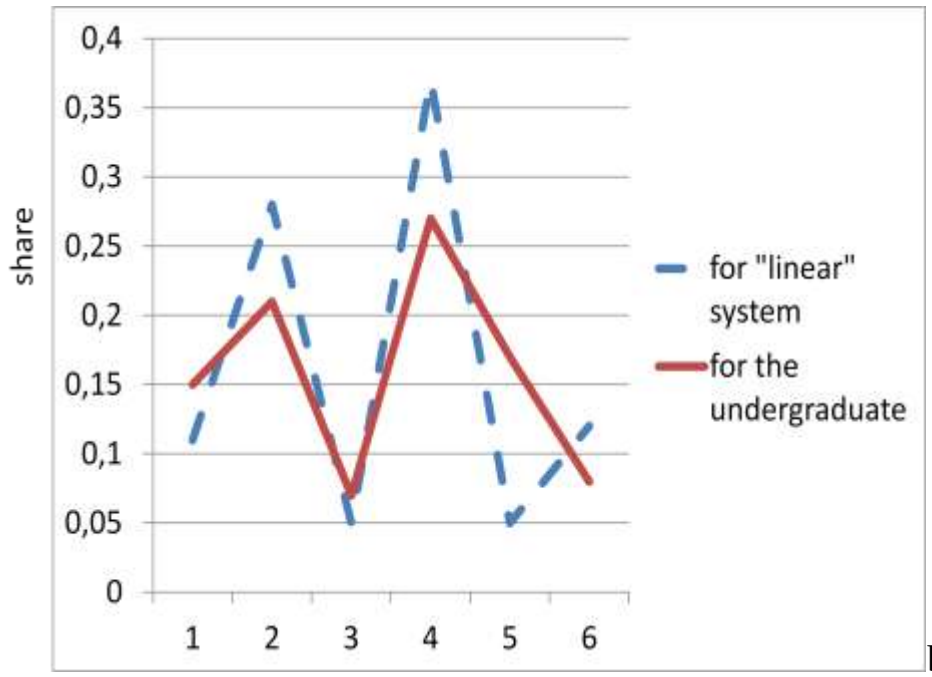
Table 2.6 -Time expenses for performing and laboriousness of 1 format

Assignment topic	Assessment task name	Getting acquainted with the task, reading literature on the topic	Drawing on the drafting paper	Consultation	Drawing on the whatman paper	Revising after checking	Decor of the drawing	work under the leadership of teacher	Number of format A4	format
Geometric constructions	0.90	2.75	0.27	5.81	0.81	1.21	11.75	4	4	3.94
Images on a drawing	0.99	4.15	0.56	6.82	0.64	1.70	14.86	7	5	4.37
Connections	0.70	2.19	0.45	3.22	0.42	1.75	8.73	4	5	2.55
Assignment #1 by Descriptive geometry	0.81	1.79	0.29	2.44	0.31	0.90	6.54	2	4	2.13
Sketching out	0.07	2.40	0.28	2.82	0.38	1.34	7.29	4	5	2.26
Reading and detailing of the general drawing	0.25	2.25	0.30	2.88	0.39	1.46	7.53	3	6	1.75
Assignment #2 by Descriptive geometry	0.25	0.95	0.18	1.22	0.14	0.40	3.14	2	2	2.57
Drawing by specialty	0.11	0.20	0.07	0.42	0.06	0.20	1.06	2	2	1.53
Total	4.08	16.69	2.39	25.64	3.14	8.94	60.88	28		

Making a task on the topic of geometric constructions both in linear system and bachelor degree takes a lot of time. The reason is that this topic was given first and our students often have an inadequate propaedeutic graphic of training level. If we divide the time expenses of each period by the total time expenses, we will find the share by each of them. They are convenient to compare with each other. For example, when we compare the shares for the tasks of Descriptive Geometry, we find the regularity (Fig.2.11). As we see, in Fig.2.11a) the regularity is preserved completely, but in Fig.2.11b) at the 6th stage there are discrepancies only.



a)



b)

Fig.2.11 - Share indexes' for the assignments by Descriptive geometry:

a) for assignment #1 and b) for all assignments.

It is a natural phenomenon that the time expenses for a single type task solution are not differed from each other. In our case this regularity is remained. The example is shown in Fig.2.12

The time expenses on A4 format (laboriousness) is lower for Descriptive Geometry than for engineering graphics as in "linear" system and as in the undergraduate. For example, if earlier this value was equal respectively 3 and 4, by the latest data they are equal to 2.35 and 2.73 respectively. The time expenses in undergraduate decreased relatively by the previous data. That's why:

i) Students choose easier options of tasks as in undergraduate they have the choosing possibility. For example, earlier the students performed the task on the topic "Reading and detailing of the general drawing" on A1 and A2 formats. Currently task by this topic is performed on the formats which in 4 to 2 times smaller than these;

ii) In present, students are fully provided with educational and methodical literature. They perform the task use the textbook, electronic textbook, many tutorials.

We used an expert study for validity grounding the method of a student's independent work volume determining. The validity was assessed by the participation of leading teaching staff of the higher education institutions on the discipline of Descriptive Geometry and Engineering Graphics. In particular, this work has been done at the Kazakh National Agrarian University, K.Satpayev Kazakh National Technical University, Almaty Institute of Energy and Communications, and S. Seifullin Kazakh Agro-Technical University. In order to determine the experts' opinion, they were interrogated. The resulting data were summarized and processed. 100% of the experts showed that the methodology of determination time expenses on student's independent work are successful, 45% of them point out that most of time and efforts are required for implementing the methodology, and 30% believe that the methodology is fully founded.

To solve tasks 3 and 4 specified in the introduction the similar to those used previously chronometry card were developed. However, they were supplemented with graphs to determine the time expenses when drawings executing in 2D and 3D systems. Experiments results conducted in the Financial Academy (Astana) with students of the specialty "Computer Science and Software" in 2016-2017 showed the following.

The time expenses on showing the same drawings that were previously showed on the whatman paper and using the computer program COMPAS decreased by 6 ... 11 times depending on the topic of the assignment.

It is known that the drawing of a detail which use the computer can be showed in two ways:

- in the 2D system with use of its tools in order similar to the drawing on the whatman paper;
- in the 3D system, when three-dimensional model is pre-constructed, then with its help a flat drawing is obtained.

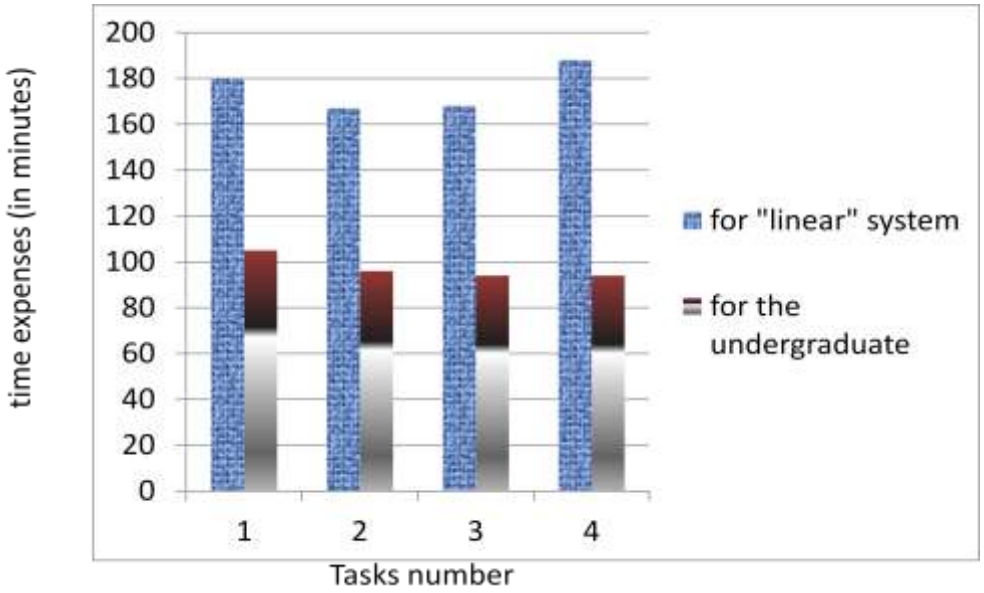
The obtained data show that the first way is more profitable because the time expenses is less (Fig. 2.13) for all tasks except the third task.

Analysis of the data in Tables 2.4…2.6 shows that the fourth stage (drawing on whatman paper) accounts for 29% (see Table 1) or 31-34% (see Tables 2.5 and 2.6) of all expenses (for Descriptive Geometry) and 42-44% (see Tables 2.5 and 2.6) of all expenses (for Engineering Graphics). This circumstance can be used for more rapid data collection, namely, the time expenses to determine not for all stages, but for the fourth stage only. Then the total time expenses approximately can be determined as follows: the time required for the fourth stage to multiplie by 3 (for Descriptive Geometry) or by 2.5 (for Engineering Graphics).

So, to use the methodology at least the time expenses on the fourth phase of drawing executing should be determined by chronometry cards.

The time expenses on A4 format (laboriousness) can be used to determine the student's independently work volume. For this purpose, laboriousness should be multiplied by the planned numbers of A4 formats.

We have shown that the methodology of the student's independently work designing on graphic disciplines is theoretical grounded and is conveniented to use in practice. It is proved by the fact that the experts evaluated the method as valid, and the experimental work that has been conducted for many years at different universities has been with a positive result. The obtained data gives the ability to determine the student's independently work laboriousness. At the same time we have determined the effectiveness' of drawings with using computer. Thus, the tasks were fully implemented.



. Fig.2.12- Time expenses for solution of each task of assignment #1 by Descriptive geometry

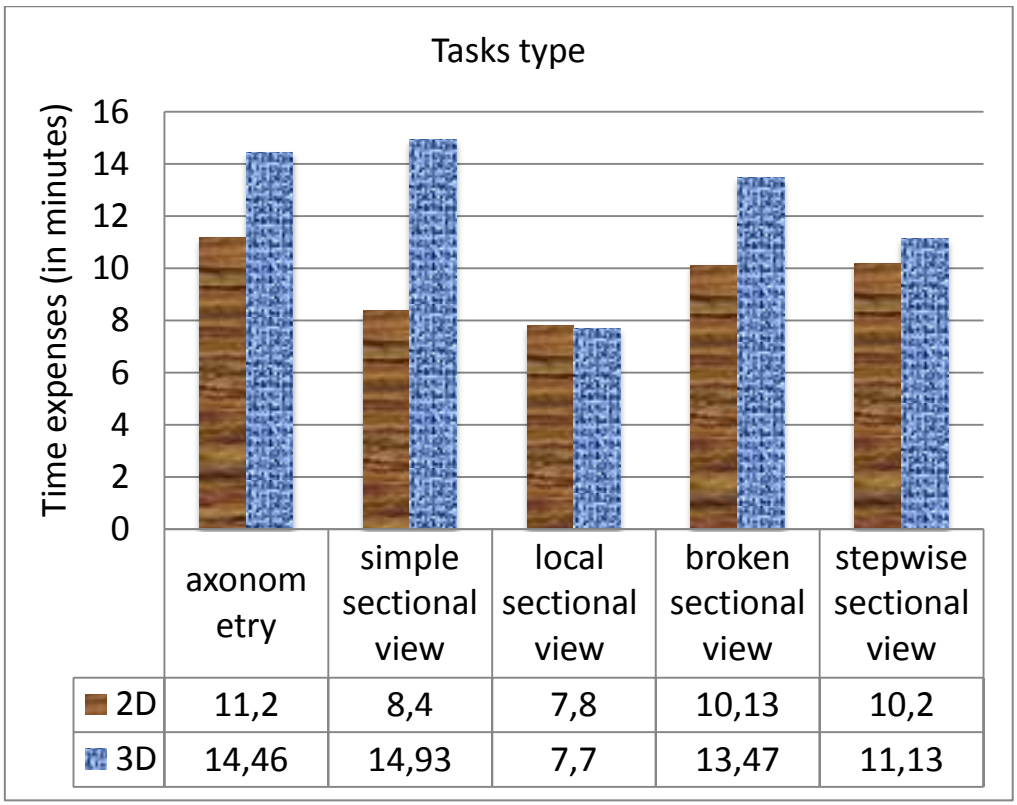


Fig.2.13 - Time expenses when executing of the drawing in 2D and 3D systems

2.5 Competence-based modular educational programs

2.5.1 Introduction

The analysis of the literature on the problems of competence-based approach to training showed the presence of a large spread of opinions and interpretations. In this regard, we recommend to rely on the following basic concepts from the Glossary of terms of the Bologna process:

1) Competence

The dynamic combination of a number of parameters of knowledge and its application, skills, attitudes and responsibilities that describe the learning outcomes of the programme/module of study.

The concept of competence may include formal qualifications, as well as elements such as the ability to "transfer" skills and knowledge to a new professional situation or the ability to innovate. The level of competence can be assessed by the person's ability to use the skills available to him.

In higher education, the Bologna process distinguishes between subject (related to the subject area) and General (for all courses/modules of this cycle) competencies.

General competencies include instrumental competencies involving the ability to understand and use knowledge and ideas; methodological competencies, understood as the ability to organize and effectively manage environmental factors

(time, learning), make decisions and solve problems; interpersonal and systemic competencies.

2) Competence-based approach

The method of modeling learning outcomes and their representation as quality standards of higher education. Results are defined as sets of competencies that are defined for each module of the program and for the program as a whole. Creating a comparable degree system requires a change in the entire paradigm of higher education, including changes in teaching methods, procedures and evaluation criteria, ways to ensure the quality of education. Developing the content of qualifications in terms of competencies and learning outcomes solves the challenge of building a pan-European consensus in determining degrees in terms of what graduates should be able to do upon completion of their studies.

3) Course unit - an element of the educational program

An element of an educational programme that has clear learning outcomes expressed in terms of competencies to be assessed and appropriate evaluation criteria. Elements of the educational program are assigned certain values of credits. Several elements of the educational program can form modules. It is often synonymous with the term "module".

4) Module

Completed in terms of learning outcomes, part of the programme with clearly defined results and evaluation criteria.

In higher education, the module is most often implemented within one semester.

5) Learning Outcomes

Statement of what the student knows understands and knows how to do at the end of training. One of the main tools to ensure transparency of higher education systems and qualifications. Learning outcomes show individual achievements, knowledge and practical skills acquired and demonstrated after successful completion of an individual course, part of an educational program/module, or an educational program as a whole. The results of training contain evaluation criteria, reflect the minimum requirements for the degree. Learning outcomes should be distinguished from goals and objectives, as they are more related to the student's achievements than to the teacher's objectives. For official documents on the final results of training is characterized by the use of active verbs expressing knowledge, understanding, application, analysis, synthesis, evaluation and so on. The General characteristics of a qualification, that is, learning outcomes, can be defined as a “qualification descriptor”.

6) Assessment of students' achievements

A set of written, oral, and practical assignments, including projects and portfolios, used to judge a student's progress in mastering a course/module. The evaluation is carried out in relation to the learning outcomes established for the module, expressed in terms of competencies.

Thus, modular training is a way of organizing the educational process on the basis of block-modular presentation of educational information.

Credit training technology has been introduced in the higher education system of Kazakhstan. This technology is one of the fundamental principles of the Bologna process. Alongside with the credit technology principle such principles as competence-based approach and modular training are of great importance.
However, although these principles are declared in the basic documents on education development in our country, in practice, implementation thereof encounters certain difficulties. Peculiarity of the objectives to implement at each of these principles is that they should be solved integrally, because a Modular Educational Program (MEP) is a set of modules aimed at mastering certain competencies. The need to solve of the problems proceeds from the global trends:
1) in educational process the emphasis is transferred from the subject (disciplinary) result to the expected results of the knowledge and skills mastering by a student;
2) competences are formed based on the requirements of employers or their associations, and then the required learning outcomes are determined by the competences.
Currently there exists perception of the necessity to reorient assessment of the student's learning outcome from the "knowledge, skills, abilities" concepts of to "competence / competency" concepts. It means the necessity to make the transition from qualification approach to the competence-based one in vocational education (Fig.2.14). Thus, the learning outcomes constitute one of the most important

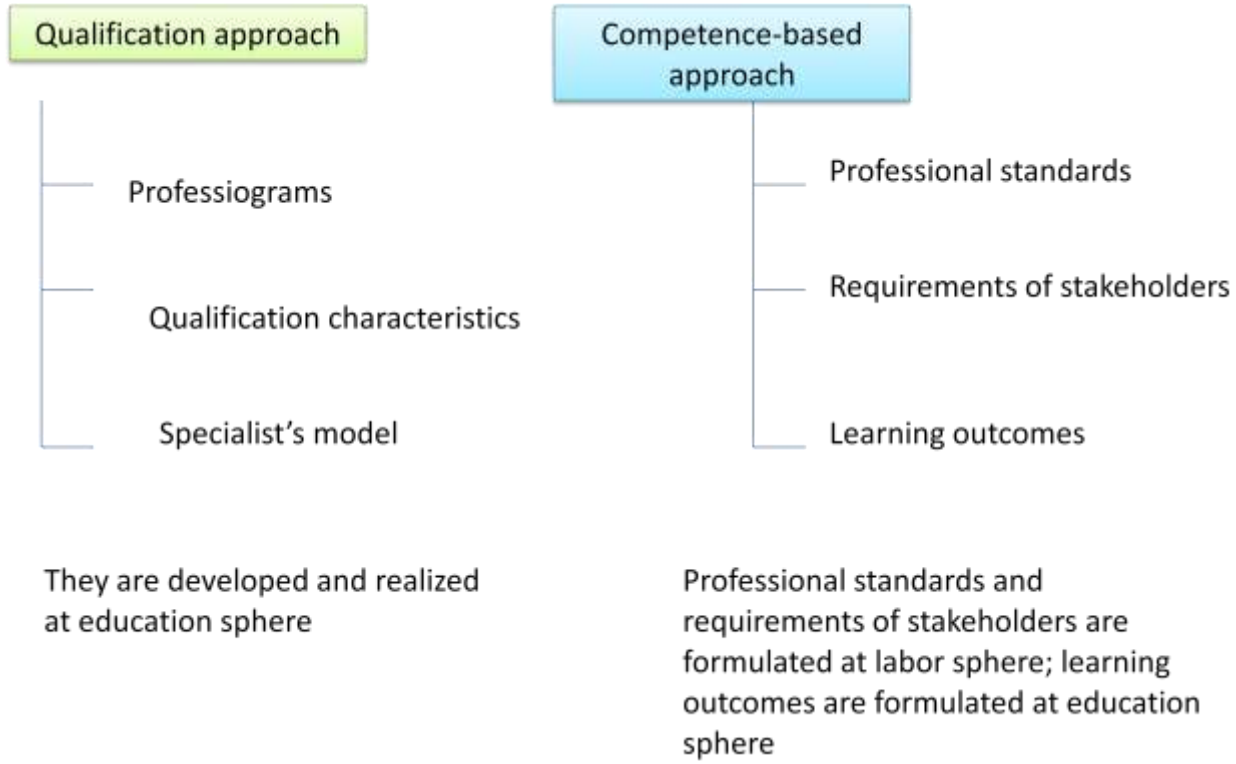


Fig. 2.14-Scheme of the transition from qualification approach to the competence-based one

structural elements of the higher education systems.

Nevertheless, it was believed that it is impossible to describe this result, and much less to standardize it.

Approach to the learning outcome as to a possible basis for recognition of the education content and qualifications (degrees) has become decisive due to Kazakhstan entering into the Bologna process.

There are three known types of standards required for vocational education and training, namely:

- professional standards to describe the functions which a specialist should perform, and the requirements to the competencies needed to perform these functions;

- assessment standards to describe the assessment process needed to award the qualifications;

- Educational standards to describe the learning outcomes required for the qualification gaining, teaching objectives and methods of, and the training context.

In the Republic of Kazakhstan the situation with professional standards is such that they have not been developed yet for most sectors of the country's economy, and there are only 70 professional standards for the training of specialists with higher and postgraduate education [9].

In connection with this situation the university teachers are bound to seek independently the ways of standards development with due regard to both the requirements of employers, and the experience and knowledge of the education sector representatives. We named such standards as educational-and-professional (or integrated) standards and determined a goal: “to develop a methodology of the integrated standards formation and to implement it for Modular Educational Programs (MEP) on some specialty”.

The methodology will consist of two tasks:

1) to develop a structure of the integrated standard;

2) to develop the document layouts for initial data collection.

Cognitive activity is always based on practice, experiments, and observations, as a result of which the factors are established. The comprehending of factors begins with analysis. Analysis (from the Greek "breaking down the whole into elements") is a study method consisting in the mental division of the whole into its component parts in order to identify certain properties and links.
The document analysis method is a method of data collection during the research based on the use of information recorded in written or printed form, on a magnetic film, in electronic and iconographic format, etc. [22]. A document is information recorded on a physical medium with certain requisites. Formalized analysis of

documents (content analysis) is a method of data collection by means of the information available in documents. Various sources of information are analyzed. The content analysis is divided into several stages, the first of which is the definition of system of analysis categories, i.e., semantic units. In our case, in order to achieve the semantic units' conformity to the solution of the research problem we limited the circle thereof by two concepts ("professional standard" and "learning outcomes"), and have studied the relevant documents, in particular, the official documents (decrees, orders, etc.), scientific articles, questionnaires, etc.

Retrospective analysis consists in the study of trends turned out during a certain period in the past. Its meaning consists in exhaustive characteristics it gives concerning the process in the statics (the level in the selected period of time) and in the dynamics during the past period [23]. For the purposes of this article the retrospective analysis of the transition from educational standards to professional ones was conducted.

At the first stage (1994-2004), the State education standards have been developed. Their authors were universities teachers only. They have formulated the requirements to knowledge, skills, acquired habits of the trainees, and determined the education content, methods to check the degree of knowledge and skills mastering.

Due to the university system transition to the credit technology in education in 2004, the form, but not the content, of standards was revised, so they were also developed by the university professors. In the subsequent standards the terms "to master..." and "be competent ..." appeared in the requirements for graduates. The terms "professional-and-personal competence" and "learning outcomes» did not come into use in the state documents on educational policy until 2010, but in the State Program (2016) it is explicitly pointed out that the share of educational programs developed on the basis of branch frameworks and professional standards should reach 45% by 2019 [9].

Questionnaire is a main tool of sociological research and constitutes a document containing a structurally arranged set of questions each of which is related to the research objectives. This relation is expressed in the need to obtain information reflecting the characteristics of object under study. It is expedient in two cases:

a) when it is necessary to question relatively great number of respondents in relatively short time, and

b) respondents should give their answers a good deal of thought, having a printed questionnaire before their eyes.

A necessary component of the questionnaire is the preamble, in which the questionnaire purpose is described, the respondent's motivation to questionnaire filling is grounded, and the necessary comments and instructions on the respondent's work with the questionnaire are given.

In our case, "closed" questions are preferable than "open" ones, because they are formalized and processed easier. Supplementing the qualitative ideas about its

subject with formalized generalizations the pedagogical theory acquires the necessary strictness and stability; therefore we will use "polar" questionnaires with point rating. Based on them, we have compiled questionnaires for evaluating and processing the results.

2.5.2 The methodology of Modular Educational Programs development

2.5.2.1 Analysis of documents for the MEP development methodology substantiating

Competence-based approach involves the design of education focused on the outcome. Conceptual framework of the competence-based approach is to replace the teaching paradigm with the learning paradigm. This paradigm is defined as an educational process motivating not only to perform of actions but also to analyze them (Johnson and all, 1992).
As the world's best practices show, in most countries the learning outcomes are formulated in the labor sphere, i.e. by the employers, and allow forming the qualifications. Educational institutions translate them into the competences language; and it is generally accepted that knowledge, understanding, skills, experience and attitudes (valuable aims) are integrated in the competencies: "Statements of what a student knows, understands and is able to do on completion of a learning process "[24].

Award of qualification and issue of the relevant certificate; diploma or degree should be awarded based on the assessment of learning outcomes. This circumstance has effect on the function and content of the learning outcome assessment evaluation and compels to apply the special methods and tools of assessment. The learning outcomes determine the student's achievements in the process of mastering the knowledge and practical skills acquired and demonstrated by him/her upon successful completion of the training in whole or on separate module of the educational program. So the concrete individual educational achievements should be evaluated. Therefore, it is necessary to develop the objective criteria for assessment and indicators of the learning outcome achievement, to substantiate the methods and means for learning outcome assessment, and to form unified mechanism for outcome assessment.
When educational standards developing the main load falls on the education sector representatives, because they should implement following:

- to determine an object, a subject, the professional activity functions, and formulate the competences, etc., although this is a prerogative of the labor sphere representatives;

- to develop the education content, the requirements to the graduate's preparedness level and solve other problems.

It is not difficult to see that in this case the educational component prevails in the standards. Thus, the problem of standard's components equalization arises. To solve the problem let us consider one of the economic specialties, as an example. This is due to the fact that among a small number of professional standards there exists a

standard of "economic activity", so there is a reason to analyze this document. The content analysis of the document showed that for the "economist" profession the following job functions are distinguished: analysis of the economic activity of the organization and determining of the basic indicators of labor and production management; improvement of the efficiency of labor organization and production profitability; planning of the economic activity arrangement; registration of the contractual obligations of the organization; work with computer facilities.

As you see, the activity goals (efficiency improvement) and the work performed by the specialist of any industry are named as job functions. Besides, the functions are defined in a general form and therefore are applicable to many professions. However, the main drawback is that the professional standard does not conform to the level defined by the National Qualifications Framework [25]. Indeed, in the annex to the National Qualifications Framework its structure at the 6th level (Bachelor's) is defined as follows:

Level	Knowledge	Skills and abilities	Personal and professional competencies
6	Wide diapason of theoretical and practical knowledge in professional field	The independent developing and promoting different options of the professional problems solutions using theoretical and practical knowledge	Independent management and control of the labor and educational activities in frame of a strategy, policy and organization objectives, problems discussion, argumentation of conclusions and literate operating by information

The comparison shows that the requirements to the job functions of this level are not reflected in the professional standard.

Thus, in the considered professional standard there are serious shortcomings which do not allow it’s accepting as a basis for description of the learning outcomes. We believe that these shortcomings are resulted from the poor preparedness of employers to development of the professional standards.

In order to assist in these shortcomings eliminating, we propose a methodology consisting of two tasks (see Introduction).

When the first problem solving we took into account the shortcomings identified earlier as well as the lack of reference to the professional activity sphere in the standard. Besides, we made a content analysis of a standard’s elements structure. We

define the order for formation of structural elements "from the general to the particular", i.e. from the professional activity sphere to the tasks from which the learning outcomes are formulated. Then the integrated standard's structure will take the form shown in Fig. 2.15

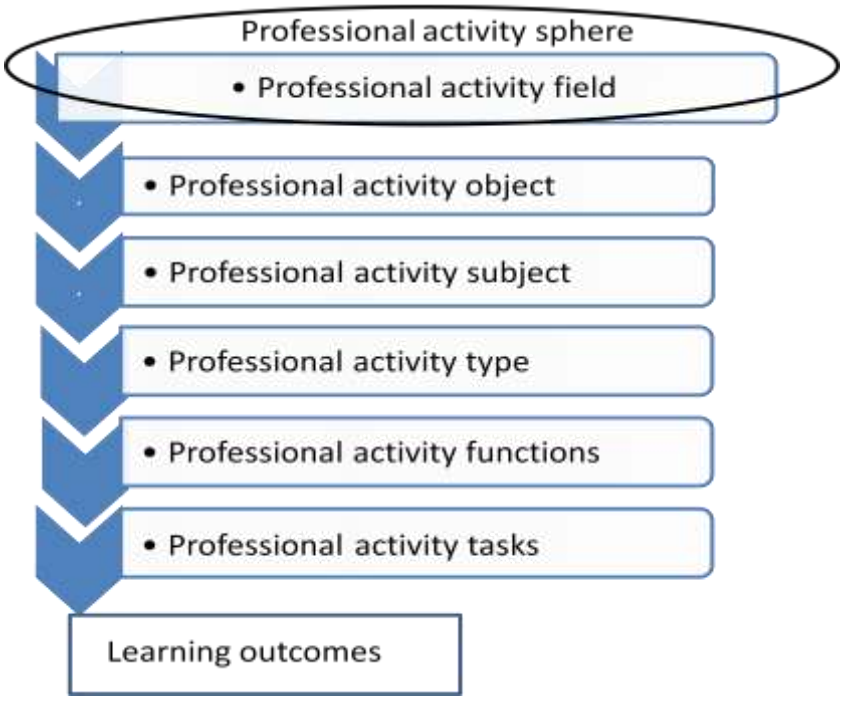


Fig. 2.15- The integrated standard's structure

As it is seen on the diagram, only one box relates to educational standards.

Thus, the development of integrated standards can compensate the shortcomings of the professional standard. The methodology of its developing includes the opinion of experts, representatives of business structures, employers and other specialists, and excludes the educational component prevalence.

2.5.2.2 Stages of Modular Educational Programs development

State Compulsory Educational Standards of the Republic of Kazakhstan are based on the educational paradigm, in which the competences constitute its main components. However, the practical implementation of new paradigm raises certain difficulties. The universities have not abandoned the qualification approach yet.

In our early works we paid attention to the systemic error has taken place for many years in the system of education quality assessment. Indeed, requirements to qualification of the higher educational institution graduates were given in the qualification characteristics of the graduate approved by the representative organ in the education field (Ministry) as a guideline document. As the qualification was confirmed by the state examination commission created in the higher educational institution, both the approval and its confirmation were carried out in the education sphere. This results in the situation when a graduate is to learn additionally under real industrial conditions. This model of the professional quality assessment is called

"entry" control, and the approach may be called as qualification based one. When the qualification approach is applied a professional educational program is linked with the labor objects (subjects) and conforms to characteristics thereof.

MEP are developed in the context of the competency model of specialists training, this is specially indicated in the Rules [26].

As is known, the modular training essence consists in the training content structuring into autonomous organizational and methodological units (modules). The module content and its scope may vary depending on didactic goals; profile and level of the learners' differentiation, there desire to choose the individual movement trajectory according to the educational course. Modules may be mandatory and elective.

The module is a complete set of skills, knowledge, attitudes and experience (competences) required to be mastered and described in the form of requirements which the learner should meet by the module completion, and representing an integral part of more general function. The module is significant for the labor scope [27]. Each module is evaluated and is certified usually.

The module is formed as a structural unit of specialty curriculum; as an organizational and methodological interdisciplinary structure in a form of a set of sections from different disciplines united by a thematic basis; or as an organizational and methodological structural unit in an academic discipline framework.

We distinguish 3 types of works related to the MEP development: preparatory, basic and final.

During the preparatory work it is necessary to carry out a set of activities related to the employers.

Competences may be selected on the basis of the branch framework of qualifications and professional standards or, if there are no branch framework of qualifications and professional standards, based on the requirements of employers (see Fig.2.16). The second stage should end with the description of learning outcomes on the specialty (the whole EP), but this description should be carried out anew if it does not meet the requirements based on the results of expertise of the employers and foreign partners (see the 5th stage in Fig.2.16).

The fourth stage consists in description of the learning outcomes by modules. The modules combination should provide a necessary flexibility degree and freedom in selection and completion of the required specific educational material for the learning (and self-study) of a certain category of students and implementation of the special didactic and professional goals. At this stage, we propose to develop invariant modules, although within the modules there may be the changeable sub modules - course modules. If, according to the results of expertise conducted by the employers and foreign partners, the program meets the requirements, the main work may be commenced.

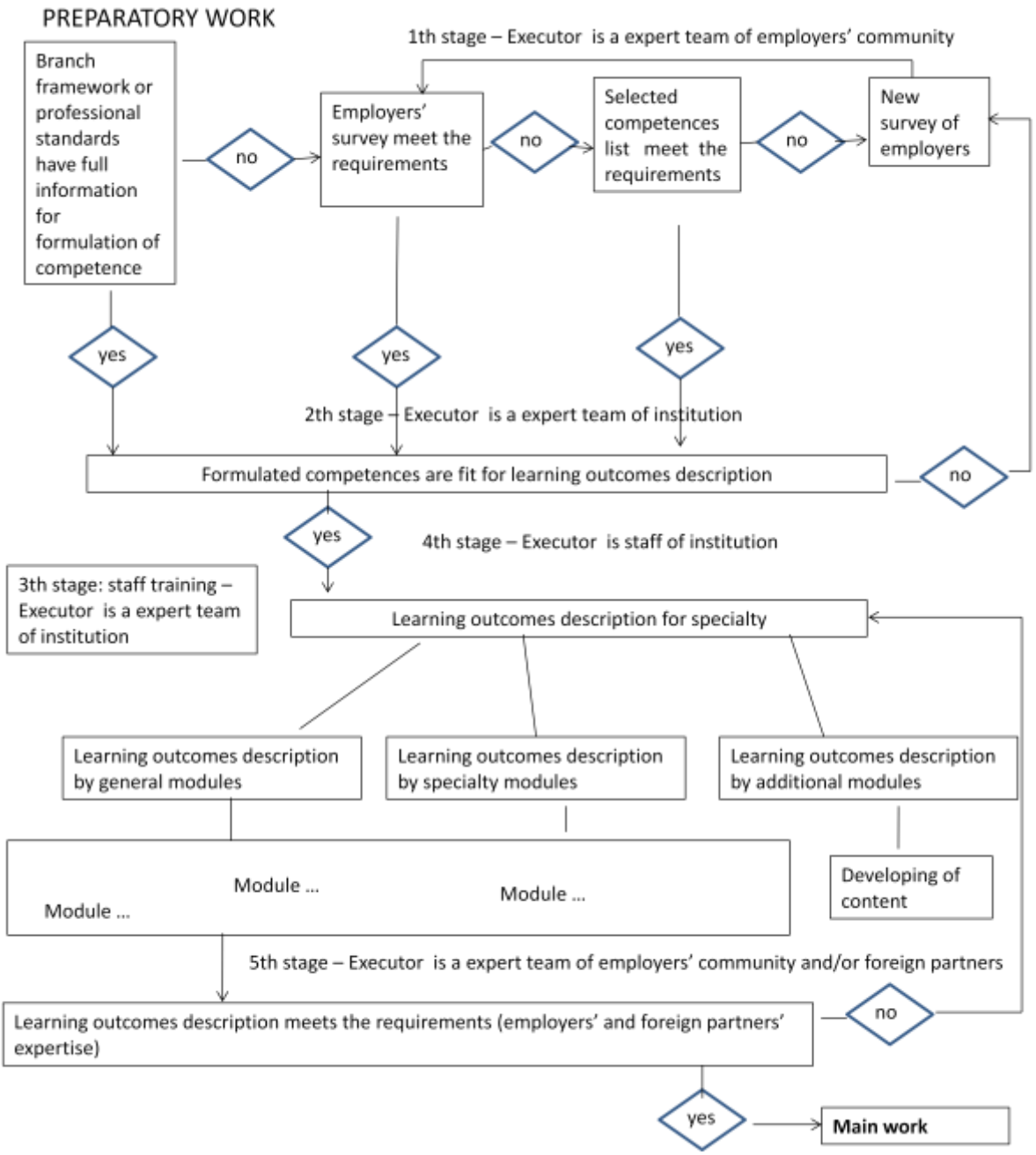


Fig.2.16- Stages of preparatory work

The main work is the most labor-intensive time-consuming and responsible. It also consists of several stages (Fig.2.17). For example, at the 3rd stage it is necessary to develop all documents concerning, in particular, the criteria for assessment of learning outcomes and the system of learning outcome assessment. However, it should be kept in mind that the expected learning outcomes shall be easily verifiable and accompanied by appropriate assessment criteria. Assessment criteria for the learning outcomes are selected by the developers. We recommend using the Dublin descriptors or the Bloom's taxonomy.

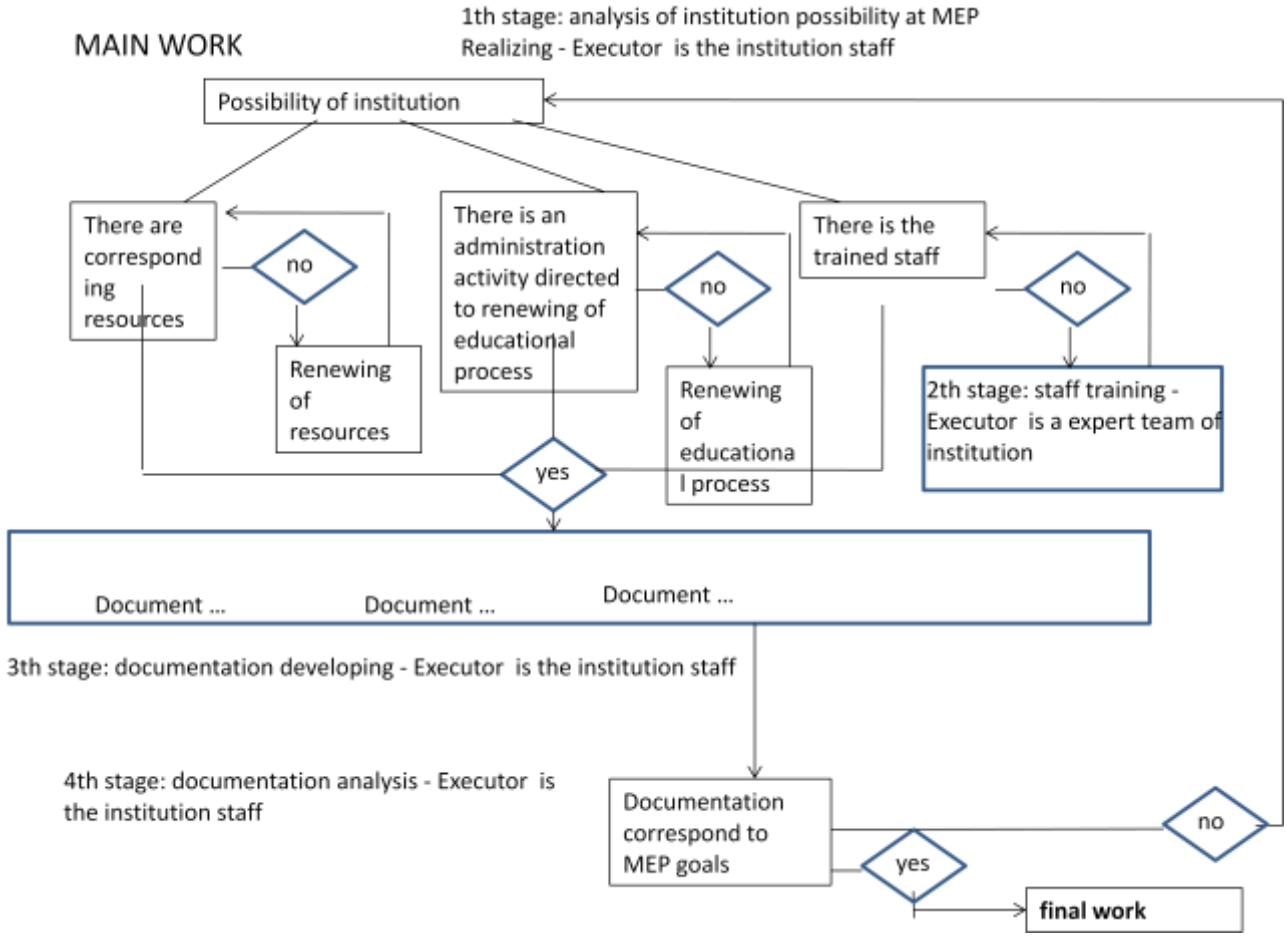


Fig. 2.17- Stages of main work

The system for assessment of the student's educational achievements includes forms of assessment, composition of educational assessors, place of assessment, assessment of the levels of learning outcome achievement, and others. The best scenario is when the documents will be drawn up as a Modular Educational Program.

Transition to the final work is possible only upon analysis of the documents.

The work is required for analysis, and in case of the program's positive results the distribution and expansion may be recommended (Fig.2.18). Analysis of the learning outcomes should be carried out on the basis of independent assessment including that carried out by the students.

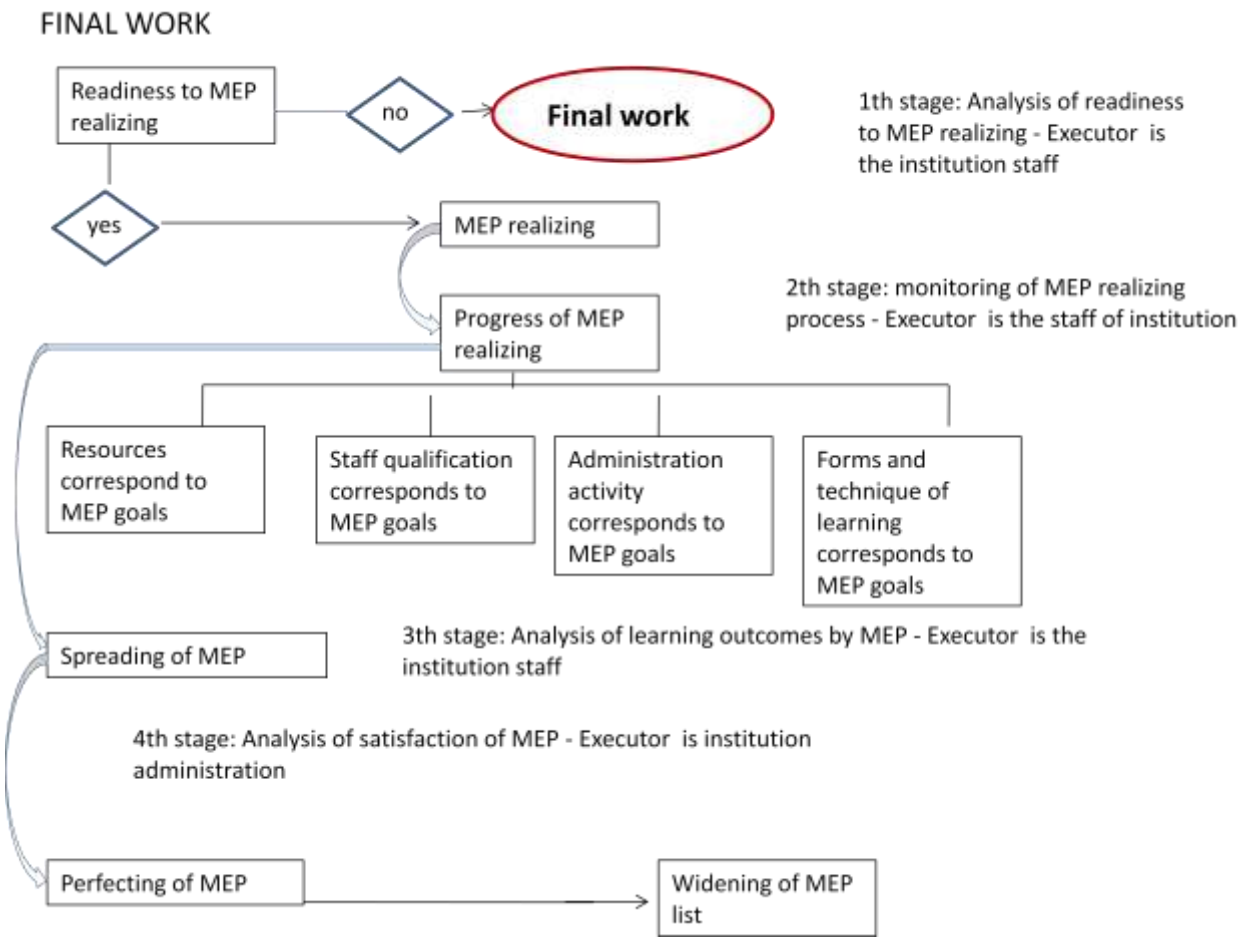


Fig. 2.18- Stages of final work

2.6 Implementation of the methodology for development of Modular Educational Programs

2.6.1 Methodology for initial data collection

Two forms of questionnaires for initial data collection are under development. The first questionnaire serves to evaluate the required professional competences by the expert. Its form is presented in Table 2.7.

Table 2.7 - Form of the questionnaire for evaluating by expert

We ask you to evaluate (in points from 1 to 5) the importance of the key and professional competencies of the bachelor in the specialty "computer technology and software" presented below and exclude non-core competencies (if any) or supplement the list		
#	Competence	Evaluation of a professional competencies importance
1		
2		

…		
…		
Position, surname, initials, signature		

Representatives of the large manufacturing enterprises and leading professors of the universities are involved as the experts. Joint work helps to take into account the labor market requirements and present them in an intelligible form. As a result, the comprehensive list of competences is formed.

The second questionnaire form is distributed among the representatives of business structures, employers and other specialists. They evaluate significance of the professional competences, selected on the basis of the first questionnaire results. Preliminary list of the competences will be ranked according to the level of their criticality and selected for adding to the final list for formulation of the learning outcomes as the result of information collecting by means of the second questionnaire.

2.6.2 Modular Educational Program of the "Computer Science and Software" specialty

Analysis of European universities' experience in the development of modules indicates their great diversity. However, there is a certain tendency in their classification. For example, the modules are most often classified as follows:

• main modules are the modules which compose the relevant science core;

• supporting modules are the modules which support the vocational training (for example, in mathematical disciplines, physics, mechanics, etc. for technical specialties);

• organizational-and-communicative modules (for example, time management, team work, rhetoric, foreign languages);

• specialized modules expanding and deepening the competences in the chosen field, and optional ones;

• portable modules (diploma thesis works, master's dissertations, internships, projects establishing the links between theory and practice) [28].

Module types given in the Rules for educational process management according to the credit technology of training and in the Teacher resource book [29] are as follows:

1) general modules including the disciplines of cycles of general educational disciplines and basic disciplines forming the general educational competences not related directly to the specialty, as well as social, ethical, cultural competences (interpersonal, intercultural, civil), economic (entrepreneurial) and organizational-and-managerial competences;

2) specialty modules including the basic and profiling disciplines forming the specialty base and are aimed at the forming of general professional and special competences within the framework of specific educational program, as well as the general competences (critical thinking, creativity, active life position, innovativeness);

3) additional modules going beyond the qualifications and including cycles of disciplines that are not related to the specialty and aimed at the forming of additional competences (information technologies, foreign languages and others).

Comparison shows that the specialty modules consisting of major disciplines constitute analogues of the core modules; and the modules consisting of basic and general educational disciplines are similar to the supplementary modules.

As mentioned above, we have carried out the experimental work aimed at the questionnaires collecting and processing. At the 1st stage the list of competences was formed. At the second stage the business representatives, heads of the universities' structural subdivisions dealing with the computer technology and programming (other than teachers!) and specialty graduates participated in the experimental work. The specialists of "Center for Information Technologies "Paradigms" LLP , "Center for Sustainable Development of the Capital" LLP, "Open Systems Development" LLP, Branch of "Forte bank" JSC, "Pride Systems" LLP etc. were invited as experts.

The results of questionnaires processing are shown in Fig.2.19. As it is seen in the figure there are no competences rated very low (under 2.5) in the competence list compiled by experts. This points to the high qualifications of experts their good knowledge in the labor market and the skill to formulate the required data.

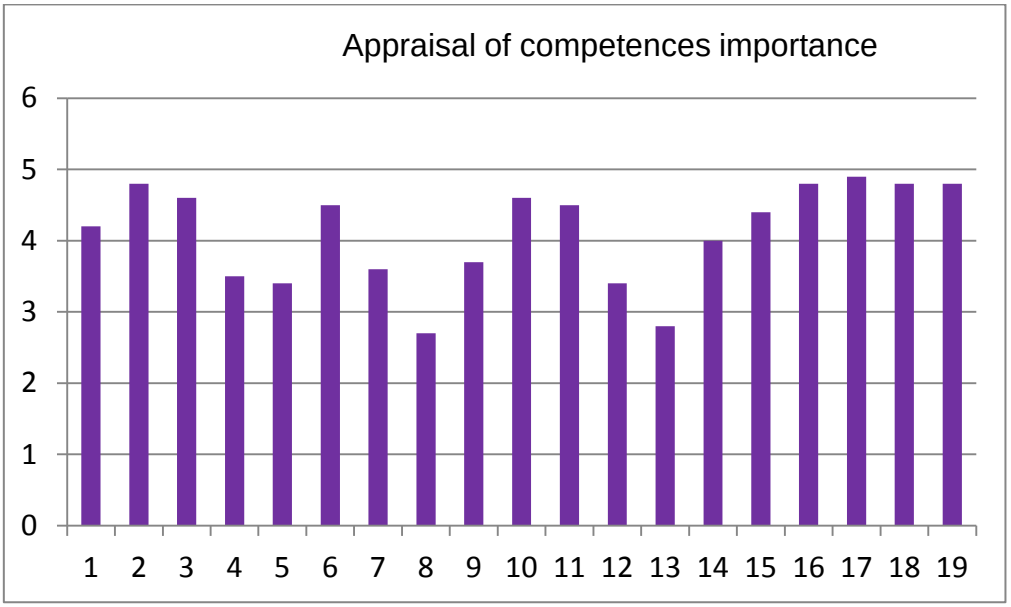


Fig. 2.19- The results of questionnaires processing

We formulate the names of modules according to the final list of competences, namely:

1) general modules

- Business communication and record management;

- Principles of research work;

- Principles of marketing;

- Principles of management;

- Economics and accounting;

- Principles of entrepreneurship and taxation in the Republic of Kazakhstan;

- Engineering psychology;

2) special modules:

- Integration of the program modules;

- Methodology for troubleshooting during installation and operation of the equipment;

- Methods and tools for assembly of the modules and software components;

- Customer service methods;

- Methodology for design in the programming;

- Complex SQL queries, query optimization;

- System integration;

- Mobile development;

- BackEnd development;

3) additional modules

- Methodology for identification and discussion of the professional problems.

The Modular Educational Program for the "Computer Science and Software" specialty is obtained on the basis of the received data given in Table 2.8. When considering this curriculum, the following features should be taken into account. The state compulsory educational standards establish the disciplines cycles and the entire volume of credits (129) is divided between them in the ratio of 25, 50 and 25%. Each cycle contains obligatory disciplines and elective disciplines. The number of credits on compulsory subjects and recommended semester of their study are specified by the standard curriculum of the specialty.

Table 2.8 - Curriculum for the specialty "Computer Science and Software"

Semester	Type of component	Name of discipline or module	Credits quantity	
			Kazakhstan's credits	ECTS credits
1	OC	Modern history of Kazakhstan	3	5
	OC	Kazakh (Russian) language	3	5
	OC	Foreign language	3	5
	OC	Mathematics	3	5
	OC	Algorithmization and programming	3	5
	EC	General module	5	8
Total			20	33
2	OC	Kazakh (Russian) language	3	5
	OC	Foreign language	3	5
	OC	Information and communication technologies	3	5
	OC	Physics	3	5
	EC	General module	5	8
Total			17	28
3	OC	Professional Kazakh (Russian) language	2	3
	EC	General module	5	8
	EC	General module	5	8
	EC	Special module	5	8
Total			17	27
4	OC	Philosophy	3	5
	OC	Professionally oriented foreign language	2	3
	OC	Architecture and organization of computer systems	3	5
	OC	System Programming	3	5
	OC	Electronics	2	3
	EC	General module	5	8
Total			18	24
5	OC	Digital Circuitry	2	3
	OC	Software Development Tools	2	3
	EC	General module	5	8
	EC	Special module	5	8
Total			19	27
6	EC	General module	5	8
	EC	Special module	5	8
	EC	Special module	5	8

	EC	Special module	5	8
Total			20	32
7	EC	Special module	5	8
	EC	Special module	5	8
	EC	Special module	5	8
	EC	Discipline "Technique for identifying and discussing of the professional problems"	3	5
Total			18	29
In all			129	200

Note: OC- obligatory component (discipline or module); EC- elective component (discipline or module)

2.6.3 Recommendations for the development of modular educational programs

In the European educational space there has been a shift from the control of "inputs "to the monitoring and control of "outputs" of the educational process. The new paradigm of education is based on the methodology of education design, in which one of the most important structural elements of higher education systems are the results of education. If earlier indicators of the effectiveness of educational activities of universities were planning and implementation of the educational process (educational, educational and methodical work, etc.), in accordance with this methodology, the results of education are necessary.

The competence-based approach to training, currently implemented in the education system of our country, involves the assessment of educational achievements of students on the results achieved both at the end of training and in the process of training in certain disciplines. The key here is the concept of "learning outcomes", which indicate individual achievements, knowledge and practical skills acquired and demonstrated by a person after successful completion of training (for example, a separate module or an educational program as a whole, informal learning). That is, in the results of training laid down the evaluation criteria, the results of which is carried out their official recognition. Orientation on learning outcomes leads to a change in content and nature, as well as assessment tools, because the assessment to be comprehensive, integrated achievement of students, in connection with which assessment tools are becoming more focused on certain objective criteria, as well as the formation of a common logic in the evaluation of persons coming to study, and their results achieved at the completion of training.

As stated above, learning outcomes are presented in the form of statements that students who have received a certain qualification or have graduated from a program or its elements must know, understand and be able to do. Their structure is based on the “Dublin descriptors” developed by the joint quality initiative. These handles are composed of generic statements of typical expectations or levels of competencies or achievements, and abilities.

Accordingly, the learning outcomes should be laid down for learning purposes, which determines what the learner should know and be able to do. Learning objectives answer the question of how to move towards the goal. The issues of identifying, measuring and assessing the level of compliance of learning outcomes with the stated goals are currently one of the Central issues in the theory and practice of learning.

When using our methodology, one should avoid formalism and superficial attitude to the collection of initial data. This refers to the careful selection of experts for the preparation of the primary list of competencies. Experience shows that employers find it difficult to formulate competencies, but can easily assess the proposed list.

The greater the number of employers, graduates and other stakeholders involved in the survey, the more extensive the material for analysis and the greater the accuracy of the selection of competencies. It is not necessary to discard the competence that scored relatively low number of points, because they can be useful for forming the optional modules or the practice-oriented training in accordance with the requirements of specific employers. They can also be used to extend the selectivity of modules, as they may be in demand in subsequent periods.

After the formation of competencies based on the results of processing questionnaires, University teachers formulate learning outcomes. They can be in the form of a map of the educational program. The form of it may be different, but we recommend that 2 columns were mandatory, they are "learning Objectives" and "learning Outcomes".

The map of the educational program should be filled by experienced teachers, leading classes in this discipline. The head of the Department is personally responsible for the quality of the map: content, novelty of approaches, taking into account the latest achievements of science and technology, compliance with the guidance documents of the Ministry of higher and postgraduate education. Responsible from each Department should promptly collect the developed maps, combine into a single document and submit to the leadership of the faculty and University.

It is recommended to complete the form in the following sequence.

1) Familiarize yourself with Dublin descriptors. Reliance on the Dublin descriptors allows for the formulation of learning outcomes to differentiate competencies at different levels of education: undergraduate, graduate, etc., it should be borne in minds that not necessarily reflect them all in the learning outcomes.

2) to Formulate the purpose of teaching the discipline. Because we are implementing the competence approach to learning, the goal of education is not to teach, not to teach, etc., and "development", "ownership", "acquisition of skills" etc., i.e. what the learner needs to show, demonstrate, etc. in the formulation of the goal after the above words in fact, is the name of the module. It should be noted that if the name of the module is made incorrectly, there may be difficulties.

3) the content of the module for formulating learning outcomes for the module needs to allocate big blocks, and to exclude such considered in the course of

questions like “introduction”, “objective”, “methods of discipline”, etc. In the content they are certainly necessary; however, for learning outcomes, they do not play a determining role.
4) when formulating the results of training should not use the words “must know”, “must be able”, etc., they should be an appeal to the learner in the form of: “identify”, “decide”, “demonstrate”, etc.
5) the Content of large blocks is almost completely reflected in section “ A “ of Dublin descriptors in the form of “specify”, “tell”, etc.
6) This content is almost entirely reflected in section “B” of the Dublin descriptors, but in the form of “decide”, “demonstrate”, “use knowledge for...”, etc.

2.7 Modular curriculum by graphic disciplines

2.7.1 The stages of development of a modular curriculum

The stages of development of a modular curriculum (MC) mostly converge with the stages of development of the entire MEP, but are slightly simplified (Figs. 2.20, 2.21, 2.22).

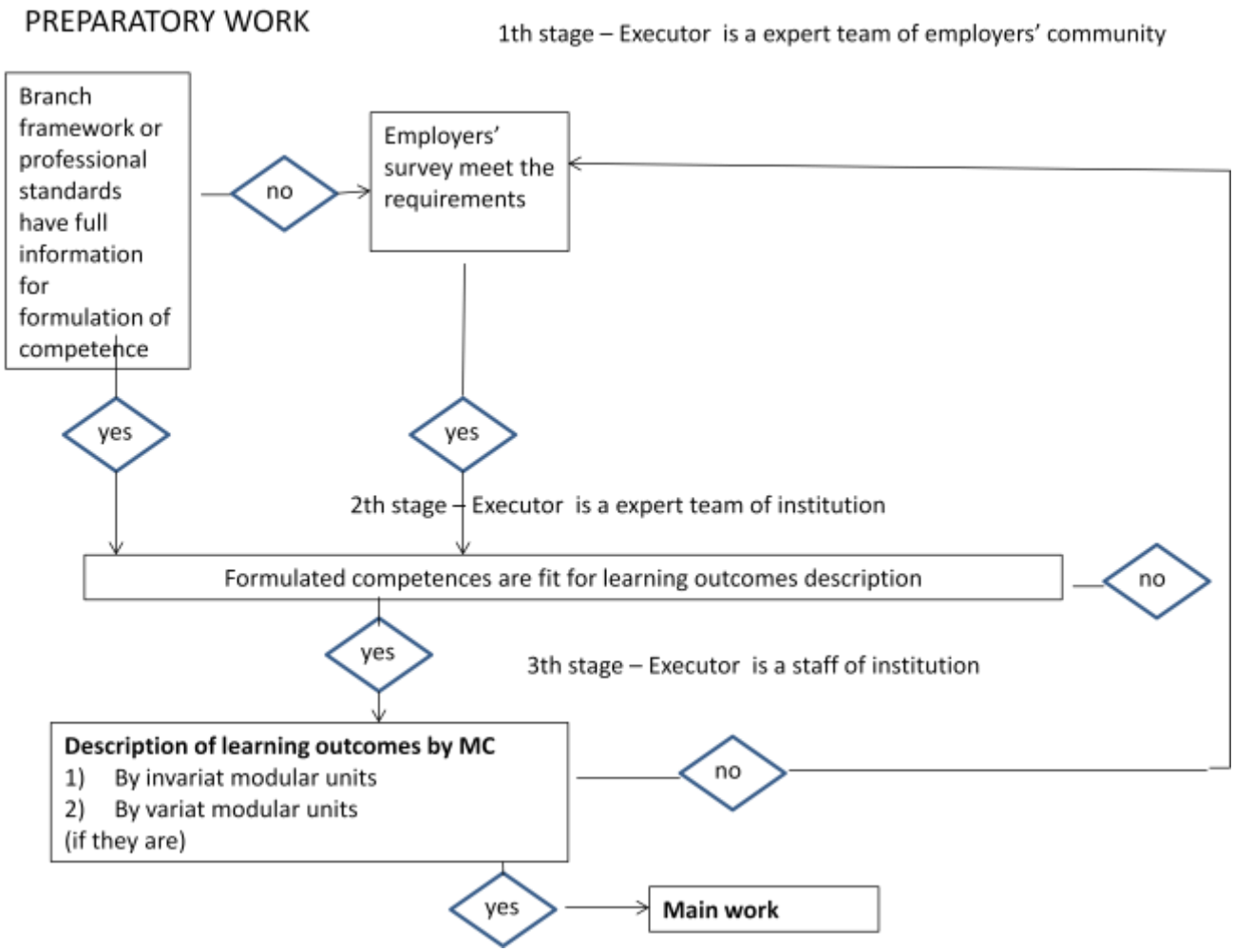


Fig. 2.20- Stages of preparatory work.

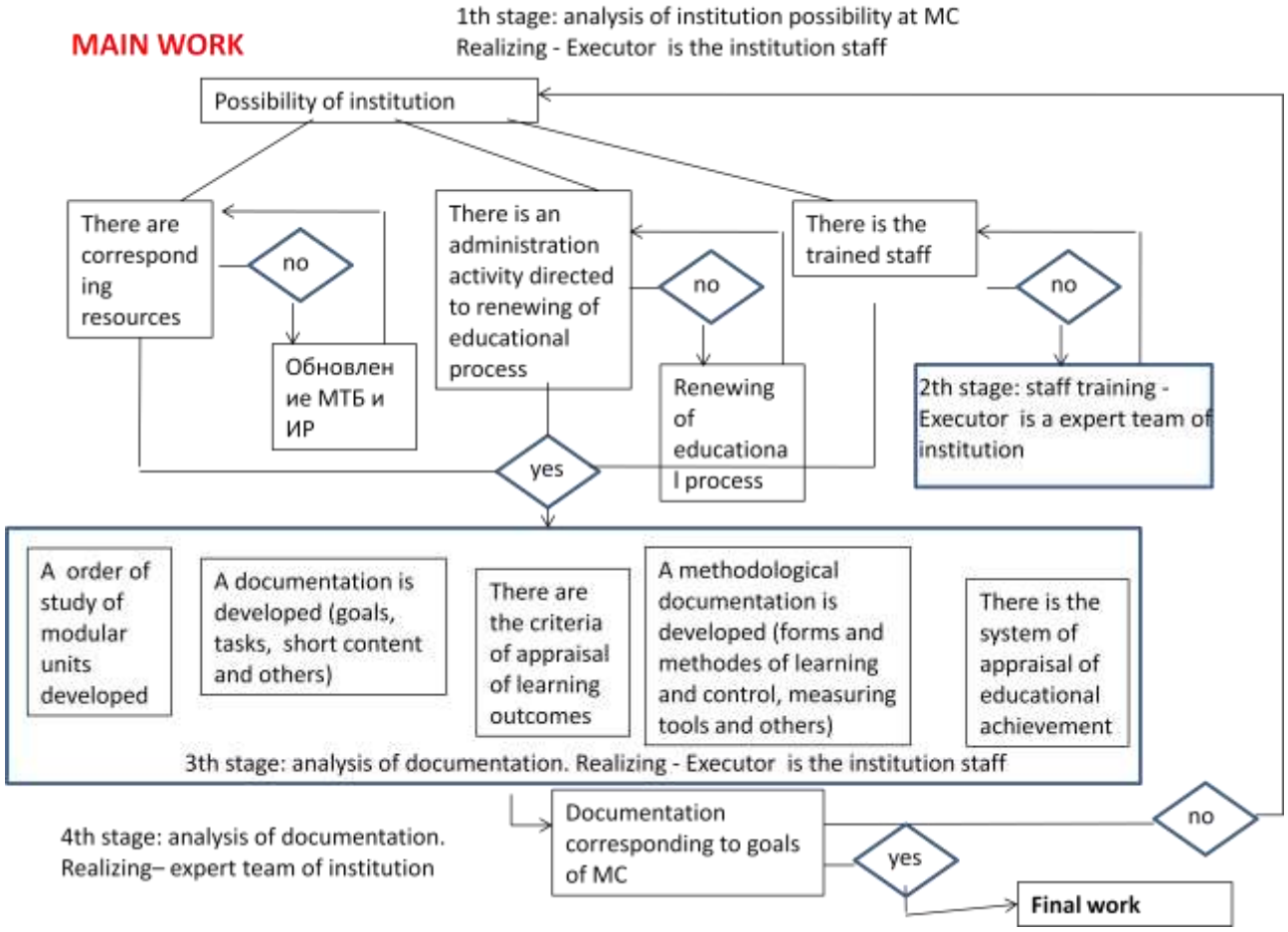


Fig. 2.21- Stages of main work

2.7.2 An example of development of the MC

Here is an example of the MC (the 2nd stage of preparatory work and the 3rd stage of the main work).

Background information:

1) For example, considered the development of documentation for the implementation of CBM" descriptive geometry and graphics "for bachelors studying in the field of"Engineering and technology".

2) Suppose that the requirements for the MC and, accordingly, the goals of the MC are determined by the University, which makes it possible to move to the next stages of preparatory work.

During the preparatory work it is necessary to perform a set of actions related to employers. However, the MC provides only basic training for bachelors studying in the specialties of this direction, and has no direct connection with the profession, so it is a prerequisite to such disciplines as "applied mechanics", "machine parts" and their analogues. Nevertheless, for some specialties, the acquisition of this MC has a professional value. For example, the professional standard "Design of spacecraft and

space systems", approved by the order of the Minister for investment and development of the Republic of Kazakhstan dated December 31, 2014 № 364, States that the design engineer must know the basics of design, construction and production of space systems apparatus, disciplines of natural science and mathematical cycle, etc., and possess the following skills:

1. General provisions use the basic provisions of mathematics, natural Sciences, Humanities and Economics in solving professional problems;

2. Use reference materials;

3. To work in the information and communication space, to carry out computer modeling, calculations using software for General and special purposes.

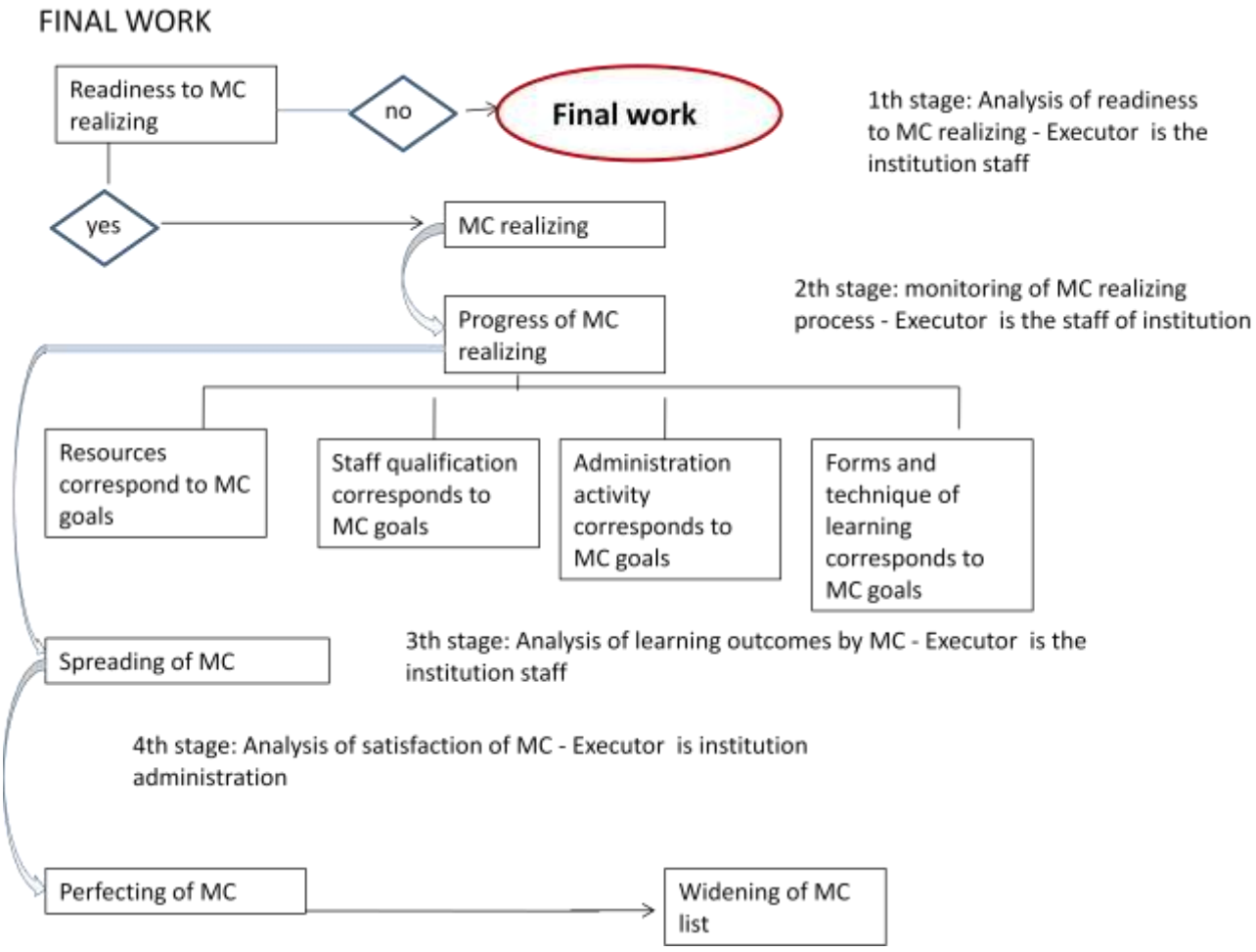


Fig. 2.22- Stages of final work

From a large list of requirements for competencies, we have cited a small part, and even from this part, not all requirements will be reflected in the results of training of this CBM. As we will see later, on the material of this CBM it is possible to form competence in such areas as design, the use of basic provisions of mathematics, the

use of reference materials, the ability to work in the information and communication space, to conduct computer modeling.

Based on the above, it can be concluded that the required competencies are known.

Based on the formulated competencies, it can be assumed that the content of the CBM will consist of the content of "traditional "disciplines" descriptive geometry"," Engineering graphics", "Computer graphics".

Descriptive geometry is the theoretical basis of the drawing. Methods of descriptive geometry are used in various industries, in architecture, in the design of surfaces during construction, as well as in such Sciences as physics, chemistry, mechanics, crystallography, etc.

Engineering graphics is one of the disciplines that lay the foundations of General engineering training. As a result of studying engineering graphics student must acquire the ability to perform and read drawings. These skills are acquired as a result of many drawing works. The field of engineering graphics, which becomes more accessible with the introduction of computer technology, is the construction of diagrams, diagrams, charts and tables. The introduction of new information technologies requires the transition to a new stage of system interaction of computer and engineering graphics.

At the heart of computer graphics is a reflection of the two-dimensional graphics with algorithms for solving problems of construction and design documentation, the capabilities of the used computer graphics packages. Parametric database presented in the form of 3D-models becomes a source of ready-made models of standard designs of components and parts, which are borrowed by simple copying. Flexibility and ease of change of any geometric parameters allow to simulate the processes of Assembly and disassembly, and if necessary, the process of the corresponding processing technology. Fundamentally changing the process of developing drawings for their three-dimensional models. With considerable simplification, it becomes more accurate and reliable. The presence of design knowledge bases, automating most of the required calculations, expand the scope of opportunities for creative activity.

The importance of drawing for learning technical subjects is huge, so str it can be used to understand the design of complex machines, to describe the regularities of flowing of the process, to show the shape and dimensions of a product, etc. d. the Basic method of studying of disciplines is the implementation of the drawings.

Traditionally, it is believed that these disciplines should be studied consistently. However, given that the conclusions of descriptive geometry are used in many sections of engineering graphics, and the computer is only a means of facilitating the execution of drawings, you should not divide these disciplines on any grounds. In this regard, the content of the discipline is reduced to an integrated course

"descriptive geometry and graphics." In modern conditions, this course occupies a special place in the system of special education: each graduate of a technical University is required to learn it well.

Course summary:

A) invariant part: descriptive geometry as a field of graphic modeling. Unified system for construction documentation (USKD). Types of products and design documents. The design of the drawing. Geometric construction. Images – views, section views, sections. Connections. Assembly drawing and General drawing.
B) variant part:

A group of specialties	Summaries
technological	Unified system of technological documentation (USTD). Schemes of technological processes
energy	Electrical drawings and diagrams
building	Drawings of plans, sections, facades. Drawings of building constructions
transport	Projections with numerical marks. Topographical drawing
technical	Reading and detailing

Sequence of learning modular units takes into account the integrated nature of the content of MC: the Standards USKD (formats, scale, lines, fonts drawing), the primitive of COMPASS system, geometric construction (using drawing instruments and computer); methods of projection, projection of point, line, plane; the Standards USKD (image – views, section views, sections); dimensioning), methods for converting projections, drawings of parts in rectangular projections and axonometry (using drawing tools and a computer), setting the surface in the drawing, positional and metric tasks (using drawing tools and a computer), the image of the connections; Assembly drawing and General drawing.

Forms and methods of assessment of educational achievements of students

In the model of results-based education, the forms and methods of assessing the educational achievements of students should be selected taking into account the goals of education. The evaluation system should ensure the objectivity and transparency of monitoring, be a mechanism for preparing students for the procedure of independent determination of their educational achievements.

State educational standards of the Republic of Kazakhstan establish minimum requirements for the level of development of the educational program. Having mastered this level, the student has the right to raise it in accordance with their needs and capabilities. Taking this into account, the measurement of cognitive processes in

achieving the planned learning outcomes is carried out on three indicators: recognition, understanding, application. Different methods are used for measuring, and usually a combination of them is used both in classroom classes and in the process of extracurricular independent work.

The level of recognition is determined by the methods of survey, testing, etc., while tests are used with selectable and constructed answers. In Figs.2.23 and 2.24 are their examples: in the first case, the answer is chosen from four possible, in the second – the answer is assumed from the fragments, for example, the answer to the 15th question is: "the Right angle is projected onto the plane as a straight if ... at least one side of it is parallel to this plane", i.e. consists of expressions numbered 1 and 3.

Ticket 1.3				
	answer: what is the drawing			
	a point located in the II quarter	the traces straight and built correctly?	point *A* doesn't lie on line *a*?	correctly found |AA| - the distance between *A* and α?

Fig. 2.23- Fragment of the test with selected answers

15. A right angle is projected onto the plane as the right angle if ... to this plane

1) at least one side of it

2) as a result of turning

3) parallel

4) perpendicular

Fig. 2.24- Example of a test with constructed answers

The ability to apply this knowledge is revealed in the course of assignments for extracurricular independent work.

As noted above, at present there is a tendency in education, the essence of which is that the educational process is based on the principles of competence-based approach to learning, when the student is the subject of educational activities, which

sets the task of self-determination, self-realization, self-control in educational activities. In this regard, it is impossible to overestimate the role of independent work.

Independent work in graphic disciplines is of particular importance to achieve the planned learning outcomes. The fact is that for the development of disciplines it is necessary to perform a large amount of graphic work, and due to the limitation of classroom time, most of its student performs independently. After all, even a simple to understand drawing requires a lot of time to perform it due to the need for accurate and thoughtful execution of graphic constructions, but also the appropriate design.

In assessing the degree of assimilation of graphic disciplines has long been used the method of self-control of the quality of graphic works. The essence of the method is that the work performed and accepted by the teacher is returned to the student, so the latter has the opportunity to analyze the mistakes made in order not to repeat them, as well as comparing their work with the works of other students. Currently, this method would be called the "portfolio"method.

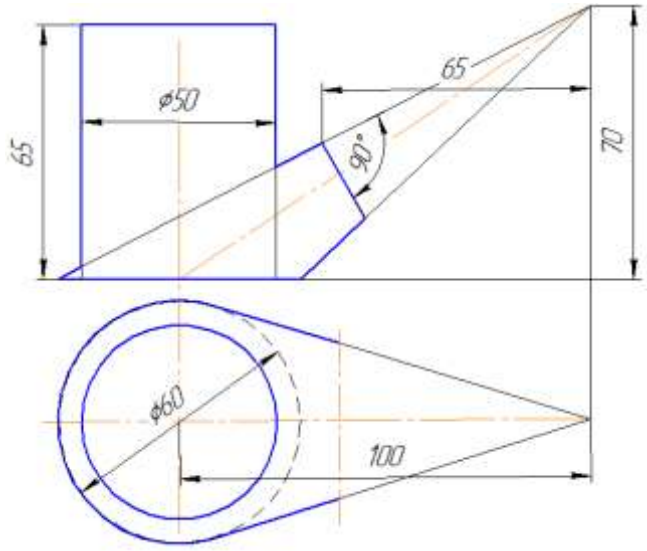
Methods of innovative, alternative to traditional, evaluation of learning outcomes began to be developed and widely used in Europe and the United States in the middle of the XX century. One of them is portfolio valuation.

The main part of their functions is realized in students ' portfolios on graphic disciplines: accumulating evidence of growth of graphic knowledge and skills, the student sees the course of development of the content of disciplines; the teacher this material also gives the opportunity to see the growth of graphic knowledge and skills and at the same time keep records of these achievements.

In the course of the tasks the student demonstrates the ability to work independently, a high level of use of drawing tools, which is a sign of achieving learning outcomes in affective and psychomotor areas.

It is necessary to adjust the volume of tasks depending on the abilities of the student and the intermediate results achieved by him. Credit technology of training allows you to do this, t. p. tasks on the same topic, but of different complexity, you can estimate a different number of points. Then a student who has planned a minimum of learning outcomes can choose a less difficult task, respectively, receiving less points than a student who has chosen a complex, time-consuming task.

As an example, in Fig.2.25 the condition of 3 tasks on the topic "the intersection of the surface with a plane or another surface, surface development". The student independently or on the recommendation of the teacher who according to the previous drawings found out abilities and knowledge of the student, chooses level of complexity and carries out constant work. This timely correction makes it possible to prevent the excessive side of time and effort.

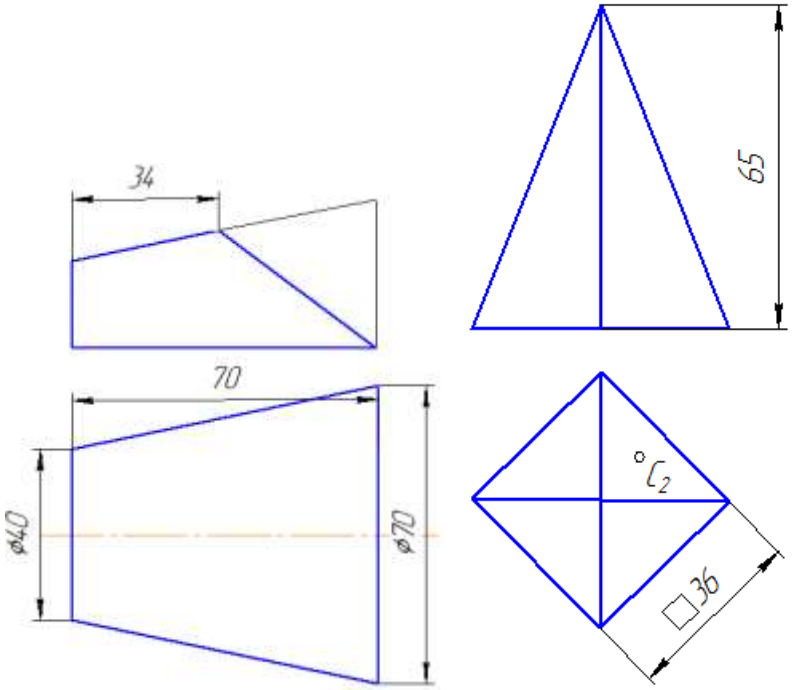


Task 1. Projections of the technical design consisting of two elements are given. Required to build:

(a) projections of cross-section lines and surface intersections

structural element;

b) sweep the structural elements with the application of intersection lines and dimensions



Task 2 There is an incomplete projection of a geomety body, dissected one or more planes. Needs:

a) complete body projections;

b) construct a development of the lateral surface of the body;

c) draw the line of intersection and the required dimensions to the development.

Task 3. The horizontal and frontal projections of the geometric body and one projection of the point (*S*) lying on the surface of the body are given. Needs:

a) construct a profile projection of the body;

b) construct an axonometric projection of the body;

c) missing projections of point(s) and axonometric projection;

c) construct a development of the lateral surface of the body and mark of point(s) to the the development and draw the required dimensions.

Fig. 2.25- Condition of tasks

According to the modular unit "Images-views, sections, sections" student, poorly mastered the topic, the teacher gives a fully executed version of it in electronic form as a reference. The student is required to at least carefully perform the image from the standard on drawing paper and using a computer. This will ensure the assimilation of the modular unit at the reproductive level.

The quality of the drawings in the student portfolio is evaluated by comparison with the samples. In the guidelines for the study of the basic course of the discipline “Descriptive geometry and engineering graphics” (Nabi Y., textbook, edition by S. Seifullin Kazakh agrotechnical University. Astana- 2014) given the work performed on each task of each task included in the collection of tasks and tasks on descriptive geometry and engineering graphics (Nabi Y.), textbook, Almaty, Bastau, 2011), which covers all modular units of the invariant part.

Thus, the student portfolio of graphic disciplines can perform all the provided control functions.

The final control(exam) reveals the level of spatial representations, the ability to solve typical problems of initial geometry, tasks for reading and execution of the drawing. In Fig.2.26 an example of an examination ticket is given.

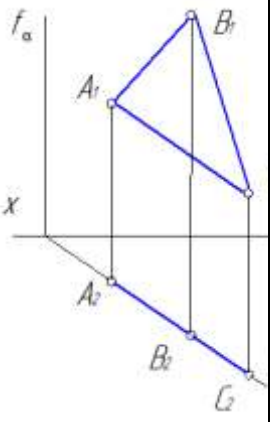
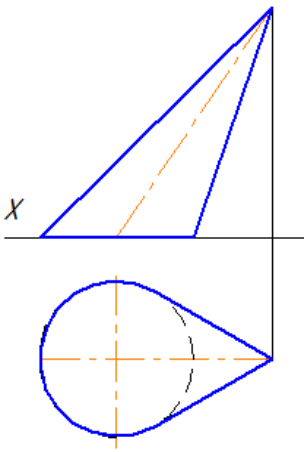
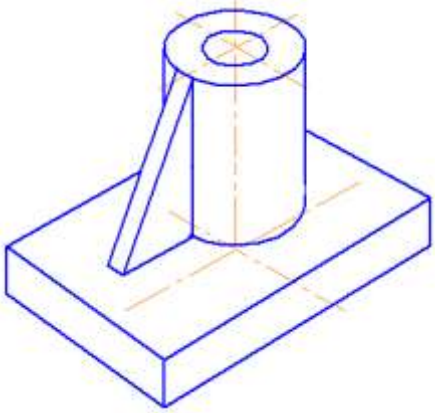
<table>
<tr><td colspan="3">Examination ticket #25</td></tr>
<tr><td>1) Find full size of ΔABC
 
</td><td>2) Construct a development of the surface of the cone
 
</td><td>3) Construct the required number of views and sectional views of the subject (using drawing tools and computer)
  </td></tr>
<tr><td colspan="3">4) According to the General drawing to construct a detail drawing (drawing is attached)</td></tr>
</table>

Fig. 2.26 Example of examination ticket

Final assessment of students ' academic achievements

The final assessment of educational achievements of students is carried out in a complex: the quality of the portfolio, the results of the intermediate and final control

(exam), evaluation of the level of analytical, communicative abilities, independence, etc. the Quality of the examination work is evaluated by comparison with the standard. In Fig.2.27*a* and 2.27*b* are an example of the ticket and the etalon of the completed exam tasks.

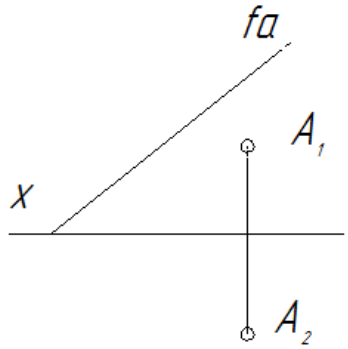
INTERMEDIATE CONTROL TICKET # 21

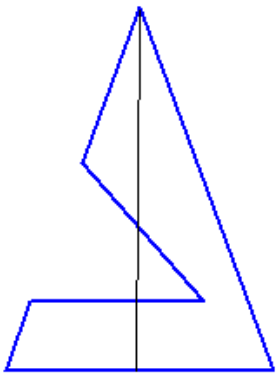
1) construct a horizontal trace of the plane passing through point A

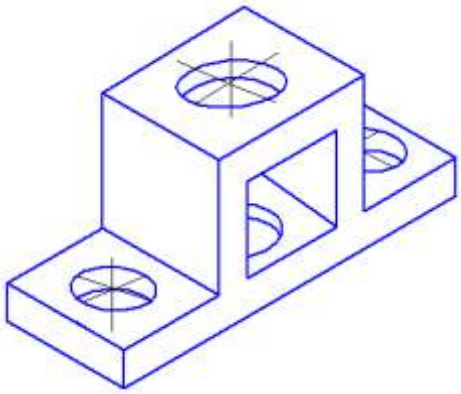
2) construct a horizontal projection of the line of intersection of the surface of the cone with the planes and development of the surface, put the intersection line on the scan

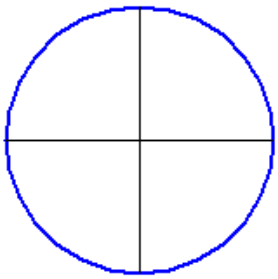
3) according to the axonometric projection of the object to draw the necessary views and sectional views

4) according to the General drawing to draw a drawing of the part









1 2 3

Fig. 2.27*a* - Example of the ticket

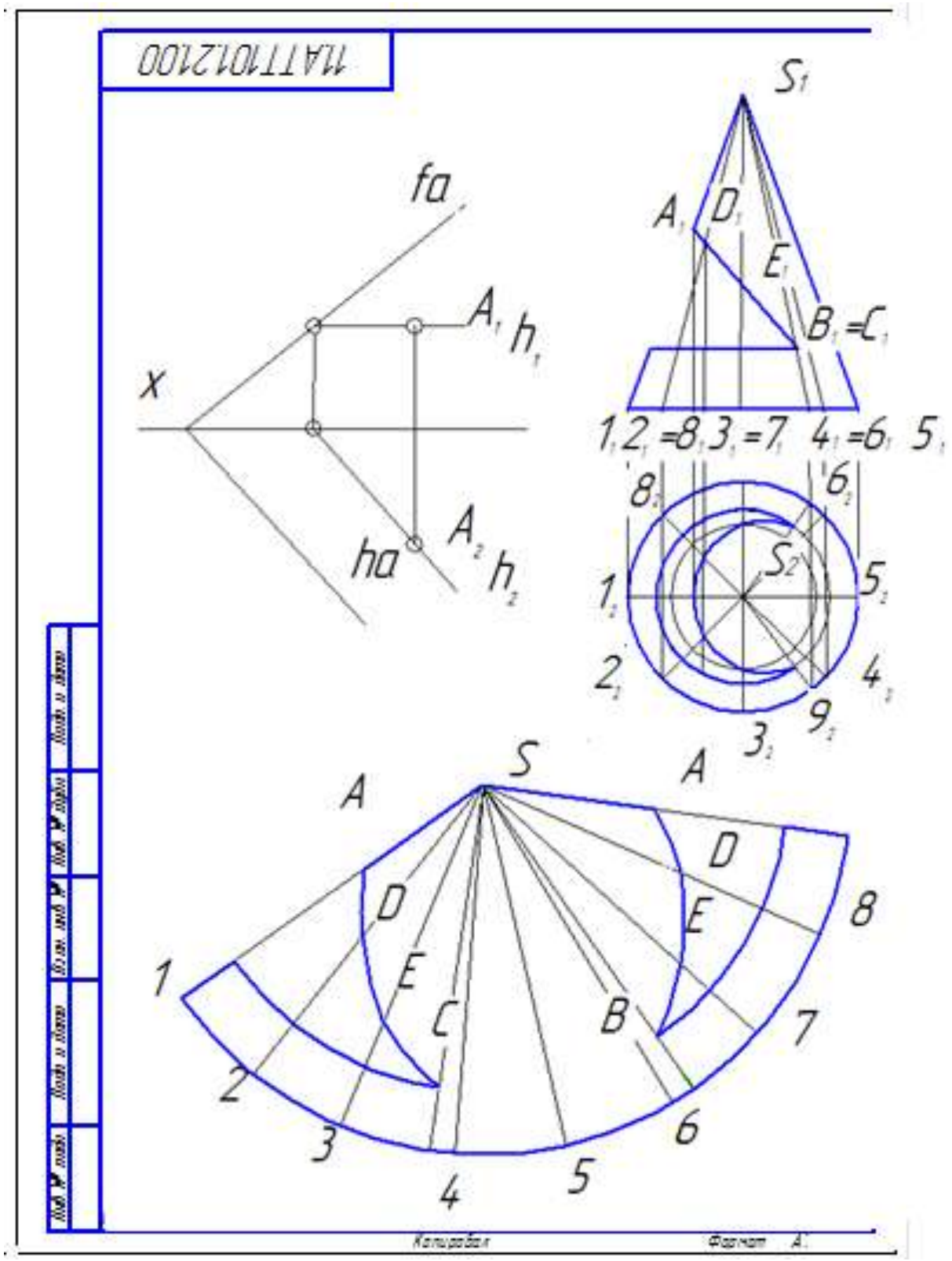


Fig. 2.27*b*- Etalon of the completed exam

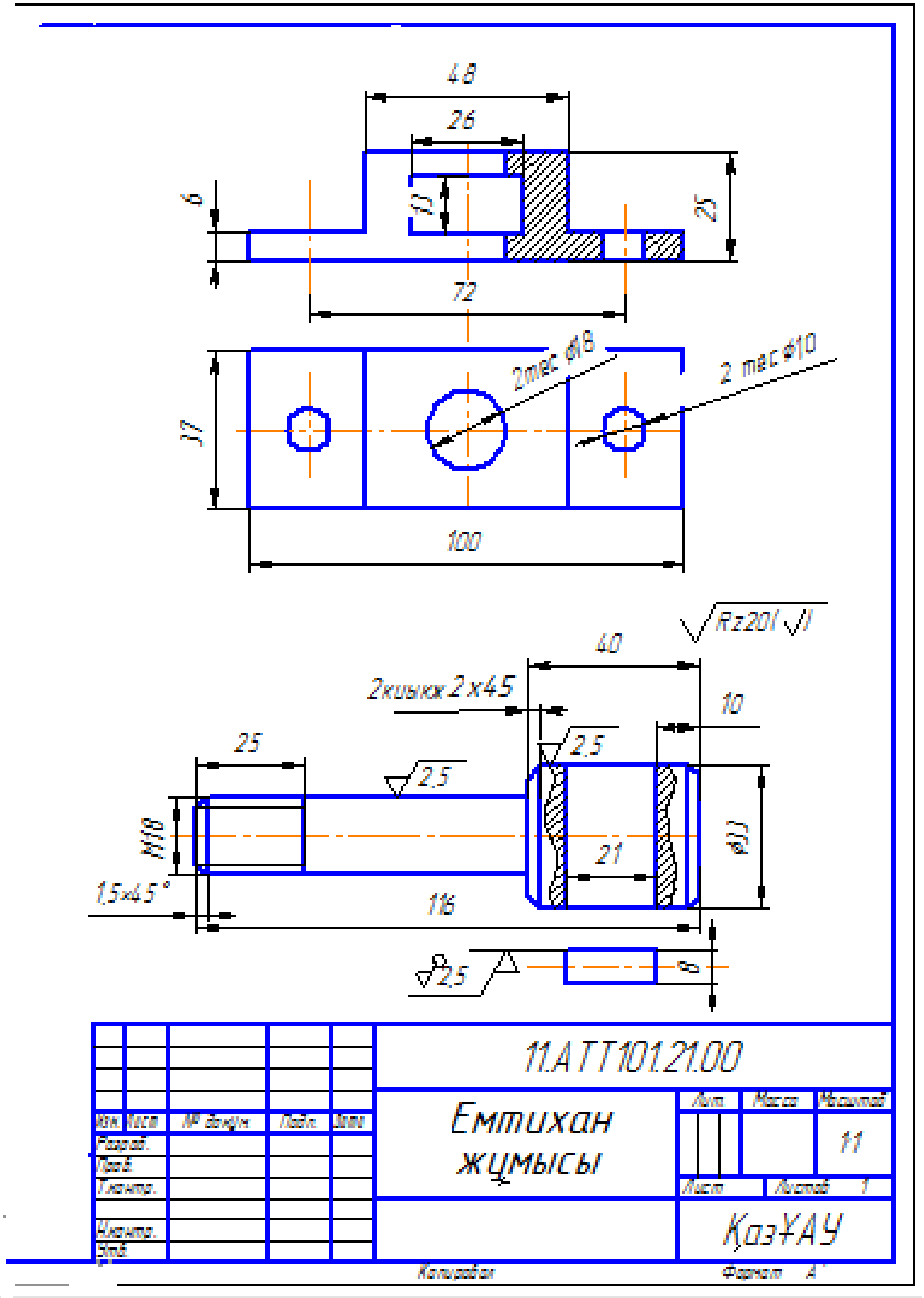


Fig. 2.27*b*- Etalon of the completed exam (continuation)

For a comprehensive assessment of the results of training throughout the MC, it is taken into account that, as mentioned earlier, the minimum requirements for the level of development of MC, so the measurement of cognitive processes in achieving the

planned learning outcomes is carried out by three indicators: recognition, understanding, application. This thesis is implemented in Table 2. 9

Table 2.9- Distribution of integrated assessment scores of learning outcomes for MC

Dublin descriptors	50-74 marks	75-90 marks	91-100 marks
A. Knowledge and understanding	As a result of survey and testing makes mistakes when reading complex drawings and determining the primitives of the COMPASS system	As a result of survey and testing allows for slight errors in reading complex drawings and determining the primitives of the COMPASS system	Based on survey and testing results shows a basic knowledge of descriptive geometry, rules of STST USKD, system primitive COMPASS
B. Practical use of knowledge and understanding	performs tasks of low complexity, reproduces the standards of work performed, makes mistakes on drawings, does not demonstrate compliance of the answer to the questions of the ticket reference	performs tasks of medium complexity, makes mistakes on drawings, does not demonstrate compliance of the answer to the questions of the ticket reference	performs drawings in full compliance with the samples, demonstrates the full compliance of the answer to the questions of the ticket reference
C. Methods for making judgments, evaluating ideas and forming conclusions		knows the advantages and disadvantages of graphics systems, but does not demonstrate by examples	knows the advantages and disadvantages of graphics systems, demonstrates the examples
D. Communication skills			prepared a message on the selected topic
E. Skill in training		Aware of the need for descriptive geometry and graphics to master the specialty, shows willingness to work	Aware of the need for descriptive geometry and graphics to master the specialty, demonstrates the

		independently. Demonstrates sufficient use of drawing tools and computer to execute drawings	ability to work independently. Demonstrates a high level of use of drawing tools and computer to execute out of drawings

2.7.3 Conclusion

To understand the methodology novelty you may refer to international experience. As it is known in most European countries the employers' associations (corporations, unions, etc.) develop the professional standards that constitute the basis for development of the educational standards. However, in a number of countries (Ireland, Scandinavian countries and some others) such standards are not developed separately. But this does not mean a departure from the education model of focused on the result. This is a consequence of the fact the employers' representatives actively participate in the preparatory work consisting in the description of learning outcomes (the required competences for execution of the labor activities) and in formulation of the requirements to their evaluation, etc. Thus, in these countries the development of professional and educational standards is a single design process.

According to our approach which is different from the approach above the development of integrated standard is not a single process. It is divided, because at the initial stage the representatives of education sphere determine only the expanded list of competences, then the employers enter the process independently on them, and the faculty formulates the learning outcomes only after specification of the competences' list.

We reported the main provisions of the methodology to the teachers of the Kazakh National Agrarian University and Kazakh Innovation Humanitarian Law University and the executive staff of the International Educational Corporation. As a result of the discussion, we received comments and suggestions, in particular, concerning the need to develop interdisciplinary modules.

Problem of the proposed methodology innovativeness remained outside the scope of this study. We define innovativeness as a result achieved in the course of certain process with observing totality of conditions as a source to improve the system effectiveness. As you can see, innovativeness is closely related to validity. We have revealed the aspects of validity by the example of technology and model. This seems to be easier than investigation of the methodology validity, because the latter will require substantiation of the methodology use to improve the process efficiency in specific conditions. Since the effectiveness definition takes the certain time, we consider it necessary to study the methodology validity in the further researches.

Competence-based approach and modular training are important principles of the Bologna process. The world tendencies of education system development dictate the need to introduce these principles into the education system of our country.

When the competency-based approach is applied the education goals are connected with both the labor objects performing specific functions and interdisciplinary integrated requirements to the educational process result. Therefore, the vocational education goal consists in the knowledge acquiring and the professional qualifications mastering by the students, and in forming the personal experience which gives them the opportunity to cope with various business and life situations and work in a team. Its implementation creates the conditions for the effective use of capabilities which make it possible to carry out the professional activities fruitfully in accordance with the workplace requirements. In this sense, competences go beyond the professional triad: "knowledge-skills-abilities" and include the informal knowledge. The competences and learning outcomes give an opportunity to rethink the goals and problems of the educational process.

The proposed methodology for development of integrated standards makes it possible to reduce the shortcomings of both educational and professional standards. These shortcomings consist in the prevalence of educational standards over professional standards, and lack of possibility for the professional standards to reflect the job functions performed in the workplace. The methodology under development consists of two interrelated tasks and is based on the principle known as "from general to particular" concerning formation of structural elements.

Each stage of the MEP development (preparatory, main, final) has its purpose, methods of goal achieving and the result. Transition to the next stage is possible only upon obtaining the result. At each stage the goal achieving algorithm represents a flowchart with a clearly defined transition depending on the "yes" or "no".

Implementation of the proposed methodology for development of Modular Educational Programs is shown on the example of the "Computer Science and Software" specialty. Extensive initial material (expert selection of competences at the first stage and evaluation of these competences by stakeholders at the 2nd stage) give the possibility to make a reasoned decision related to due regard to any competence. The final list of competences constitutes the basis for the MEP formation. The program consists of the disciplines of the mandatory component of the standard curriculum and the modules depending on the final list of competences.

In accordance with the structure of integrated standard, after the MEP forming it is necessary to formulate the learning outcomes.

The tasks considered in the study do not cover the full range of problems related to the MEP development. In this regard, we will continue our research in this area.

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