Comparative Analysis of Learning in Three-Subjective Didactic Model

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Abstract. The article theoretically shows transformation of modern didactic model into three-subjective (Student - Teacher - Information and communication pedagogical environment). Active components of new subject, which are the most evident in a learning process, are analyzed in the article. The requirement block of information and communication environment as a subject of the educational process is described. The comparative characteristic of the main components of traditional and innovative teaching systems is presented in the article. The authors have made a comparative description of the main forms of university studies in different didactic models: object-subject, subject-subject and three-subject training. The measurement of cogency of each of these three study subjects and their significance in the process of major educational operations (collection, processing, storage, transmission) in various forms of training: lectures, practical classes and individual work were presented.

Keywords. Didactics, information society, information and communication pedagogical environment, three-subjective didactics, forms of training organization at university

Key terms. KnowledgeEvolution, KnowledgeManagementMethodology, Didactics, KnowledgeManagementProcess, ICTInfrastructure

1   Introduction

Education is an institute of social experience transmission and human socialization in society. Naturally it depends on the level of social development and labor market needs.

Modern university education is in crisis, according to UNESCO specialists' definition, it helpless and failure of modern education may bring to global problems of humanity. These are irregular development of different countries in the context of globalization, education inactivity caused by the relative conservatism of human resources brings to constantly fast-moving knowledge renewal.

Weak sides of university education are the following students' training instead of

general cultural development, low professional motivation and responsibility, strict regulation of students' activities, provided graduates' inactivity, not much attention to the levels of training, etc. According to this fact, it's said about global educational crisis, the paradigm shift in pedagogical thinking [1].

We are going to trace the change of professional education at different stages of society's development to overcome the crisis of modern university education.

Down the ages human language existed primarily in form of sound speech. Its main limitation was space-time limit: spoken word spread out the territory limited by physical laws of sound and in form of material reality actually existed only while pronouncing, straight after that passing into the history and vanishes in it. The era of word was characterized by a certain lack of knowledge acquirement and the Institute of transmission, as the main source of the word transmission process from one generation to another appeared to be a man.

The increase of information amount became the background for writing nascence as it was difficult to keep the information in mind without losing its content. Writing unlike the sound speech turned to be the technology of knowledge transfer.

The invention of writing (i.e. the possibility of fixing speech using a specially developed system of graphic symbols) allowed to transmit voice information to an unlimited distance and extremely broadened its existence in time. Beyond dispute, the appearance of writing created new additional conditions and opportunities to realize a potential of human culture. But at the same time, writing leads to limitation and narrowing of informational content of speech. An issue is that writing is a sign system and it is shown as a representative of the signified so it reproduces only a half of properties and meanings of what it means. In this case, word transfers only a part of the properties and meanings contained in the "live" speech. Thus, written language is actually completely lost in the so-called prosodic information contained in the "live" speech that sounds. The case is that the graphical definition is losing information that is expressed and transmitted in direct speech by means of phonetics which plays a divisionary role.

Year 1450 AD (500 years ago) is marked by the appearance of new information technology, the third one in a row. Only then printing technology appeared which we consider a knowledge distribution technology. We call this phase an era of books. Definitely the appearance of books allowed creation of an effective and mass education system, to organize public libraries, to ensure the development of universities. The appearance of books as a mean of transmitting knowledge, promoted the humankind's achievement of those heights which it has now.

An important consequence of definite social development turned to be an understanding of purposeful activity of social skills transfer from one generation to another as a connection between two organized activities – teaching and learning, their concrete reflection in the learning process. Humanity cumulative experience of the learning process has found expression in didactics, one of the pedagogy's section that examines general theory of education and training. It is believed that the term was introduced by German pedagogue Ratko in his lectures "Rahitiy's summary of didactics and art education", meaning a scientific discipline which studies theory and practice of teaching [2].

Efforts to make an educational process intelligently organized and purposeful are presented in many Jan Komenskiy's works, especially in "Great didactics," which covers almost all the issues that present the subject of modern pedagogy. Jan Komenskiy was the first one who developed didactics as a system of scientific knowledge, giving a reasoned exposition of principles and rules for children's education. He examined the most important questions of the learning theory: educational content, teaching visualization principles, sequence of education, organization of class-and-lesson system, etc.

Object-subject teaching relations between teachers and students of that time were the most prolonged in pedagogy. The subject is the teacher who works actively to educate students as his objects of influence through *informative-educational environment* (word, book, equipment). Schematically such didactic relationship is depicted in Fig.1.
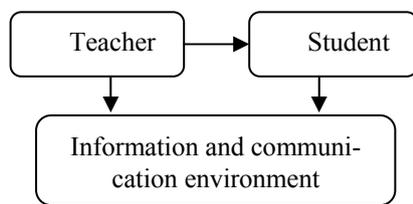

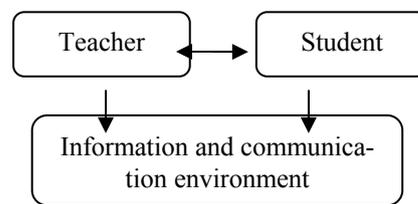**Fig. 1.** Schematic model of the object-subject relations

Fig. 2. Schematic model of the subject-subject relations

Gradual development of public experience of mankind has increased to such an extent that a person using only natural abilities was not capable to learn and operate with informational resources. As the result, the person begins to use technological tools to optimize working process with information. According to it, labor market no longer corresponds to specialists' "conveyor" training, as received mental vocabulary knowledge quickly becomes obsolete, an employee must make a "decision" in unusual situations. Naturally, a student becomes an equal subject of the educational process. The transformation of an object into a subject in the educational process is the result of the democratization of education, dissemination of differentiation and individualization of education. Schematically, the new relationship is depicted in Fig. 2.

Intensification of information processes, introduced into science, economics, production, requires the development of new models of education, a variety of information and communication environments in which people could reveal their creativity fully, develop skills and cultivate a necessity for self-improvement and responsibility for their education and development.

The traditional paradigm considered education as training of younger generation to work and life by consuming material valuables created in other areas. The new paradigm foresees independent values in education.

2   Innovative methodical system

The purpose of creating a new education paradigm is to provide conditions for education, training and development for independent, smart person to satisfy the requirements on a market economy, capable to improve continuously his own level of knowledge and culture, integrated into the global informative space.

Thus, today, we are talking about innovative methodical system which unlike traditional one, corresponds to professional education demands in an informative society. The comparison of the main components of these two systems is presented in Table 1 [3].

Table 1. Comparative characterization of traditional and innovative teaching systems.

Name of component	Traditional methodical system	Innovative methodological system
Learning objectives	Seizure and adoption of educational material. Provide students with knowledge, skills and practice.	Provide students with knowledge, skills and practice. Creation of modern information and communication teaching environment. Purposeful development of creative self-sufficing person. Formation of professional competence, leadership skills, ability to work in group.
Principles of learning	The scientific character principle. The principle of systematicity and consistency. The principle of visibility. The principle of studying direction in accordance with issues of education, training and development.	The principle of the activity learning environment. The principle of organic unity between the changing requirements at labor market and conserved features of the educational system. The principle of necessity for continual self-study.
Contents of training	Classical learning, technocratic one.	An integrated approach to fundamental and applied activity aspects of a specialist-to-be.
Study methods	Reproductive, explanatory, illustrative.	Problem-search, research.
Study means	Visual tools. The teacher's word - for knowledge transfer, books, movies, tape, training devices, pictures, maps, tables, machines, devices, models, collections, tools, and historical schemes, charts,	Facilities. Information and communication technologies. Hypertext, multimedia training materials. Databases for educational purposes. Networking means for videoconferencing and video lecture. An effective system of

Name of component	Traditional methodical system	Innovative methodological system
	diagrams, etc. Technology. Video-recordings, radio and television, filmstrips, slides, transparencies, projectors, televisions.	monitoring training activities. Remote devices for self-work. Computer testing in on-and off-line modes.
Study forms	Lectures, seminars and practical lessons.	Dispute, seminars, conferences, "round table", symposium, debates, colloquium, distance learning, teaching and business games, role-play game.
Control forms	External process operations control within strictly defined rules is dominated. A teacher assessment result (flow, final control) is dominated. Lack of balance between control and self-control. Lack of effective control for individual learning methods of each student.	Strict current control of individual learning of each student by means of testing in on-and off-line mode. Rating control knowledge. Creating an effective environment according to Jean Piaget for easy convenient self-organization that motivates students in learning activities.

In addition, society today has faced the phenomena which require answers:

1. Teacher has lost the monopoly on knowledge;
2. Students have unlimited access to information resources;
3. The phenomenon of "red shift" in expanding informative and communicative space;
4. Availability of qualitatively and quantitatively different ICT competencies of young and older generations.

For that matter, an educational paradigm transforms, which is characterized by the following principles:

• Globalization of knowledge, free access to educational resources
• Integration of learning resources
• Organization of global educational audiences
• WEB-multimedia presentation of educational resources
• Multilingual educational space
• Asynchrony of modern models for learning management
• Harmonization of social and educational environment
• Formation of social identity of information system
• Divergence in the implementation of their own educational way

Thus, an evolution of modern education, information studies, mass computerization of educational establishments, constant upgrade of hardware, and development of

computer networks, expanding of personal computerization of society, increasing of software products designed for use in an educational process – these are conditions that create new *information and communication pedagogical environment* (ICPE). This environment constantly and aggressively increases student's motivation to consume content that circulates in it, creating a new didactic model – *three-subjective relations*, which include three subjects of study - students, teachers and an environment.

However, is it legitimate to consider ICPE a possessing equal rights subject for learning along with a teacher and a student?

3   Model of three-subjective relations

Consideration of information and communication teaching environment as a subject, in our opinion, is possible because its components are not only technology but human resources as well, which continuously update them at the constantly growing speed. In this sense, it is necessary to point out an existing qualitatively new learning environment as opposed to which one that was 15-20 years ago. The question deals with the obtaining of today's educational environment the status of an equal partner. Sir Ken Robinson in The Third Teacher (2010) says, "The physical environment of the building is critically important in terms of curriculum" [4].

Within this approach, we implement an important target triangle: a natural integration of teaching, research and labor market needs. After all, ignoring the environment as a subject of education, we will prepare specialists for inadequate reality.

The inevitability of the transition of the education system to consider three-subjective relationship is reflected in the following three stages of didactic changes:

Stage I – the subject-object instruction (a teacher provides students with knowledge). Characterized by one-dimensional linear model, the volume of processed data – megabytes;

Stage II – subject-subject didactics (a teacher and a student are equal competent training partners). Characterized by two-dimensional polylinear model, the volume of processed data-gigabytes;

Stage III – three-subjective pedagogy (a teacher – a student – ICPE). The interaction of all subjects of the learning process (a teacher – a student – ICPE) obeys to the common goal which is formation of a competitive specialist and is characterized by a three-dimensional nonlinear model, the volume of processed data – terabytes.

Thus, we have the right to talk about three-subjective didactics as one of the areas of pedagogical science of the most general regularities, principles and means for organization of studying, providing a firm and conscious assimilation of knowledge and skills within peer relations pupil (student), teacher (teacher) and information and communication teaching environment.

It is important to underline that in this process, status and general condition of those who learn and teach and ICPE are constantly changing. In this context, we understand these learning activities with assimilation of knowledge and skills, and teaching - the knowledge message or source of knowledge to students, as well as in-

struction on ways and methods of work, coordinating training activities, particularly organization of active forms (discussion, round table, project activities, etc.) and monitoring of students mastering knowledge, skills and experience obtaining. Unlike traditional views, we consider, that it's necessary to introduce the one who teaches into the learning process, the changes that are ICPE (for example, by means of publishing of educational materials in the Internet). We have to mention, that new innovative forms of teaching activity are connected remotely or, as they say, distance management software training activities, both in time and space.

Within this definition naturally occurring three-subject relations, which we understand as the continuous and constant (both in space and time) interactions between students, teachers and information and communication pedagogical environment directed for satisfaction of students educational needs (Fig. 3).
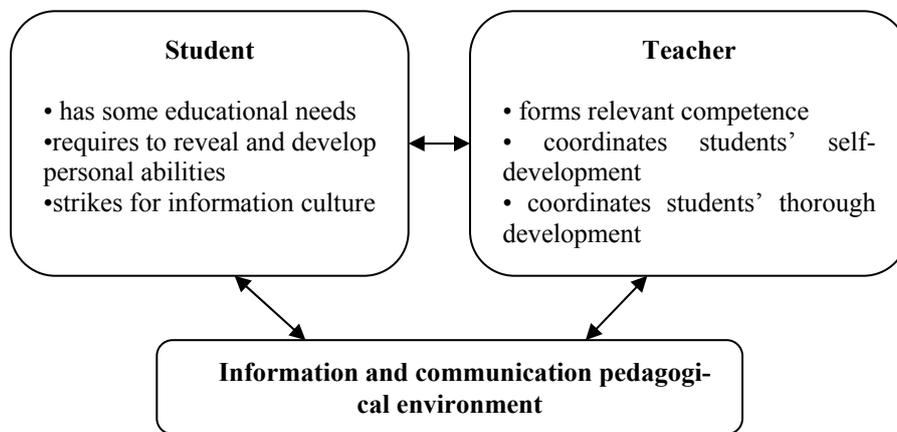

Fig. 3. Schematic model of three-subjective relations

As we are examining an environment as a separate element, it's important to mention its operation characteristics, which are the most evident in the learning process:

- environment constantly and more aggressively increases motivation of the younger generation for content use that circulates in it
- environment provides access to resources at any convenient time
- environment has comfortable, flexible, friendly, intelligent service, that helps people to find informational resources, data or knowledge they need
- environment is not a negative emotional one, it corresponds people's demands as much as it is needed
- environment permanently is filled up with information, data, knowledge with a constantly increasing speed
- environment offers an opportunity to organize practically free, time convenient contacts between any number of people to provide suitable and flexible information exchange (in any form) between them

- environment, step by step, standardize, and then integrates the functionality of all previous, so-called traditional ways of receiving, storing, processing and presenting of the required information, data and knowledge to mankind
- environment undertakes more and more routine operations connected with humans operating activities (which is one of the greatest challenges for humans to expect in the future - "the more commissions - the more responsibility - the greater risks remain without resources")
- environment receives more and more control over the data, and operational mankind's activities [3]

Due to our three-subjective didactics, we can answer the above-listed vital questions connected to modern educational system:

- the teacher's role and place in the new didactic model
- correlation between virtual and visual forms of subjects' relationships in didactic system
- development of technological management providing rights for subjects of didactic system to login informational resources
- organization of modern control systems over learning activities
- assurance of the organic unity between changing requirements of labor market and conservative educational system potential
- organization of modern, and most importantly, systematic and constantly active system of re-training and professional qualification upgrade of teachers

Step by step, it is getting clear that technology that produces modern industry, today, not only affects the technology transfer of knowledge, but in fact, it determines qualitatively new forms of its organization for their mastering. At this stage, we can see the following problems:

1. Heterogeneity of distribution of computer and communication facilities
2. Huge differences in the process of training and constant re-training of staff, both academic and administrative ones
3. Inertia of education system
4. Constantly growing volume of technological renewal of learning environment that includes all the tools, both for teacher and learners
5. Imposing of different learning paradigms that make substantial confusion in the teachers' presentation of their new role in the process of knowledge transmission, development of abilities and skills
6. Stereotype of the philistine attitude to pedagogy in whole, as a descriptive section of human knowledge, in which every citizen is a knowledgeable expert
7. Absence of formal systems which describe different models of learning [3]

Active learning environment contains the following units, which are procedural, substantive and control. The environment begins to play a more important role and assumes some part of teacher's functions. There is no doubt that, certain requirements must be done in the process of setting up a proper learning environment, which will provide active learning environment. Working with the program, both a student and a teacher will be limited by a system of actions, which was laid out in the program,

that's why development of the system requirements of ICPE is very important. According to our research, information and communication learning environment can serve as the subject of the educational process if it meets the following group requirements:

1. Hardware requirements: multimedia computers in classrooms are networked with the obligatory access to the Internet resources. In addition, an important aspect creates opportunities to access educational electronic resources (Wi-Fi technology) for students in any convenient place, for example, library, dormitory, canteen etc.
2. Software requirements: software environment should resolve security issues (registration, personalization, delineation of access rights to get to resources), to be integrated (all educational components should be in its natural form), easy for exploitation, filling and modification, to provide opportunities for interaction, communication, monitoring for learning process, to contain an output mode out of the complicated situations (expert), to offer opportunities for distance learning (on- and off-line modes).
3. Academic requirements refer to methods of filling information and communication teaching environment.
4. Social demands. Special attention should be paid to a specified group of claims which, in our opinion, contains cultural, ethical and legal aspects, because users of information and communication pedagogical environment create some community. First of all, it is about the rules of communication in the network and use of the reworks of other authors.

Requirements to Human Resources. Construction of the educational process on the basis of information and communication technologies implies specialists- programmers and accordingly well-trained teachers.

ICPE correspondence to these requirements can be achieved by using management system of the quality of educational information resources [5].

Introduction of new subject of learning process naturally transforms existing elements of training, including forms of teaching at higher educational establishments. Today, educational resources are open and distance forms for studying are actively developing and integrating into traditional forms of teaching: lectures, workshops, laboratory classes, independent, individual work of students, forms of control. Let's try to analyze basic traditional forms of training organization in different didactic models (Table 2).

Table 2. Forms of learning in didactic models

Subject-object study	Subject-subject study	Three-subject study
Teacher		
The source of educational information is a teacher; students are forced to put down a limited amount of	A teacher presents difficult educational material, students selectively put down the information that is nec-	A teacher and students in the debate form discuss problematic issues due to free access to open lecture and other information

Subject-object study	Subject-subject study	Three-subject study
information, static visibility is used additionally.	essary for each personally, use additional sources, including the Internet. Dynamic visibility is dominative.	sources. Students write down the required information at will.
Practice		
Reproductive methods of teaching material development are used.	Part-search training methods prevail.	Search and creative methods are directed at forming experience of training materials, particularly under unusual circumstances.
Independent work		
It consists of lectures, practical exercises execution.	Studying unwrought amount of teaching material.	The main part of teaching material is studied individually.
Forms of control		
A control requires presence of a teacher who relates a student's knowledge with the volume of lectures material.	Students' readiness to use received knowledge in condition of life situation is also under control.	Monitoring can be conducted without teacher's presence, and the result – unconventional approach and creative thinking of students are estimated.

4   Measurement of the importance of training subjects

However, is ICPE a significant, important subject of learning in practice of University operation? The theoretical conjectures study was conducted at the Faculty of pre-school and primary education of Kherson State University in order to confirm or refute it. The research required a questionnaire of future primary education teachers, as they acquire an integrated system of philology, humanities, exact, natural and artistic sciences, which, in our opinion, reduce a risk of results' obtaining only from certain cycle of training. The main task of the questionnaire is to evaluate the significance of subjects of modern educational process, including ICPE.

Determining the validity of each of the three subjects of the educational process was made by expert evaluation method. 27 qualified experts (university teachers, graduate students, methodologists) joined the independent expert committee.

To define a point of evaluation for each subject Delphi method (for members of the expert committee conditions for an independent individual work were created) was used [6]. Maximum and minimum estimates depended on a number of subjects, in which, there are three. Thus, minimum score for one of three components –1 point, an average score – 2 points and maximum – 3 points. Then, the statistical processing of the results, which were presented to experts for final approval, had been conducted. The cycle of expertise was repeated three times.

Below are the results of an independent expert committee (Table 3).

Table 3. Determination of cogency of training subjects (*V*)

Subjects of the educational process	Number of points			Σ	*V*
	1	2	3		
Teacher	12	8	7	49	0,30
Student	2	10	15	67	0,41
ICPE	12	11	4	46	0,29

According to the results of expert reviews cogency V (in fractions of a unit) for each of these three specified subjects, according to experts, is approximately the same, with a slight advantage "student" (0.11 larger compared to "ICPE" and 0.12 larger compared to the "teacher").
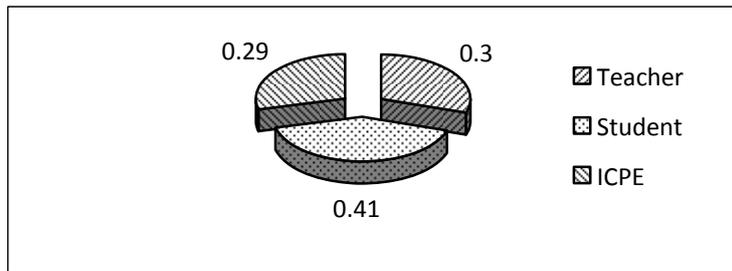
Results summarizing the data are shown in Fig. 4.

Fig. 4. The importance of the subjects of the educational process

214 students, as the most significant subject of didactic system according to experts' definition, were asked to rate on a 10-point scale the importance of the three subjects of the educational process: students, a teacher and ICPE – in the process of operating with information (collecting, processing, storing, transmission) in various forms of training organization: lectures, practical classes and independent work. To do this, students were asked to determine the importance of each component of didactic models: Student - Teacher - ICPE a five-point scale (1, ..., 5).

Results of the student's questionnaire are shown in Table 4.

Assessment E_{ij} (i, j = 1,2,3) for each i-component of the didactic system operations in terms of j-forms of training organization is given by (1):

$$E_{ij}=K_{ij1}+K_{ij2}+K_{ij3}+K_{ij4}, \tag{1}$$

where E_{ij}– total score in terms of transactions weight, K_{ijk} - i-score weighting components didactic system, j-teaching forms and k-rate transactions, %.

The overall assessment of V_i (i = 1,2,3) for each component of the didactic system is given by (2):

Table 4. The results of the student's questionnaire

Components		Student		Teacher		ICPE	
Form of training organization	Indicators	points	%	points	%	points	%
Lecture	Collecting	1182	5,5	2187	10,1	334	1,5
	Processing	2151	10,0	2630	12,2	2411	11,2
	Storing	2625	12,2	1455	6,7	2402	11,1
	Transmission	830	3,9	2004	9,3	1355	6,3
	∑	6788		8276		6502	
E			31,6		38,3		30,1
Practice	Collecting	1674	7,7	2006	9,2	1235	5,7
	Processing	1885	8,7	3121	14,3	815	3,8
	Storing	1241	5,7	1663	7,6	2421	11,1
	Transmission	2178	10,0	1198	5,5	2322	10,7
	∑	6978		7988		6793	
E			32,1		36,6		31,3
Independent work	Collecting	2214	9,7	2119	9,3	2033	8,9
	Processing	2366	10,4	2882	12,6	1938	8,5
	Storing	2154	9,4	2007	8,8	2013	8,8
	Transmission	994	4,4	384	1,7	1703	7,5
	∑	7728		7392		7687	
	E		33,9		32,4		33,7

$$V_i = (E_{i1} + E_{i2} + E_{i3})/3. \tag{2}$$

Let's analyze the results.

It is generally known that, lecture – is the main form of teaching, prepared for the adoption of theoretical material. Table 4 shows that while gathering information during lectures (17.1%), the most significant entity of the educational process is a teacher (10.1%), 5.5% of operation is performed by a student, 1.5% – ICPE. It's explained by identification of the content and material of lectures, in its selection, the main role is occupied by a teacher, but the lecture provides not passive acceptance of students' knowledge but their active involvement into the learning process, preparation for lectures, which is provided with ICPE use. We should note that active cognitive activity of students during lectures is possible for basic training, which includes familiarization with the theme of the lecture and its plan, the main content of the theme for the tutorial, content repetition of the previous themes etc.

According to the survey results, information processing on the lecture (33.4%) subjects' contribution is approximately the same: 12.2% - Teacher, 11.2% - ICPE, 10% - Student. This is because the teacher coordinates educational information processing, and an active entity involved in this process may be a student. ICPE activity due to a shift in emphasis onto the use of methods and means of processing students - from note-taking information material: full or theses synopsis for computer processing of the information received.

Storing educational information of the lecture (30%) between the subjects of the educational process was distributed: 6.7% - Teacher, 11.1% - ICPE, 12.2% - Student.

According to received questioning results, transfer of educational information of the lecture (19.5%) is implemented by a teacher (9.3%) and ICPE (6.3%), although students (3.9%) provide additional information, interesting facts and problematic issues. The task of the teacher, at this stage, is to transfer the adapted information disclosing a nature of scientific concepts, genesis of scientific theories, ideas, etc.; aggregated information is transmitted using pedagogical software, e-presentations, etc.

The results of the distribution of three-subjects training, in the process of operation with information during a lecture are presented in Fig. 5.
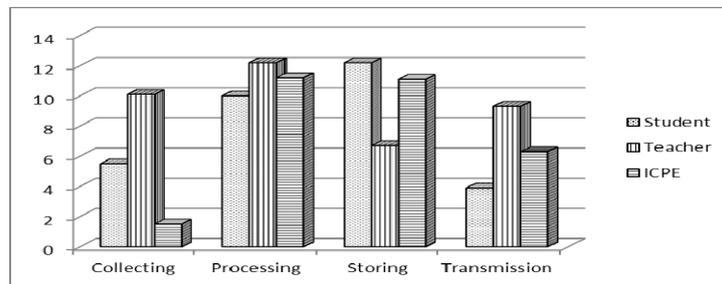

Fig. 5. The significance of the subjects of the educational process during operations with information on the lecture

Thus, the most important subject of the lecture organization according to students is a teacher (38%), a student (31.6%) and ICPE (29%) provide processing and preservation of educational information. In general, during the lecture principal place of work with information take processing operations (33,44%) and storing (30%), followed by transfer (19.5%) and collection (17.1%).

Let's analyze the data from Table 4 according to the importance of the subjects of study during the preparation and conduction of practice. As it is known, practical lesson is a class that involves organizing teacher's detailed study of individual theoretical positions discipline and development of skills in their practical application by individual performance to related tasks.

Analyzing the data in Table 4 concerning the collection of information (22.6%) during the practical sessions was revealed that students' contribution is 7.7%, but teacher's and ICPE respectively 9.2% and 5.7%. Comparing with a lecture, students' activity increased by 2.2%, due to test theoretical knowledge of students, development of skills based on acquired knowledge and, as a result, a detailed collection of information for further processing.

In the process of collection (22.6%) and processing (26.8%) of the information during preparation and practice, according to students, a teacher and a student have the greatest significance, which is confirmed by received data: respectively (9.2% and 14.3%) , (7.7% and 8.7%). This is due to students interest in learning, deepening and refinement of knowledge, developing skills, primary accumulation of experience,

professional motivation and, consequently, activity in learning. Significance of ICPE is gradually increasing, as it is evidenced by statistics data, in storing and information transmission: 11.1% and 10.7%.
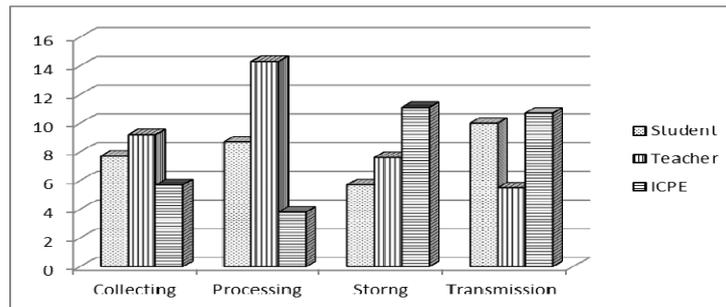
Visually, the results are presented in Fig. 6.

Fig. 6. The significance of the subjects of the educational process during operations with information during the practice

Thus, a teacher is the most important subject of practical training organization (36.6%), although a student (32.1%) and ICPE (31.3%) are equal subjects. Generally during practical classes the importance of operations with information is as follows: processing (26.8%), transmission (26.2%), storing (24.4%) and collecting (22.6%).

Let's analyze the importance of training subjects in the process of student's individual work organization. As you know, independent work of a student is a primary mean to master academic material at a time, free from mandatory training sessions.

Leading role in collection, processing, storing and transmission of material belongs to a student (33.9), according to the relevant data: 9.7% 10.4% 9.4% 4.4%. This is primarily due to the students' understanding of the importance of having theoretical knowledge, development of skills, and accumulation of their own professional experience and, as a result, operations with the information according to the educational goals. Practice has proved that the most active in independent work will be a student who is more motivated to master for his future profession. The result of questioning is the importance of teachers is on average 32.4%, ICPE - 33.7%, and an independent educational-cognitive students' work is task-teacher, under his leadership, but without his direct involvement but widespread use of information and communication teaching environment. The importance of business education in independent work is shown in Figure 7.

So, according to students' definition, important subjects of independent work are all three components of the didactic system - Student (33.9%) and Teacher(32.4%), and ICPE (33.7%). During the independent work with information, transaction processing occupies a principal place (31.5%), then collection (27.9%), followed by storing (27%) and afterwards transmission (13.6%).
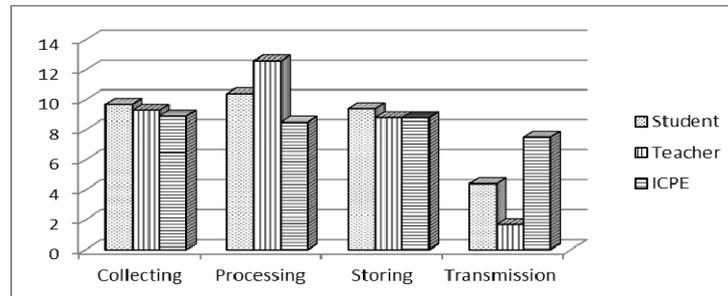
Fig. 7. The significance of the subjects of the educational process during information operations in class work

The analysis of the results of the survey showed that according to students' all three constituents are important and significant components of the didactic Student-Teacher-ICPE system. This is the statistics of indicators weight components: Student ($V_1 = 32,5\%$), Teacher($V_2 = 35,8\%$), ICPE ($V_3 = 31,7\%$). It's important to underline that received students' survey data correlate well with similar data of experts' assessment of component's importance of the didactic system. The student is a significant subject of a teaching process at the University as learning outcomes largely depend on its intended acquisition of trade. Proof that serve high levels of significance to students in maintaining and processing information during lectures, collecting, processing and transmitting information during practice, collecting, processing, storing information during independent work. Major indicators of the importance of the teacher can be seen during collection, processing and transmission of information during the lecture, which is determined by specifics of this type of training sessions - teaching theoretical material. During practical sessions and independent students' work the teacher has the greatest indicators of the importance of information processing. ICPE's significance is high during operations with information and practical lessons in the process of information preserving, as for in-class, ICPE acts as an equal-right subject of the educational process. This is because ICPE provides access to informational resources at any convenient time, quickly and easily enables to find all necessary information, provides flexible and convenient information sharing between students. However, according to average data ICPE significance inferior teachers' importance, as a teacher manages the studying-cognitive students' activity, coordinates their independent improvement of knowledge, skills and abilities. It should be noted, that due to ICPE systematical involving in learning process the role of it as new subject will improve gradually because of improving learning outcomes.

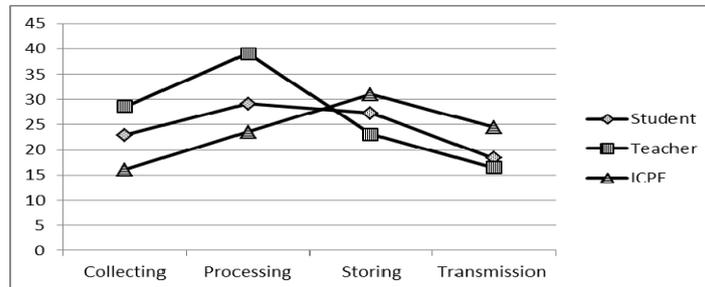Summary results of the survey are presented in Fig. 8.

Fig. 8. The importance of the subjects of the educational process during operations with information

5   Conclusions

Thus, the analysis of the scientific literature, theoretical and experimental study on transforming learning into different didactic models showed that information and communication pedagogical environment is an important subject in the process of learning at the University; ICPE transforms traditional subject-subject model of study into three-subject one, directly affecting and slightly changing the role and function of other subjects of study, partly fingering their functions itself, particularly in transient conditions while performing operations with information on various forms of training.

References

1. Fokin, J. G.: Competencies of Education in University. Academy, Moscow (2002)
2. Kendall, H. L., Sugimoto, R. A.: The Didactic Theory of Wolfgang Ratke. California State University (1976)
3. Petukhova, L. E.: Theoretical Bases for Training Primary School Teachers in Information and Communication Teaching Environment. Scientific Monograph. Ayilant, Kherson (2007)
4. The Third Teacher: 79 Ways You Can Use Design to Transform Teaching & Learning by OWP/P Architects, VS Furniture, Bruce Mau Design, Abrams (2010)
5. Kravtsov, H. M.: Design and Implementation of a Quality Management System for Electronic Training Information Resources. In: Ermolayev, V. et al. (Eds.) Proc. 7-th Int. Conf. ICTERI 2011, Kherson, Ukraine, May 4-7, 2011, CEUR-WS.org/Vol-716, ISSN 1613-0073, pp. 88-98, CEUR-WS.org/Vol-716/ICTERI 2011-CEUR-WS-paper-6-p-88-98.pdf. (2011)
6. Rowe, G., Wright, G.: Expert Opinions in Forecasting: the Role of the Delphi Technique. In: J.S. Armstrong (Ed.) Principles of Forecasting – a Handbook for Researchers and Practitioners, pp. 125-144. Kluwer Academic Publishers, Boston, MA (2001)