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From Programmed Teaching to Constructivism and Personally-Oriented Approach to E-Learning

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Abstract: This article presents comparative analyses of basic principles of programmed teaching and constructivism, with a view for their subsequent use in creating open learning didactics based on personally-oriented approach. The authors also investigate the claim that in the basis of the two paradigms (constructivism and personal learning) lies the same idea: the humanistic character of education, consideration of individual characteristics, activity-based approach and the student. The assumptions about the increasing efficiency of educational process, based on the ideas of integrative unity of these concepts are justified. Further development is discussed of personally-oriented approach in terms of such interconnected approaches as e-learning, connectionism and combined learning. Simultaneously, programmed teaching is also going through experiencing its renewal phase and in connection with other paradigms can be used effectively and purposefully in education.

Keywords: Programmed teaching, personally-oriented approach, constructivism, e-learning, connectionism, combined learning

1. Introduction

Enhancing ICT skills, despite significant progress in recent years, as shown by statistics and studies conducted earlier in Poland in some other countries of East and Central Europe, has not had an effect on all teachers and trainers. It can be argued that in the coming years the situation will change and the number of teachers who have acquired and mastered the basic, then intermediate and advanced level of IT competence (Morze, Smyrnova-Trybulska 2014) will increase, but this positive momentum has brought to the teacher training system (on a global scale), and especially to teachers, a whole range of new problems:

1. Maturity of the basis of IT competence of teachers does not solve the problems of the implementation of new information and communication technologies in the educational process. What is needed here is quite high qualifications, especially at the level of pedagogical competence, on the basis of specialized knowledge and skills in the use of ICT in teaching activities (average and more advanced level).
2. Teachers who have IT competence in the use of ICT in the educational process should have appropriate technological space to apply their knowledge and skills in teaching. 3. The teacher must be interested and have the motivation to apply information and communication technologies in the educational process and professional development on a regular basis.
3. There must be sufficient, in terms of quantity and quality, base training and teaching in

respect of a new generation of materials that can be effectively used in the teaching of subjects with the systematic use of information and communication technologies and professional development, including self-education.

4. It is necessary to develop communications through the Internet so that teachers can quickly receive technical and methodological support, as well as the rapid exchange of experiences with their colleagues.
5. It is necessary to organize ongoing professional consultancy support for the use of ICTs in education and professional development.

Among these problems, one of the most important issues, most probably related to material and mental-psychological aspects, is the lack, , on the part of the majority of teachers, of real interest in motivation and readiness to use ICT in their own learning process systematically and regularly (Kovalenko, Stoljarov, Cvetkova 2004). This issue, unlike the others, cannot be solved only by means of training courses and training in the field of information and communication technologies. Most of the training courses that are currently being conducted in the field of ICT provide the teacher only with basic skills in using computers and the Internet, but fail to show how one can, or should, use information and communication technologies in a specific teaching process, in teaching basic topics as part of main school subjects within the class-lesson learning system. It remains an undeveloped system of regular, permanent methodological support to teachers through information and communication technology, ICT and use of ICT in the learning process. These and other factors lead to the situation where no desire is stimulated in teachers to use information and communication technologies in the learning processor in improving their own skills. Teachers, unfortunately, more often perceive ICT as a means of externally imposed training and technology, which they themselves are not willing or able to use at the level at which the current stage of the modernization of education requires. This problem can only be solved by using a systematic approach and a holistic, comprehensive solution to all the tasks and problems described above.

The aim of the study was to determine the level of knowledge and competence of teachers, post-graduate training participants at the University of Silesia and Borys Grinchenko Kiev University and future teachers studying at the universities.

The working hypothesis - the levels of knowledge that future teachers have in both regions of Poland and Ukraine do not differ significantly.

Research methods and tools. The main research method was a survey. A questionnaire was prepared with several questions in the Moodle system (Questionnaire) and in Google Survey. One of the questions concerned the respondents' knowledge in the field of educational theories and teaching methods, including innovation and the use of ICT and their applications in teaching practice. Some of the results of the research will be presented in the next part of the article.

We would like to stress that the described results are only part of the global comprehensive research, conducted within the framework of the international research project IRNet (www.irnet.us.edu.pl) . The main objectives of the project are as follows:

1. To evaluate teaching competences and to suggest effective strategies of implementing new innovative tools in the educational activity in the context of globalization of education.
2. To explore indicators of educational effectiveness in the EU and third countries involved in the project.
3. To exchange experiences, analyse and evaluate teaching competences in the use of innovative forms of education and suggest effective strategies of implementing innovative ICT tools in the educational activity.
4. To analyse and evaluate social, economic, legal and ethical conditions, as well as metho-

dologies and models of e-learning techniques being developed in the European and third countries involved in the project.
5. To evaluate the effectiveness of the existing models/methodologies designed to provide e-learning and enhance intercultural awareness.
6. To develop a new model based on the current existing models/methodologies and literature reviews.
7. To evaluate and present new models/methodologies for effective remote collaborative work and improve information technologies in education science in the EU and third countries.
8. To transfer knowledge actively with a view to generating strategic impacts in the thematic research area.
9. To promote scientific discussion about the integrity of systems of education and work focusing on competence issues in the context of globalization of higher education.
10. Staff exchange between institutions in Europe (the Czech Republic, the Netherlands, Poland, Slovakia, Spain, Portugal) and third countries (Ukraine, Russia and Australia).
11. To strengthen existing collaborative research (e-learning methodology, web 2.0, web 3.0 technology analysis, intercultural competences, teacher skills in school of the future, social, human, IT, psychological, methodical, ethical, legal factors, influence on developing some key competences) (IRNet Project Application, www.irnet.us.edu.pl).

The more detailed concept and results of WP2, WP3, WP4 have been described in several publications of the researchers, participants of the research network and IRNet project (Smyrnova-Trybulska 2014; Smyrnova-Trybulska et al. 2014, 2015; Kommers et al. 2014, 2015; Morze et al 2015; Noskova et al. 2015).

2. Overview of the theory and research background

Knowledge of a course and the regularity of the learning process is the starting point in formulating the accuracy and organization of the educational process (Grzesiak, 2010).

For this reason, modern teaching emphasizes the dialectical unity of teaching and learning, conditioning the mutual co-existence of both of these processes (Strelau, Jurkowski & Putkiewicz, 1975).

J.S. Bruner emphasizes that „devising ways of teaching young can't forget about what we know about the development – with its conditions and potential opportunities" (Bruner, 1974). The same author lays down four basic requirements for learning theory:
1. The theory of teaching should specify what experience is developed most effectively in an inclination to learn.
2. The theory of teaching must identify ways to assign, to any resource of knowledge, a structure which makes this knowledge most easily digestible for the student.
3. The theory of teaching must specify an efficient sequence in which the material to assimilate needs to be presented.
4. The theory of learning must specify the nature and frequency of use of rewards and punishments in the process of learning and teaching.

In view of the assumed interaction of many factors, as well as significant specialization of scientific disciplines, one cannot give a systematic explanation of the course of learning in all its complexity, from the position of one scientific discipline. F. Tałyzina rightly argues that „(...) efficient programming teaching process is impossible without the knowledge of both psychology and pedagogy, and without knowing the basics of cybernetics. Without an analysis of the achievements of these disciplines the teaching process cannot be controlled" (Fleming, n.d.; Linhart, 1973; Talyzina, 1969).

3. Programmed teaching

In 1954 B.F. Skinner embarked upon a series of studies designed to improve teaching methods for spelling, math, and other school subjects by using a mechanical device that would surpass the usual classroom experience. General theoretical basis of programmed instruction created by an American psychologist B.F. Skinner was based on the following principles (Tollingerová, Knězů & Kulič, 1966; Heba, Kapounová & Smyrnowa-Trybulska, 2013):

- the principle of active response;
- principle of strengthening / confidence;
- principle of small steps; control one's own pace;
- principle of management.

He believed the classroom had disadvantages because the rate of learning for different students was variable and reinforcement was also delayed due to the lack of individual attention. Since personal tutors for every student were usually unavailable, Skinner developed a theory of programmed learning that was to be implemented by teaching machines (Wleklinski, n.d.).

A teaching machine is mainly composed of a program which is a system of combined teaching and test items that takes the student gradually through the material to be learned. The „machine" involves the use of a fill-in-the-blank method on either a workbook or in a computer. If the subject is correct, he/she gets reinforcement and moves on to the next question. If the answer is incorrect, the subject studies the correct answer to increase the chance of getting reinforced next time (Wleklinski, n.d.).

The teaching machine is merely a device for presenting the set of frames of which the program is composed. However, it is not supplementary but all-inclusive. The program will do all the teaching through a response/reward mechanism. Skinner also noted that the learning process should be divided into a large number of very small steps and reinforcement must be dependent upon the completion of each step. Skinner suggested that the machine itself should not teach, but bring the student into contact with the person who composed the material it presented. He believed this was the best possible arrangement for learning because it took into account the rate of learning for each individual student. The machine is a laboursaving device because it can bring one programmer into contact with an infinite number of students. Skinner's programmed instruction became a major education and commercial enterprise that flourishes today (Wleklinski, n.d.).

Once the proposition that reinforcement is essential for learning had been stated formally, a host of experimentation developed which aimed to answer such related questions as, for example, 'How late can reinforcement occur and still be effective?' It appeared that reinforcement with any organism may be quite inefficient unless it is almost immediately subsequent to the response. Another finding emerged early from research, but, unlike the preceding one, was the subject of controversy for a long time, largely because it seemed to contradict everyday experience. This second fact is that you cannot teach anything new by punishment (disapproval, censure, etc.) for an incorrect response. What punishment seems to do is to suppress activity in general. If we regard one kind of reinforcement as the giving of information, it is easy to see how a punishment under certain conditions may give information of sorts regarding the response that has just been emitted. But that is rarely the way in which punishment is used. Much more frequent is the use of punishment for 'unlearning'; wrong responses. However, the apparent fact is that punishment at best suppresses undesirable responses but does not wipe them out or prevent their occurrence in the future (as true learning would). The third fact that became evident was that responses that are wrong can be 'unlearned'; by simply withholding the reinforcement after their occurrence. This fact, like the first one, is a trite statement to the effect that the best way of dealing with bores and fools is to ignore them. There were other facts regarding the learning process (and resulting

methods for efficient teaching) which were with more or less certainty established in psychological laboratories. But let us pause here and see to what extent we are following the rules these facts generate when we are at work in the conventional lecture hall or classroom. The student is given quizzes, but the knowledge of whether or not the answers he gives to these quizzes are correct is often not given to him until at best a day later-much too late, it appears, to effectively strengthen his behaviour and be of any learning value. Even as the teacher talks in the classroom a student may in his own mind formulate questions (and answer them for himself) without ever being sure that he gave the right answers. Giving a student immediate feedback regarding what he is doing is, of course, nothing new; the ancient Greeks knew no other system of teaching than having a single tutor for each single student. That a good tutor can teach a student efficiently is evident to anybody. And it is just as evident that if this insight (that a single tutor for a single student is better than one teacher for 20 or 30 student) were all that psychologists have to offer to modern educators faced with the task of teaching ever-increasing numbers of students, such advice would amount to no more than a bad joke. However, psychologists working on learning and teaching realized early that because of the importance of providing reinforcement for every correct response on time, it was more convenient and much more successful to invent machines which would provide reinforcement, whenever called for, without tiring (Ryans, Glaser & Schaefer, 1961; Skinner, 1986).

3.1. Personally-oriented approach

Traditionally a personally-oriented approach is considered within the framework of developing education and provides maximum consideration of individuality of a student – the unique identity of each person performing her livelihoods as a subject of lifelong development (Yakimanskaya, 1996, p. 9). I.S. Yakimanskaya rightly points out that "Individuality is a generalized characteristic feature of a person, firm expression of which (…) defines individual style of activity as a personal learning" (Yakimanskaya, 1996, p. 19). The personally-oriented approach involves "the consistent attitude of a teacher to a student as an individual, self-conscious and responsible subject of own development and as to an object of educational interaction". The purpose and objectives of personally-oriented learning is to help students to understand themselves as individuals, "to determine and reveal their capabilities and to establish identity in implementation of personally meaningful and socially acceptable forms of self-identity, self-fulfillment and self--assertion" (Bim-Bad, 2003, p. 134).

The role of a teacher in organization of developing learning is to create conditions conductive to the development of the student's personality. The system of principles that reflect the current understanding of the organization of personally-oriented learning includes the following assumptions:

- education is not a self-aim, but a means of student's abilities and inclinations development;
- each student is unique and individual;
- the student is a subject of educational process;
- supporting in training on the subjective experience of a student;
- providing student with freedom to choose the content (according to the curriculum), means and methods of learning material, organization of training;
- providing positive emotional contact in "teacher-student" and "student-student" systems based on cooperation, co-creation and motivation to succeed;
- recording the value of thought and academic progress of each participant of the educational process and tolerant attitude towards them;
- assessment of learning achievements not only for compliance with educational standards, but also as stages of individual personal growth of each student.

Thus, the implementation of the personally-oriented approach in learning enables personal

development of each student with the most complete view of its specific features. The same aim of a maximum possible development of personality and individuality is demonstrated by the constructivist didactics and open e-learning didactics.

3.2. Constructivism

The category of "constructivism" is derived from the Latin words "constructivus" (connected with construction, designing) and "iconstructio" (accession, construction). Construction in a process of learning is defined as" a means of deepening and broadening of received theoretical knowledge and development of creativity, inventive interests and aptitudes of pupils" (Bim-Bad, 2003, p. 127).

Humanism and desire for individualization are traced in constructivist pedagogy and this makes it similar to personally-oriented paradigm of education, which is particularly important in the construction of a modern theory of e-learning. Therefore, the main idea of the article is to compare the basic principles of constructivism for their further use in creating open learning didactics based on personally-oriented approach.

Educational philosophy of constructivism uses activity and consideration of individual, "subjective" experience of students and pupils. It is in the writings of J. Piaget, J. Brunner, J. Dewey, G. Gardner that ideas of constructivist didactics first appeared, embodied in many proprietary methods of self-development and "free education" (M. Montessori, R. Steiner, C. Freinet, etc.).

An activity approach and reliance on students' activity are definable, essential characteristics personally-oriented learning and constructivist didactics. Reflecting the principles of the theory of A. N. Leontiev, S. L. Rubinstein, P. Ja. Galperin, A. R. Luria, V. P. Zinchenko, A. A. Leontiev and of other researchers about the defining significance of a child's personal activity in her mental development and taking into consideration the conclusions of L. S. Vygotsky about the relationship of language and intellectual development, technologies were developed under constructivism that are related to many development concepts and technologies (for example, project-based learning, the concept of personal fulfillment, the concept of individual learning) of personal approach. Also it is important to point out that ideas of developing training are reflected in educational technologies, developed in the light of constructivist pedagogy and can be effective in the development of open learning didactics.

It is obvious that in the basis of the two paradigms (constructivism and personal learning) there is the same idea: the humanistic character of education, consideration of individual characteristics, activity-based approach and activity of a student. E. S. Polat underlines that "both areas have grown from the core values of humanistic psychology and pedagogy, which is the antithesis of traditional, authoritarian pedagogy" (Polat, 2006, p. 16). As a result, there is a justified assumption of increasing the efficiency of educational process, based on the ideas of integrative unity of these concepts. So let's discover their content and functional aspects in details and demonstrate how they can be used in the implementation of e-learning.

Constructivism rejects the ideas of the theory of objectivism and instructionism, considering the learning process as the transfer of knowledge from one who knows to the one who does not. In this radical constructivism, as the basic thesis, there is a provision stating that the process of perception does not reflect any reality, a person creates (constructs) a relative and subjective reality; education is a fully self-governing and self-organizing process: outside pedagogical impact in gaining knowledge is not decisive and effective. More flexible is the understanding of cognition mechanism within the framework of pragmatic (dialectical) constructivism, which attempts to link constructions and instructions, self-governing knowledge and training. Constructivist didactics today is mainly seen within the framework of pragmatic constructivism.

Conceptual provisions of constructivism didactics are the following: self-focused development and "self-creation" of a personality during its lifelong active interaction with society and

the environment; activity of the individual in learning and inefficiency of a transfer of fully completed knowledge to students; the importance of knowledge endowed with a personal meaning; the need for creation of conditions for self-regulated cognition; cooperation and "soft" management by the teacher etc. Constructivism considers the position of a student as an active, self-governing, mainly based on her/his own constructive activity, only from time to time controlled externally by the teacher (Mandl, Koop & Dvorak, 2004, p. 27). The modern view of foreign researchers and educators on the organizational aspects of the educational process is reflected in the fact that the teacher creates conditions for students' self-development, providing them with assistance (if it is necessary), but does not provide fully-complete knowledge, models, algorithms and methods for solving problems. This is similar to the main provisions of inverted learning, which is important in the implementation of e-learning. The teacher's activity is aimed at forming each student's independence by using the instruments of self-construction of their previous experience and personal learning environment, which includes such component as an electronic personal learning environment (Dubs, 1995, p. 30).

The system of the basic principles of constructivism didactics consists of the following provisions (Polat, 2006, p. 40-41):

- cognitive activity is an active process of constructing, by a student, of new knowledge generated from earlier experience;
- knowledge is impossible without the motivation and sense of purpose of cognition;
- the cognition process of a specific phenomenon (event) occurs simultaneously with the analyzing (thinking over) of a whole scheme of phenomena (events). As a result, the designing of training content is conducted based on the generalized concept, system knowledge and integrative skills;
- basis of experience formation is the intellectual activity of a student which allows pedagogical motivation of his mental activity (encouraging thinking out loud, statements of assumptions, hypotheses etc.);
- learning process is based on, and effective in terms of, communication and social activity of a student;
- cognitive activity is linked with a student's real life;
- cognitive activity takes time and multiple rethinking;
- training is based on the creation of conditions (choice of methods, learning, assessment tools), emphasizing the intellectual dignity of each student, in particular the value of his point of view, personal approach to solving problems, unique vision, personal style of thinking.

In light of the present view of the functions of teaching and especially its specific focus on the individual, the constructivism approach is the most appropriate approach to systematic knowledge creation and designing activities in accordance with the final result. Storage by the memory of fragments of perception as a certain "structures", the formation of knowledge systems on the basis of cognitive and informal attitude to the process of elaboration of knowledge as to the personal needs to "make" and "create", using forms of cooperation – this is the modern approach to learning activity. This approach is currently used for development of conceptual positions of open education that involves extensive use of e-learning environment and e-learning technologies. The process of continuous construction and reorganization was described in (Choshanov 2000).

3.3. E-learning

Constructivists consider students to be active participants in the learning process. Knowledge is not transferred from a person; it is an individual interpretation and processing of received information materials. The student is at the center of learning with a teacher who serves as an adviser, facilitator and supports learning, drives the student's individual learning paths. The main focus

of this theory is on learning conducted in a context. If the information is to be used in multiple contexts, then we must ensure multiple contexts learning strategies and ensure that students can widely use educational information materials. Proceeding from the foregoing, it is possible to formulate a number of theses to be used in the implementation of innovative educational technologies and e-learning which didactics is composed of nowadays:

1. Learning should be an active process. An active process involves providing students with tasks for using information in practical situations. This information may be in a single learning environment of the institution and created by all participants.
2. Students must construct their own knowledge instead of personal perception without converting the data from teachers; students should be active participants in filling the educational space of the institution.
3. Joint and cooperative learning must be implemented. Teamwork is a life experience of students involving work in groups, which allows using successes of other students and to learn from them.
4. Students are required to provide the ability to control the learning process. This is possible by using formative assessment ideas – most MOOC use peer-to-peer evaluation technology.
5. Students should be given time to think and for retrospective analysis of their activity (reflection). Such reflection is desirable to be constant and open.
6. Students should feel that learning has a personal meaning for them. So it is useful for study materials to contain examples that are close to the interests of students and interesting as additional information and take into account their individual needs and learning dominating styles.
7. Learning should be interactive in order to ensure high learning standards and social significance. Training is an extension of the space of new knowledge, skills, and relationships with reference to databases and educational environment resources, including electronic ones.
8. Constructivist learning space formed by a teacher consists of the following components: activity, constructive, cooperation, commitment, complexity, content, communicativeness, reflexivity.

3.4. Connectionism

In developing innovative approaches to implementing e-learning it is necessary to consider ideas of connectionism as information and educational space, including electronic space, in which students, teachers and administration cooperate and study, which is a network where all nodes are data carriers (human resources, scientific and methodical works, library and Internet resources), and edges are connections between network nodes. It is known that the academic standards of a university depend on established information and educational space. Leading universities have well-developed and diverse networks that work almost constantly, update and develop, and are absolutely interactive. The nodes of these networks are teachers-researchers, teachers-methods of teaching specialists, tutors, laboratory facilities, experimental basis, a powerful library, developed web resources. With these nodes students are in constant contact. In time they also become the relevant nodes of such an educational network.

Connectionism (proposed by George Siemens, 2014) is based on theories of network, chaos, hard-organized and self-organizing systems. Study, according to Siemens, is a process that takes place in an uncertain, vague and changing environment. This process cannot be fully controlled by the individual. Study can be supported from the outside and is a combination of information sources. This means creation of a personal learning environment for all students. This integration of the units allows us to rise to a higher level of understanding. Connectivism emphasizes the transient, dynamic nature of learning. The principles of connectionism include:

- learning and knowledge require diversity of approaches and opportunities to choose an effective approach;
- study is a process of network forming, connecting specialized nodes and sources of information materials;
- knowledge is in a network that is constantly changing;
- knowledge can exist separately from a person. Technology helps us in learning;
- ability to learn new things means more than accumulated knowledge. The ability to extend is more important;
- learning and cognition happen all the time – it is always a process, but never a condition;
- key skills today is the ability to see connections between fields of knowledge, concepts and ideas;
- timeliness (accuracy, renovation of knowledge) is a necessary feature of modern learning. Instead of folders came flows;
- teaching is decision making. In the light of changing reality we constantly have to make a choice of what to teach. Choosing the right thing today may be wrong tomorrow, because of changed conditions in which decisions were made.

The use of ICT in the learning process enables us firstly to increase power of information and education network (appearance of new resources) and educational environment, and secondly, to increase the links between nodes (web 2.0) and take out student outside the campus (you can involve third-party experts from industry and business). But it should be noted that such power increases gradually and most universities still do not feel it. Against the background of increasing average age of the teaching stuff changes are almost absent. Therefore, one of the priorities is to improve the qualification of teachers in ICT usage in the learning process and the services and technologies of creation and development of modern educational environment of the institution.

Siemens argues that behaviorism, connectionism and constructivism cannot be used in learning in knowledge-environments distributed online and obtain the necessary meta-skills. What is important is not the "know how", but "know where". Connectionism theory and constructivism can be used in massive open online courses (MOOC) and development of didactic basics of open e-learning.

Connectionism theory describes learning as a process of creating relationships and developing networks. It is based on the premise that knowledge exists in a world, not in the mind of a person. From a practical point of view, education should focus on where to find information (flows), and how to measure these flows, rather than trying to add it in the memory of a person.

3.5. Combined learning

In recent years, information technologies have dramatically changed education in the leading countries of the world. It is almost impossible to imagine the learning process without social services (Web 2.0). There are new pedagogical approaches (for example connectionism), massive open distance learning courses, which train, free of charge, hundreds of thousands of students. At the same time, still among modern approaches to learning combined or blended learning is the leader. By definition of the Sloan Consortium, education is considered to be combined (mixed) if distance education is within the range 20% to 80%.

At this stage combined learning is a purposeful process of gaining knowledge and skills in the integration of classroom and extracurricular academic activities by subjects of educational process on the basis of use and addition of technologies of traditional, electronic, remote and mobile learning with self-control by the student of time, place, route and rate of learning.

A combination of traditional and distance learning allows teachers to use the strengths of each learning environment to achieve academic goals. The ultimate goal of combined learning

is in improving the efficiency of learning by using systematic evaluation of related variables and integration of learning tools.

A combination of learning contributes to the optimization of resources and time, learning becomes more open; students have opportunities to learn to manage their learning and tend to be ready for the successful completion of the course.

The principles of combined learning include (Sahar, 2006):

1. Focus on the goals, rather than on method of delivery of course materials.
2. Different personal learning styles need support to achieve learning objectives.
3. Each student brings different knowledge into the learning process.
4. In many cases, the most effective strategy is to meet the needs in a timely manner.
5. There are six reasons for the use of combined training (Dubs, 1995):
6. High educational level.
7. Access to Knowledge.
8. Social interaction.
9. Personal learning.
10. Cost-effectiveness.
11. Ease of viewing.

According to Josh Berzina the key to the combined training is the right choice of social services at the lowest possible cost. To achieve this, in principle, is possible because of clear goals, and quality educational design.

Combined study is recommended to be designed with using the ADDIE technology and taxonomy of Bloom (Sahar, 2006). In a learning management system and various social services the student's activity during whole educational process is planned. This increases student's responsibility; he is not just learning a specific discipline, but learning to learn.

4. Some research results

The authors of the article conducted research among future teachers – students of the Pedagogical faculty at the University of Silesia and at Borys Grinchenko Kiev University and in-service teachers pursuing postgraduate studies, with 60 respondents from each university. Respondents received several questions to answer in an electronic mode, prepared in the Moodle system (Questionnaire) and in Google Survey.

One question concerns respondents' knowledge about pedagogy theories and teaching methods and their uses in pedagogical practice (Figure 1 and 2):

Q2. What pedagogy theories and teaching methods do you know and use in your pedagogical practice?

1)I know and I use 2) I know, but I do not use 3) I have heard of it 4) Do not know

Table 1 includes the questions with the value of Pearson criteria and level of correlation between data, received from 2 samples at the University of Silesia and at Borys Grinchenko Kiev University. The Pearson correlation coefficient for all the variables, i.e. for all the survey questions of the two samples is 0,64; it is a high value and confirms the working hypothesis that the level of knowledge of the future teachers in both regions of Poland and Ukraine do not differ significantly. Probably this is due to the fact that both universities have set up and properly operate an electronic information and education space, and the training of teachers includes thorough methodological instruction in terms of ICT, e-learning and other innovative teaching methods.

Table 1. Guestions with the value of Pearson criteria and level of correlation between data

	Questions	Pearson criteria
Q 2.1.	The development of theoretical thinking in learners (L. Vygotski, V. Davydov)	-0,84
Q 2.2.	Elements of the theory of constructivism (J. Piaget, S. Papert)	0,95
Q 2.3.	Elements of behavioral and programmed learning (J. B. Watson, B. Skinner)	-0,05
Q 2.4.	Elements of operationalization of the aims of education (S. B. Bloom, J. S. Brunner, L. Talyzina, L. Galpierin)	-0,12
Q 2.5.	Elements of connectivism (G. Simmens)	0,92
Q 2.6.	The use of ICT in the teaching of school subjects	-0,43
Q 2.7.	ICT	0,31
Q 2.8.	E-learning	0,79
Q 2.9.	MOOC	0,22
Q 2.10.	Teaching in the cloud	0,92
Q 2.11.	Teaching module	-0,02
Q 2.12.	Projects method	0,91
Q 2.13.	Subject paths	-0,26
Q 2.14.	Problem-based learning	0,96
Q 2.15.	Personalization teaching (individualization of instruction)	1,00
Q 2.16.	Varied teaching	0,45
Q 2.17.	Personality-oriented approach	0,96
Q 2.18.	Self-study	1,00
Q 2.19.	Team teaching and learning	0,99
Q 2.20.	Education in cooperation	0,76
Q 2.21.	Designing the learning process	0,50
Q 2.22.	Learning in the context of the future professional activity	0,83
Q 2.23.	Educational games	0,88

Figures 1 and 2 illustrate the survey results. The respondents are relatively well familiar with practical methods such as problem-based learning, personalization teaching (individualization of instruction), varied teaching, personality-oriented approach, self-study, team teaching and learning, education in cooperation, design of the learning process, learning in the context of the future professional activity. We can see that future teachers in Poland as well as respondents from the Ukrainian university are generally well familiar with theory and methods of learning and teaching. Elements of the theory of constructivism (J. Piaget, S. Papert), elements of behavioral and programmed learning (J. B. Watson, B. Skinner), elements of operationalization of the aims of education (S. B. Bloom, J. S. Brunner, L. Talyzina, L. Galpierin) are also familiar to the respondents.

The highest correlations (0.5–1.00) can be seen in the answers to the questions: Elements of the theory of constructivism (J. Piaget, S. Papert), Elements of connectivism (G. Simmens), E-learning, Teaching in the cloud, Projects method, Problem-based learning, Problem-based learning, Personalization teaching (individualization of instruction), Personality-oriented approach, Self-study, Team teaching and learning, Education in cooperation, Learning in the context of the future professional activity, Educational games.

On the other hand, those surveyed are not that familiar with such modern pedagogical theory as elements of connectivism (G. Simmens) as well as some contemporary methods and tools such as MOOCs, teaching in the cloud. The Ukrainian students have better knowledge of the development of theoretical thinking in learners (L. Vygotski, V. Davydov) than the Polish ones.

Of course, these results will be taken into account in the design of the future educational process and further results will be published in the authors' other article at a later time.

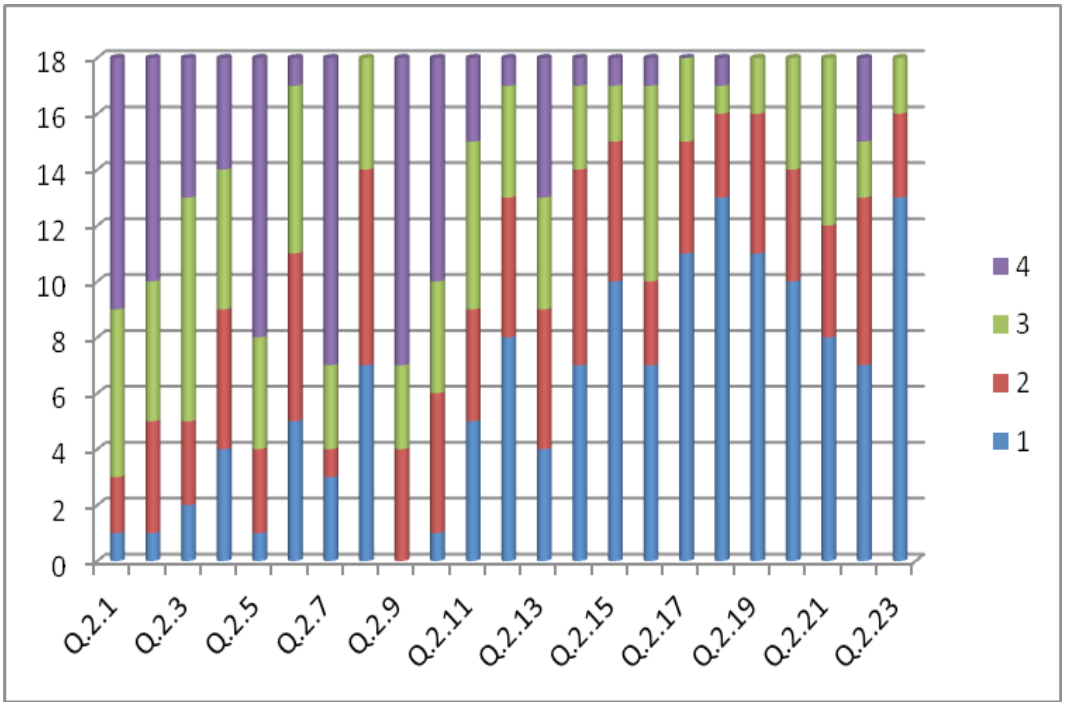

Figure 1. Answers of respondents from the University of Silesia to the question "What pedagogy theories and teaching methods do you know and use in your pedagogical practice?": 1) I know and I use 2) I know, but I do not use 3) I have heard of it 4) Do not know

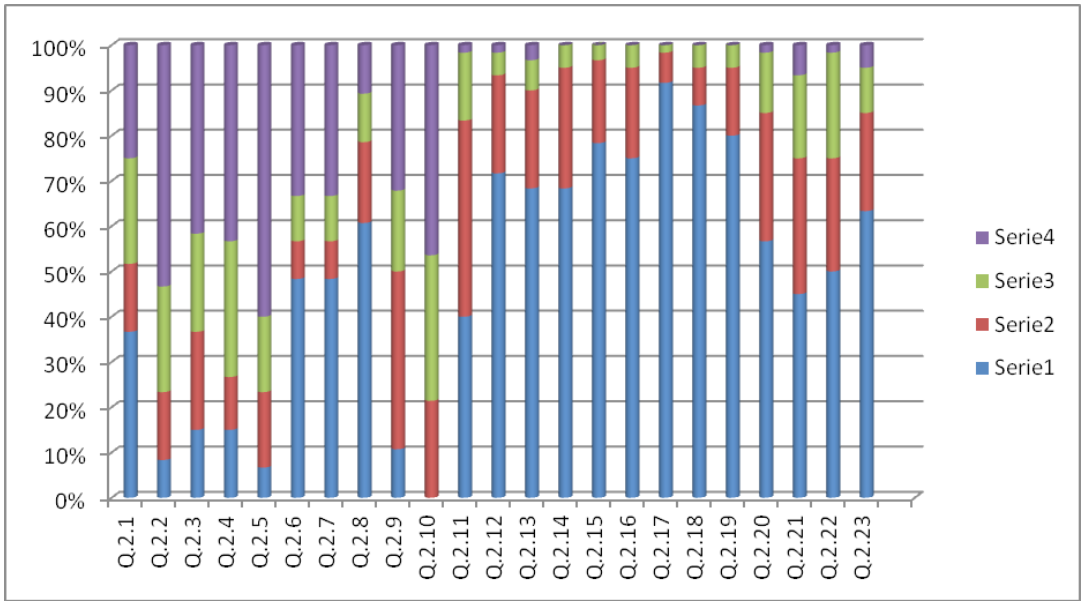

Figure 2. Answers of respondents from Borys Grinchenko Kiev University to the question "What pedagogy and teaching methods do you know and use in your pedagogical practice?": 1) I know and I use 2) I know, but I do not use 3) I have heard of it 4) Do not know

5. Conclusion

To summarize, we note that the analysis of the main provisions of programmed teaching and constructivist didactics shows that it can be understood as a pedagogical philosophy, ideology that is close to the personally-oriented approach. The affinity of personally-oriented paradigm of learning and constructivist pedagogy can be traced to several positions, particularly rich in content and functional filling. As in constructivist pedagogy, as in personally-oriented learning and as in e-learning the student is the main figure of all educational process. The objectives of constructivist pedagogy, personally-oriented learning and e-learning are to create conditions for the development of the personality and individuality of each student.

However, the content and functional fullness of personally-oriented approach concepts, programmed teaching, constructivist pedagogy and e-learning have originality and distinction. Considering learning as an active process in which the student is in a situational interaction with the teacher and constructs her/his own knowledge, constructivist pedagogy specifies targets of individual approach to learning and suggests ways to achieve them. Thus the principles of training remain unchanged: activity, reliance on subjective experience and independence of the student – the main factors of developmental education. Focusing on the development of personality and individuality, education constructivism, in fact, offers a way to achieve the goal of developing education, thereby reflecting the tactics of the educational process within the framework of the strategic statements of personally-oriented educational paradigm. At the same time, e-learning forms an information-educational environment in which contact between students and teachers occurs, and as a result generates an information network of the university. However, this network also aims at forming the independence of each student as it provides management of self-construction of their experience, including the use of a personal educational learning environment. So today, the use of electronic environment and e-learning forms the basis for the development of conceptual positions of open education in connection with components of programmed teaching and learning.

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