



Technology of Mastering Educational Material in Universities

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ABSTRACT

The modern conditions of globalization processes stipulate to raise the demands for training future specialists. Variability of life situations and conditions of professional activity realization actualize the problem of creating technologies of mastering educational material in universities, which favour both improvement of educational class efficiency in particular, and quality of professional preparation in general. The author has elaborated effective educational classes called studactive, for university students. Implementing such classes into the educational process furthers heightening the level of mastering educational material by students, realization of professional growth in accordance with capabilities and natural abilities of future specialists, formation of personal qualities. The article deals with the problem of elaborating the technology of carrying out such classes. It is proved that such a technology is directed at realization of all stages of a studactive class. The principles which the technology is based on are characterized. It is stated that the technology is orientated at highly efficient preparation of future specialists. The stages of organization of the educational process in class, management of out-of-class work and active educational activity by students, realization of active educational interaction modes which are included into the technology of conducting studactive classes, are researched. The functions and main demands for objective assessment of educational progress of students are analyzed. Along with a wide range of powers for students, collective and individual estimation of future specialists' activity is introduced. During the control stage a common status for all class participants is created. It is emphasized that the most part of control is held by students rather than teachers. "Mutual control" and "self-control" are outlined. The advantages of the technology of carrying out studactive classes are revealed.

Keywords: educational class; mastering educational material; technology; student; university

1. INTRODUCTION

In conditions of post-industrial epoch, an impressing rate of scientific and technical progress, development of modern economics and industrial sphere there is a more and more urgent need in highly qualified specialists capable for life changes along with the fundamental ideological paradigms. It promotes elaborating new approaches for preparation of future specialists of all majors as well as its correction. In connection with this there is a necessity to make the educational process pedagogically managed, directed at a specific result. The technological approach in preparation of future specialists and creating highly efficient technologies of mastering educational material in universities are still urgent.

The elements of a technological approach were used by world-famous pedagogues many centuries ago. For example it is well-known that Y.A. Komenskiy highlighted the skill to define a goal correctly, choose the means to achieve it and form the rules to use these means. The boom of interest in technological aspects is a characteristic feature of the XX century. Among the sciences which are established are pragmatic psychology and pedagogy, industrial pedagogy, programme learning etc. Besides this, technical means are implemented into the educational process. Gradual accumulation of specific pedagogical modes in accordance with a well-known transition of quantitative changes into qualitative one leads to creation of basic innovations. Technologies have become such innovations in education.

The aims of technologies are different. Some of them are directed at knowledge, skills and habits, others – either at formation of thinking or creative qualities, or key competences etc. On the other hand it is obvious that not only knowledge or thinking is important but also the inner-self of a professional. That is why the technologies which are directed not only at formation of professional but also personal qualities are especially valuable.

Preparation of highly qualified specialists together with effective mastering of educational material and formation of personal qualities can be successfully realized at studactive classes. Such classes have a new structure and acquiring and mastering knowledge becomes a life necessity of a student [1].

At the same time the technology of such classes is still not researched. The article is dedicated to this problem.

Research questions

The study was guided by the following research questions:

- What is the aim, or what is the technology of a studactive class directed at?
- What principles and ideas stipulate understanding of such a technology?
- What are the advantages of such a technology?

2. LITERATURE REVIEW

The word “technology” comes from Greek words “techne” – art, craft and “logos” – word, doctrine [2-4]. That is why in the process of mastering the educative material the technology literally means a word or a doctrine about art to master the educative material.

In the pedagogic science at first technology was connected only with application of technical means in studies [2,5]. Then a term underwent several transformations and now there is a great quantity of its definitions. They differ depending upon the region of its application, and even within one country the term is understood in various ways. In the

western part of Europe and the USA the notion “educational technology” prevails. It is visibly or latently connected with application of technical means, a computer in particular [6-8].

In the result of the definitions analysis of the notion “educational technology” we have come to one more conclusion, namely that this notion is multifaceted and each author emphasizes the key aspects chosen by them. For example:

“The use of video to bring the depths of the universe to the learner’s eyes; the use of the Internet to give the learner instant access to thoughts and observations of humanity’s greatest thinkers – these are examples of technology facilitating the application of our own senses, memories, and cognitive abilities” [9]. In the same work the author gives the following definition:

Educational technology is the considered implementation of appropriate tools, techniques, or processes that facilitate the application of senses, memory, and cognition to enhance teaching practices and improve learning outcomes.

Besides the conditions by which a technology has value are indicated and it is emphasized that an educational technology is intended to provide assistance and support to both students and teachers. If a technology does not improve learning outcomes, there is no point to utilize it [9].

The Association for Educational Communications and Technology has given the world the following definition:

Educational technology is the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources [10].

There are a lot of comments concerning this definition in scientific literature as well as in different blogs. The thing is that the word “facilitating” is left unnoticed. Can one take it for the key aspect of the definition? The philosophical question is: What is facilitating for solving a task – finding the answer on one’s own or looking for it in the Internet? For some people finding the answer on one’s own facilitates solving the task. It will take them less time than surfing the net and they will take pleasure from the process of solving. Still other people would not even try to solve the task on their own but would start searching for the clue in the Internet at hand. Exactly this choice will facilitate their activity. It depends upon a number of reasons. A rhetorical question arises: which variant of the considered above should be assumed by a student to learn solving tasks. Another thing is if “facilitating learning and improving performance” is considered as an inseparable link in the definition, i.e. improving those results which the technology is directed at.

It should be mentioned that the notion “educational technology” is mostly defined through “facilitating”. Hence there are some questions:

- Will the essence of the notion “educational technology” change if “facilitating” is omitted?
- What notion will be defined then?
- What will we get if “facilitating” is changed into “complicating”? Don’t we get “educational technology” for all this?

In the eastern part of Europe scientists differentiate between “pedagogic technology” where application of technical means is not obligatory, and the “technology of education”, while “educational technology” is defined in another way [5,11]. Differences in explanations do not prevent scientists from practically unanimous:

- stating that application of technologies should provide a forecast specific result,
- outlining three components of a technology, the names of which also are not unanimously agreed upon (Fig. 1).

In the article [1] a new notion “studactive class” is grounded and introduced into the world scientific practice. On the base of the research of the didactic functions of studactive classes and their scientific content in comparison with other types of educational classes, the conclusion is drawn that studactive classes differ from the ones known before (lectures, practical classes, laboratory work etc). This difference lies in the specific organization of the whole pedagogical activity of all class participants, the way of obtaining competences of a future specialist, the type of management of the cognitive activity. The macrostructure of a studactive class is grounded. It is defined on the basis of provision of active individual work of each student in the unified process of obtaining and qualitative formation of competences that allows to provide natural communication for the participants of the educational process, share the results of their work. It is determined that the essence of the methodical aspect of organization of the studactive class lies in mastering active forms and methods of work both by a teacher in order to organize and provide help for students in overcoming difficulties and eliminating mistakes, and by future specialists for their self-cognitive activity taking into account their personality and subject specificity.

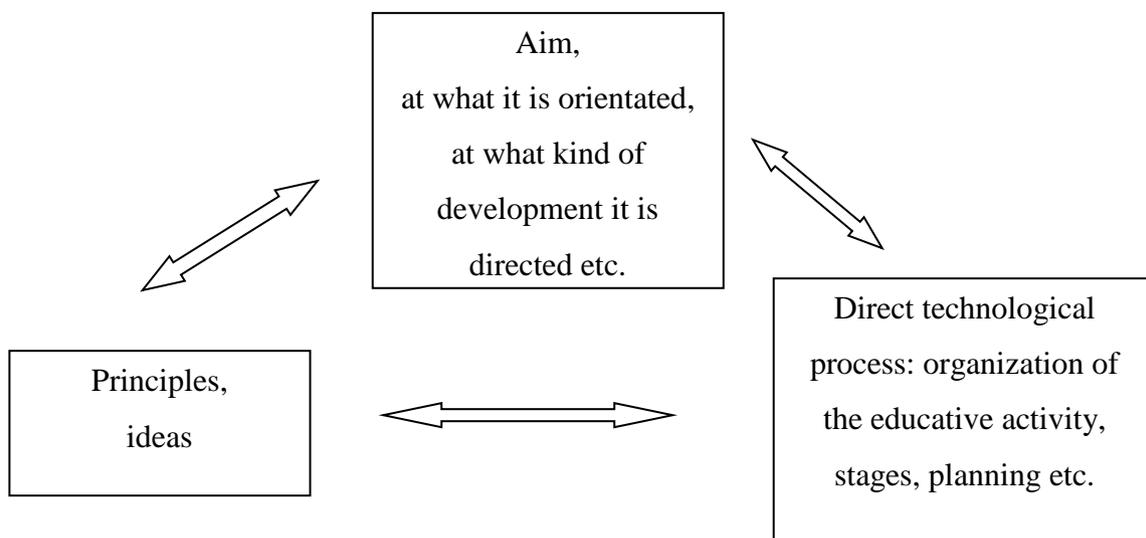


Fig. 1. Technology Components.

The methods of mastering knowledge are based on the deliberate independent acquiring new knowledge, forming a dynamic stereotype to self-improve and self-develop, drawing to a permanent active process to reveal knowledge [1].

The task that has emerged lies in comprehensive outline of the technology of a studactive class on the base of its structure, didactic functions that is peculiar for its progredient active creative individual mastering by students of the educational material and

competencies in coherence with self-reflection, self-improvement, self-realization under the influence of collegiality, and is orientated at professional interest.

3. DISCUSSIONS AND RESULTS

From the research conclusions [1] it stems obviously that the technology of carrying out studactive classes is orientated at highly efficient acquiring and mastering knowledge, professional development of a future specialist in accordance with their natural capabilities and abilities, formation of personal qualities.

It is determined that the technology of carrying out a studactive class is directed at implementation of all its stages, it is realized both out of class and in class. Besides it includes organization of the educational process through a studactive class, management of individual out-of-class work and active participation of students, usage of stimulation methods, realization of modes of active educational interaction.

Let us characterize the common principles which the technology of carrying a studactive class is based on. In their work teachers are guided by the goal of training specialists of a world level who combine a wide fundamental, scientific, practical preparation, are able to solve complicated tasks that will provide the state progress and personal well-being. Didactic principles come from the aim.

The principle of deliberate individual learning. At a studactive class practically everything is done by specialists individually. To have students working deliberately and individually it is necessary to teach them first of all rational methods of individual work: to use a text-book, a reference book, a dictionary; surf the Internet for specific information; write summaries, theses, resumes; fix and work out tasks results; analyze data; make conclusions; create tasks, schemes, questions; foresee possibilities to use the learnt material in the practical activity. To attain this objective it should be noted that general and methodical briefing-recommendations as well as consultations are held, special instructions are handed out.

The principle of simplicity and individualization. A studactive class presupposes passing from the simple to the difficult, from the close to the remote. It is organized as individual work of each student taking into account their psychological abilities, knowledge, skills and habits along with the level of cognitive interest.

The principle of spiral-likeness. Studactive classes are made up of both the new material and partly the one that is already covered. Thanks to it some students catch up with the material that was missed, while others consider the same problem from different angles at a more complicated level.

The principle of mutual enrichment of students. Organization of a studactive class allows to use methods and forms of work which give the possibility to share thoughts and creative activity in a free way that stimulates formation of a creative personality and fosters such skills as the ability to outline and formulate the problem, point out hypotheses, search, find and realize the way of its checking, introducing students into a common process of acquiring and mastering knowledge, creating positive emotional background in which the topic is learnt, providing student communicative interaction and cognitive activity.

The principle of mutual and self-control. Self-control encompasses inner motives that appear as a result of realization of the contradiction between competences already mastered by a future specialist and the necessity to acquire the new ones and become proficient in the ways of personal activity control and its realization. At a studactive class students undergo not only self- control but also mutual control, for example while working in micro-groups. The aim of self-control and mutual control is to avoid erroneous actions or operations and to make corrections. The pedagogic activity of students is organized in such a way as to give the possibility for permanent control.

The principle of partnership and collaboration. Such a class changes completely the relations between a teacher and a student. Relations are built on a partnership base. Collaboration is grounded on a collective interaction. Students form their democratic self-consciousness, become co-authors of a class, play the role both of a student and a teacher.

The principle of freedom. The essence of the principle is that a relative freedom in actions is given to future specialists as subjects of the pedagogical process. Students are free personalities who individually define and utter their attitude to the things that happen. This principle orientates them at the maximum activation of personal potential, maximum usage of personal individual capabilities in creative activity.

The principle of deliberate educational and cognitive activity. The activity is manifested in a way where new knowledge is given to students not in a ready form but has to be revealed in the unity of theory and practice in the process of deliberate actions. The pedagogic mastery of a teacher is revealed in the skill to motivate such educational activity in order to provoke not only students' interest but also their demand for self-cognition and development of skills to overcome barriers while reaching success in mastering educational material. Educational and cognitive activity favours development of thinking, formation of personal views, extending and deepening knowledge that is necessary in the structure of professional qualities. Such an activity helps to reveal the features peculiar to each student which have practical meaning at the present moment. In perceptible forms of cognition subjectivity is stipulated mostly by peculiarities of the nervous system, logical and language forms along with the former knowledge.

The principle of the systematic character and consistency. The systematic character of learning obliges students to build their personal educational process by the didactic logics. It does define consistency and the character of elaboration of each topic, working out tasks, questions in their gradual complication. The specificity of the principle is that namely the systematic character and consistency of learning are the means of mediated by consciousness mutual determination of the truth and values of the things being studied.

The principle of collegiality. Management is held by a group of people who have the equal rights and responsibilities in decision-making. Such a group consists of the chosen students and as a rule a teacher. As an exception all students may belong to this group. The teacher's vote does not differ from others'. The possibility is provided to any student to address these leaders at the necessary time.

The principle of connection between studying and professional activity. This principle is expressed in the choice and formation of the educational material. As far as possible studying of the topic is connected with doing those professional operations which will be done by professionally qualified specialists in labour collectives. The peculiarities of the professional

activity of future specialists are taken into account and mastering of the professional cultures at all subjects is motivated. Reflection in terms of the social context of the professional activity is foreseen.

The principle of creativity. This principle is connected with the faith in each student's creative abilities which are possible to be trained. Students' activity is directed at creation of different values, it is permeated with the elements of improvement, enrichment, development of social feelings, communicative and empathic skills.

The principle of success and self-actualization. Any trials of students to develop their natural and socially acquired capabilities are stimulated, publicly noticed and supported. The least successful activity of class participants is emphasized. If there are no visible achievements so far, the hope is expressed for success in the nearest time. The possibility is created for a future specialist to experience joy from personal growth and development.

The principle of scientific character of studying. Conformity to natural laws of studying as well as those related to the educational material, psychology of perception, imagination, understanding and mastering educational material are taken into account basing on the scientific achievements. Students study not only the ways of acquiring knowledge individually regarding the recent science achievements, but also the ways to use it, especially in the professional sphere.

The principle of using the visual aids. Teaching students encompasses a wide range of visual aids forms: subject visual aids in the forms of labour tools; word and image visual aids in descriptions of professionally significant events from life of famous figures of a specific sphere or society; conventionally illustrative visual aids such as schemes, drawings, tables etc; dynamic visual aids such as video-clips, movies. Functions of visual aids depend on the didactic goal.

It should be marked that to realize the considered principles, educational technologies in [7,8] can be used to a wide extent. Let us remind you that educative and cognitive activity is formed out of class where students' knowledge is checked on the previous topic or several topics, students' consultations are held, task for in-class work are composed [1].

Drawing students in the individual composing of tasks is held systematically and consistently. Didactic demands for the system of quality for composing tasks by students is illustrated in the Fig. 2.

It is proved that organization of the studactive class consists of:

1. rate fixing of a studactive class;
2. planning of a studactive class;
3. educational and methodical provision;
4. studying labour-intensiveness of s studactive class;
5. motivation of the educative activity;
6. control of active students' work;
7. analysis of knowledge quality.

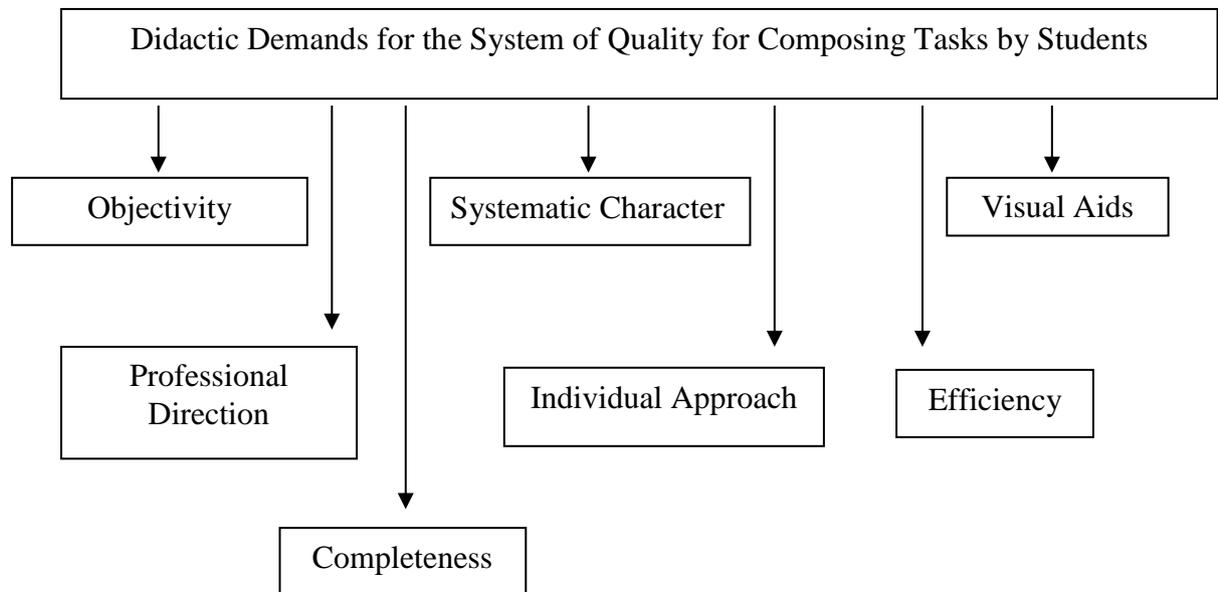


Fig. 2. Demands for Composing Tasks.

Research done by N. Talyzina, N. Kurdiukova as well as personal experience confirm the necessity to provide students' control in intersession periods, moreover the more frequent is the feedback, the more precise is the process of management. Measurement of students' educative achievements is a form of feedback, a source of information for a teacher about the process of mastering educative material by students, completeness and intensity of its studying [12].

Control at a studactive class helps students to estimate their achievements and mistakes critically, organize their further work in a correct way, provide its systematic and regular character. Control efficiency at such a class depends directly on combination of a teacher's controlling activity and students' self-control together with mutual control. All forms of work in class and by preparation to it are assessed in points (pass units) getting immediate pass by those who get the specific sum of points for active innovative work.

Let us clear up in what way it is possible to assess students objectively and stimulate their wish to study. The process of assessments in our understanding is interaction of a teacher and students or technical system and students, the result of which is a mark or estimation. The mark is a number, i.e. quantity of points that come from assessment of a student's activity. Estimation in a narrow sense means verbal or non-verbal reactions given to a student's activity. In a wider sense it is defining and expressing in conventional signs and teacher's appraisal judgements the extent to which students master knowledge, skills and habits in accordance with programme demands, level of diligence and discipline. So, estimation is a mark together with partial estimation [11,12].

Studying the process of assessing student activity in universities has confirmed the absence of a precise, generally accepted and scientifically grounded corresponding thesis. Most frequently teachers are guided by personal intuitive ideas about assessment criteria. Marks also depend upon a teacher's attitude to a student: if this attitude is negative then the marks are lowered; upon a teacher's character and personal qualities: giving everybody too

high a mark that causes insufficient student diligence and development. Or on the contrary, when negative judgements prevail students may not have any chance to get a high mark. Some teachers do not use the whole scale of marks, practically do not give the highest or the lowest points, postpone the mark, assess the answer according to the logics of thoughts, class attendance, average progress in departments, level of students' knowledge in groups etc.

The mark depends on the student ability to control oneself in interrogation. It is a well-known fact that students with a weak nervous system make mistakes more often during control than while doing their homework. In research of many scientists there is an inter-correlation between the level of anxiety and progress of pupils or students. By the absence of anxiety the progress is lowered as well.

During a studactive class there is no place for this drawback because of responsibility. At such classes both collective and individual estimation of future specialists' activity are introduced. The control is conducted not only by a teacher but also by students. The peculiarity of the researched technology is that student activity is assessed by all participants of an educative class. Moreover students themselves recognize their achievements. Objective assessment of a student activity leads to understanding its significance, favours overcoming fears, lack of skills and knowledge, psychological oppression and other difficulties. Avoidance of negativisms additionally creates and intensifies the subjective psychological state of satisfaction from the result of personal efforts that stimulates professional growth. In this case there is a place for release of latent capabilities of a personality, transformation and realization of spiritual strength. A student acquires skills of assessment of other people's activity that is necessary for future work at enterprises. Estimation of students by students during a feedback is expressed in measurement characteristics that are defined by goals of education. Homework is assessed by a combination of signs "+" and "-". The sign "-" does not dispirit psychologically to such an extent as an unsatisfactory mark. The numbered mark is not obligatory given. All disputes are solved collectively and in favour of a student. For a verbal estimation the following rule in judgements is strongly recommended: positivism – negativism – positivism; or just positivism. The line such as positivism – negativism, or negativism – positivism are avoided. It is strongly recommended as well not to assess a future specialist's activity only in a negative way.

Notwithstanding that teachers experience a lack of unity, specificity and precision in the list of criteria of students' assessment, we consider expedient to take into account the following points:

- completeness and comprehension of mastering the most important scientific information;
- knowledge and understanding of connections and interdependence between the studied phenomena, laws, regularities and rules;
- the skill to use the acquired knowledge for the correct interpretation of specific facts and phenomena of the real life;
- independence of opinions;
- diligence of students by working with material.

If students make efforts while studying educative material, and get a lower mark than they desire without emphasizing their diligence, then in some time their aspiration for learning may disappear. In such a situation a teacher has to fix the student activity results with the help of a collective mark, as well as to stress by estimation their diligence and efforts that

are noticed. Stimulation of a student will depend upon the level of appropriateness of estimation for a specific situation and student, chosen by a teacher.

Besides a stimulating function, the suggested assessment during studactive classes has a corrective function as student may compare their results with others'.

Realization of a diagnostic function is possible due to assessment by all participants of a class through attaining validity, accuracy and reliability of control. The level of mastering educative material, its size and extension by students is exposed. Students ask correct questions and use the terminology that is clear not only for students but for a teacher as well.

Due to a permanent feedback, an educative function is realized that is defined by the level of knowledge, skills and habits growth noticed by control. A student has the possibility to find out what is done correctly and where there are errors and ways to correct them.

During control students develop their personal blocks, namely collaboration under the scheme: things I know – things I study – things I will study. Students even do not try to cheat while doing tests. So the upbringing function is realized. Confirmation of values of humanistic pedagogy along with harmonious formation of intellectual and moral qualities of a personality, are obligatory taken into account.

Knowledge increase does not always lead to development. This thesis cannot be true for questioning at studactive classes when speech and syncretic thinking are developed. That is why a developing function of future specialists' activity is singled out.

Application of self-control and mutual control of students both in class and out of class favours understanding of a goal and tasks as well as high results of educative and cognitive activity, usage of didactic innovations in the context of doing tasks, combination of new knowledge with the one mastered earlier, formation of general and specific educative skills and habits, comprehension of personal mistakes and their analysis, adequate self-estimation of students. Mutual checking is an important component of control of educative achievements of students. With this aim the following creative modes are used: analysis of the composed plan, formulation of questions, searching and finding variants of answers or their choice, formulation of conclusions on the base of the elaborated educative material, work with reference books with the aim to specify and add factual material.

It is proved that such control of mastering educative material by future specialists in universities furthers improvement of objectivity in estimation and assurance of students in the least level of a teacher's subjectivism during control.

It is determined that one of the most important factors which influence success of a studactive class is management of active student's work by a teacher. The basic components of this process are researched.

During studactive classes the following modes of active educational interaction elaborated by us were approved:

- 1) search for the truth through a series of logical operations which motivate students for collaboration;
- 2) opinion of audience concerning specific content elements of the studied topic;
- 3) composing and solving different types of tasks;
- 4) composing questions on a topic, their analysis;
- 5) visual aids for a structural composition of a topic;
- 6) emphasizing the main problem of the given topic;

- 7) building logically consistent chains of arguments and facts;
- 8) comparison, analysis, synthesis, conclusions;
- 9) working out schemes, tables etc;
- 10) didactic material in the form of handouts (graphs, citations, content questions for analysis, tests, tasks, schemes etc);
- 11) creating problematic and professional situations, finding their active productive and research solutions;
- 12) search for rational methods to solve tasks, prove theorems etc.

Among the advantages of the technology of a studactive class are the following ones:

- 1) Students master knowledge in accordance with their personal intellectual level that gives the possibility to reveal talented personalities and conduct scientific work with them.
- 2) Future specialists learn on their own to acquire competences and use them.
- 3) Along with the development of skills of individual work students learn to summarise their reports or solutions to tasks in a brief and schematic way, search for mistakes, ask questions as well as think creatively, expose intellectual capabilities and communicative habits, control their behaviour, logically express their thoughts, argumentatively prove other people's wrongness and change their opinion.
- 4) In-class time period is shortened.
- 5) A future specialist plays simultaneously a role of being both a student and a teacher, that relieves a university teacher from some tasks through delegating a part of their authority, teaches students to be responsible, shapes their personality.
- 6) Organization skills, leader qualities, skills of research work are formed. Students learn how to use the specific notions correctly, formulate statements, deductions, demonstrations, change hypotheses and a strategy of solving problems, apply the acquired knowledge in non-standard situations, analysis and estimation of personal and others' achievements, expose tolerant attitude to opponents, assess consequences of their own actions as well as their groupmates' actions from different points of view, deliberately control the process of both their own personal thinking and their groupmates'.
- 7) The studactive technology promotes interconnections with groupmates that are similar to their professional relations with colleagues, adaptive transition from a student collective to a labour one.
- 8) Students with poor progress are given the possibility to keep up with the average pace.
- 9) There is a possibility for a teacher and students to get an immediate feedback concerning the state of mastering the educative material by each student and do the corresponding corrections in studies.
- 10) The process of up-bringing is based on formation of an intellectual humane personality, their creative abilities, development of positive human qualities, adaptation in the social life etc.

4. CONCLUSIONS

Thus, the technology of a studactive class involves organization, management of student individual in- and out-of-class work, application of methods of stimulation, realization of the elaborated modes of active interaction.

The didactic principles which the technology of studactive classes in universities is based on, are characterized. Among them are the principle of deliberate individual learning, simplicity and individualization, spiral-likeness, mutual enrichment of students, mutual and self-control, partnership and collaboration, freedom, deliberate educational and cognitive activity, the systematic character and consistency, collegiality, connection between studying and professional activity, creativity, success and self-actualization, scientific character of studying, using the visual aids.

It is proved that the technology of a studactive class favours the reduction of in-class hours, development of skills not only of individual work but also creative thinking and intellectual abilities. Students are taught to summarize their presentations and task solutions schematically and find errors. Besides, communication skills are fostered: students become able to manage their personal behaviour, express thoughts, formulate questions, argumentatively reassure in somebody's wrongness and change their opinions. At a studactive class students form their organization skills, leader qualities, responsibility, skills to do research work, use the studied notions correctly, change hypotheses and strategies of solving problems, use the acquired knowledge in non-standard situations and analyses as well as personal and others' estimation, tolerant attitude to opponents, estimate the consequences of personal and groupmates' actions. It provides interconnections with groupmates similar to the professional ones with colleagues, adaptive transition from a student collective to a labour one.

The control of mastering the educative material in universities is revealed that furthers increase in objectivity of estimation and assurance of students of the limited teachers' subjectivism by control. The significant principles, main functions and demands for assessment are analyzed. The notions of collective and individual estimation are introduced, control is held by students to a larger extent than by a teacher. The stages of organization of a studactive class are revealed. The modes of active educative interaction are worked out, they proved to be efficient at studactive classes in universities.

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