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# PSYCHOLOGY OF KNOWLEDGE CONSTRUCTING IN THE FRAMEWORK OF "PROBLEM INTERPRETATION STUDY" TECHNOLOGY

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## *Abstract*

The urgency of the presented research problem is determined by the need to use innovative educational technologies to maximize the use of cognitive and creative resources of students as active participants of the educational process and the current lack of such technologies in the modern educational space. The purpose of the article is to describe the content of the educational technology of problem interpretations by the example of the formation of the ethical competencies of students. The article describes the educational technology, which is based on the idea of knowledge constructing by students independently during learning processes. Theoretical base of technology consists of three main approaches: about the zones of nearest development, about the student as an initiator of development and self-development during educational activities, about constructivism in education. Also it combines the key ideas about constructing and self-constructing, problem-based learning and creativity. The leading method of research was forming experiment, which allowed to explore and to test all the main aspects of the proposed technology. The article presents the results of the approbation of technology which ensured the growth of ethical development among students. The algorithm of technology can be used by teachers and graduate students of higher educational institutions for various disciplines with an ethical focus and ethical content.



**Keywords:** Education, technology, interpretation, students, learning, constructing

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# 1. Introduction

The effectiveness of modern educational technologies is determined by the recognition of students as active participants of learning processes. Therefore, one of the main tasks of modern education involves mastering by a future specialist the methodology of creative advances. In this case, the process of creative advances is understood as discovering of new knowledge by students. This approach is corresponding to one of the key points of the study - the idea of constructivism in education. According to this idea, teaching should not be about presenting ready-made knowledge. The formation of knowledge is carried out through its constructing. The student doesn't receive ready-made knowledge, which is "alien" to him, but constructs it in accordance with the inner picture of his own worldview. In this case, one of the ways to improve the effectiveness of educational technologies is to use the mechanism of interpretation – the process of identifying the meanings of the phenomena in the process of trying to understand them. The technology of problem interpretations, which is proposed in this research, is a procedure that allows students to find solutions of non-standard problems and develops their critical thinking skills and motivation.

The knowledge, which is constructed by student independently during educational processes, was explored in the framework of technology, which was called "problem interpretation study." The theoretical base of this technology included three general provisions. First provision was about the "zone of the nearest development" (Vygotsky, 1999). According this idea, the effectiveness of student learning could be improved through the creation of special conditions, where the student moves from the zone of actual development to the zone of potential development. Thus, the educational environment of the university is the space where the student gets the opportunity for such step forward and for the encouragement of his/her pro-activeness.

According to the second provision, the student is an active participant (figure) of the educational process who is on equal footing with his/her teacher (Brushlinsky & Polikarpov, 1999; Davydov, 1986; Zimnyaya, 2000; Ivoshina & Shvareva 2010; Kudryavtsev & Urazalieva, 2002; Tsukerman, 1996). The essence of this approach implies the understanding of a student as proactive participant in the cognitive activity, as an agent in the educational process.

The third theoretical provision involves the concept of constructivism in education. The key idea of this approach (Beerenwinkel & von Arx, 2017; Brooks & Brooks, 1999; Dragonas et al., 2015; Kiraly, 2000; Li, 2017; Moreira, 2017; Rivera, 2016; Tchoshanov, 2000) is that knowledge can't be simply transferred to the learner in a ready-made form. A student can only construct and build up his/her own knowledge through organizing certain educational conditions. Consequently, each person over the course of his/her life constructs his/her own understanding of the surrounding world, including the construction of knowledge in his/her educational activity.

## 1.1. The person as an initiator of development and self-development

The technology proposed in the study solves the highlighted problem and presents an effective instrument of developing of ethical competencies that determine the successful professional activity of psychologists. This technology was based on the conceptual provisions of the model of the psychological organization of person as the initiator of development and self-development (Popov, 2005).

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The psychological organization of a person as an initiator of development and self-development is a phenomenon that includes the inner world of person. The main provisions of this model are based on general principles of the systemic approach (Lomov, 1984):

1). The presence in the system of static and dynamic;

2). Hierarchical subordination of structures;

3). Development and self-development of the system in time.

The model of psychological organization of a person as an initiator of development and self-development includes two main complexes (space-time and determinant) and a development mechanism. The basis of the development mechanism is presented by provisions about the mutual transitions (*Leontiev, 2005*), internalization of external actions (Halperin, 1985), phases of creativity and thinking (Ponomarev, 1976; Rubinstein, 1973), the zones of the nearest development (Vygotsky, 1999).

The base of the proposed technology consisted of provisions about the psychological mechanism of creativity and about internal and external actions as part of the cognitive (space-time) complex of used model.

The cognitive complex consists of static and dynamic components. Static components entail the outcomes (results) of the person's interaction with objects that exist in the form of images: perceptual, representative and conceptual. The dynamic component includes, first of all, the processes of internal and external activity (not results as in the static case). The dynamic component represents a real reflection of initiative actions of student as continuous acts of his/her interaction with various objects of external and internal worlds: his/her external and internal activities. Thus, the dynamic component of the cognitive complex provides the most accurate understanding of the psychological mechanism of the development and self-development of the student as a person of learning activity.

Among the internal actions (inner processes) it is necessary to distinguish two branches. The first is a branch of the students' quantitative filling of their intellectual repository.

In this version, information from outside is taken by the student as a matter of course and is integrated into his/her internal information space without any thought (critical) processing. This branch is a reflection of the "information hunger" of the student, the spontaneous placement of any information inside his/her consciousness for the purpose of subsequent extraction without any processing – what can be presented through the concept of "reproductive activity". A person who uses this method of internal actions can possess vast encyclopedic knowledge without being able to achieve success in a specific area (science, practice or art), because he/she uses only the experience of other people without creating anything new himself/herself.

The second is a branch of qualitative transformation of incoming information. And here it should be noted that external creation and internal transformation are phenomena of the same order – acts of creativity (external and internal).

The main sign of inner creativity is the transformation of incoming information from the phase of "saturation" to the phase of "the problem statement." Internal processes (Ponomarev, 1976; Rubinstein, 1973, Brushlinsky, 1970) are taken in the highest form of activity (productive) and are considered through the stages of thinking and creativity. Thinking, according to Rubinshtein (1973*)* and his followers, has the following stages: 1) saturation; 2) the problem; 3) the hypothesis; 4) tasks; 5) findings (the creation of the model of the phenomenon considered the limiting level of generalization). Creativity, according to

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Ponomarev (1976*)* and his followers, has the following sequence of stages: 1) saturation; 2) the problem; 3) the collapse of logical programs; 4) incubation; 5) intuitive insight; 6) verbalization; 7) formalization (which also ends with the creation of the model of the highest level of generalization). The difference between these approaches is a different degree of realizing the processes. In the thought variant, all the marked stages are recognized (in person's consciousness), and in creativity two stages ("incubation" and "intuitive insight") are not recognized.

The first stage of the external processes is reproduction, then the stage of "reproduction with improvisations" comes, after that the stage of "creation" takes place, which is carried out in two directions: substantial and technological. The substantial direction answers the question: "what is created?" In contrast to the technological one, which answers the question: "how is it created?". Both directions have three levels of significance of created outcomes (results): creation for oneself (individual creativity), creation for subculture (for a few others) and creation for culture (objective creativity).

According to the "psychological pendulum" (Popov, 2005*)*, all mental processes, including intellectual ones, have an oscillatory-rhythmic basis. In psychology, this manifests itself in the form of internally-external processes, which are continually being committed by every person. In the framework of this study, this is the intellectual-activity processes. Integrating the idea of a psychological pendulum with ideas of Vygotsky, we concluded that the most important thing in the development and self-development of a person is the constant expansion of the zones of his/her development: from the zones where person performs simple actions (saturation and reproduction) to the zones of maximum productivity (production). The person's readiness for independent movement from the zones of minimum development to the zones of greatest development (in particular, mastering of new branches of science and practice) can be considered as his/her ability for self-development.

As the means that support the processes of self-development are various manifestations of internal determination. These are: certain values, social expectations, ideals, achievement aspirations. These internal determinants constantly create a state of imbalance that a person seeks to restore – something which is designated as motivation in psychological theories.

### 1.2. The optimal educational process and conditions

According to Andreev (2000) the most optimal educational process is the one which gives the student the opportunity to move from the stage of development to the stage of self-development. Or, in other words, which enables moving from the stage of external motivation to the stage of internal motivation. This also correlates with idea of independent movement to the zone of the nearest development: from the zone of actual development into the zones of potential development. This is what, according to the research of Stern (1997) is called "introception" - the process of transforming externally given goals into the internal goals of the personality.

Practical disciplines, which are most effective in the process of developing the competences of a future specialist (master, bachelor), are one of the forms of the educational process, where students can show their activity, moving from the zone of the actual to the zone of potential development.

Within the framework of the proposed technology based on the model which is described above, students are given the opportunity not only to receive certain information, but also to master the

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professional competences (in this case ethical ones) necessary for further professional activities. The organization of certain conditions activates students' mechanism of “introception’’, which is connected with their internal motivation and stimulates their movement into the zone of the nearest (potential) development.

Seeing students as the initiators of development and self-development allows teachers to use the strategy of a holistic approach. In this case, the teacher by pushing the student towards creative activities shifts the focus from the traditional mode of passively receiving knowledge (contemplative activity) to stimulating him/her to transform the world around him/her.

In accordance with the provisions of the model of a person as an initiator of development, it is necessary to make efforts constantly for activating of the reciprocal crossings of internal and external actions and for expanding of the zone of nearest development of a student. According to the criteria of elements of the psychological mechanism of creativity, the proposed technology includes the creation of internal and external products at the level of "creation for the few others" (for subculture).

## 2. Problem Statement

The use of modern educational paradigms should be based on the view of a student as an initiator of his/her development and self-development. Moreover, one of the main tasks at higher education institutions should be encouraging the creativity of students through stimulation of their self-processes. Solving of this task defines the problem of the research – the creation of educational technology based on the psychological principles of self-constructing by students as active participants of the educational process and with the maximum use of their cognitive and creative resources.

The modern psychological and pedagogical arsenal of learning tools in higher education includes a large number of technologies and techniques based on the stimulation of the cognitive and creative potential of students. The variety of methods of active learning (including the use of case studies, discussions, problem lectures and elements of training during sessions) shows shifting from the view of the student as an object of influence to the view of the student as an active and equal participant of educational process. At the same time, the analysis of psychological and pedagogical sources shows the lack of research related to the problem of developing the ethical competencies of student psychologists through using technologies, based on activation of mechanisms of interpreting problem situations (cases).

## 3. Research Questions

The stimulation of the creative and cognitive abilities of a person as the initiator of self-development and the use of psychological mechanisms of the independent construction of knowledge by students in educational processes allows to increase the effectiveness of education in higher educational institutions

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## 4. Purpose of the Study

The purpose of work - to create and test the technology «Problem interpretation study», which includes ideas of constructivism and self-development and aimed at the active assimilation by student the ethical competences

## 5. Research Methods

Over the process of designing the described technology, the following research methods were used: theoretical analysis, “forming” experiment, systematization of theoretical and empirical facts, designing and modeling, testing, observation, interviewing, group discussions, brainstorming, questioning and approbation.

The analysis of actual active learning methods, where the student is seen as an active participant of educational process, has allowed to create the described technology. As the leading method of research, a “forming” experiment was realized. During assessment of the technology’s effectiveness were used such methods as observation, interviewing, group discussions, questioning and testing. The interviews were conducting after each session and at the final stage of the experiment. The testing was conducted after approbation of the technology and consisted in assessing of the current level of student’s ethical competencies.

### 5.1. Experimental base

The experimental base of the research was Kazan Federal University. The approbation of the technology was carried out through the work with two groups of students: students of psychology and students of clinical psychology.

### 5.2. Stages of research

The research included three main stages.

The first stage involved theoretical analysis of the conceptual approaches related to the active role of a student in educational activities, related to the basic principles of active learning and effective learning technologies that are used in modern education. The problem, purpose and tasks of experimental research were also identified.

At the second stage "Problem interpretation study" technology for the development of the ethical competencies of students of psychology was created. It was built on the principles of activity and constructivism in education. During this stage were established: the structure of the technology, its procedural components and main exercises, tools for assessing its effectiveness.

The third stage included the approbation of the technology. Assessment of the technology effectiveness was conducted within the framework of the discipline "Professional Ethics" in two experimental groups.

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## 6. Findings

"Problem interpretation study" technology was based on the cognitive-search activity of students during their collective and individual work with problems set by their teacher. The key idea of the technology was focused on the interpretation processes: students constructed their own understanding of the material within the framework of problem situations.

The general task of the teacher was to coordinate student's activity and included: the analysis of known facts, the setting of problem situations, consultations. The main tasks of students included: analysis of problem situations, collective discussions, independent generating of solution hypotheses, relating individual and group hypotheses, integrating and generalizing of the results.

The structure of technology included five main stages: activation, problem situations, collective interpretations, individual interpretations, reflection.

### 6.1. Description of the structure of technology

The activation stage was aimed at stimulating cognitive and creative abilities of students. Students were introduced to the basic idea of technology and received an attitude to actively participate in the planned work. To help students, the teacher offered a variety of information resources that reflected the basic didactic units of the studied discipline. At this stage, the teacher created learning situations for actualizing cognitive qualities of students and formed motivational attitudes that stimulated an active personal filling to the content of the sessions.

In particular, students were asked to build an individual roadmap for the development of ethical competencies within the framework of the discipline "Professional ethics" and jointly solved the problem of assessing the productivity of each session. The main results of this stage were finished in the form of individual training plans for each student and in the creation of a collective "Productivity (effectiveness) questionnaire of the session".

The activity of the teacher at this stage was limited to the following tasks:

1. To stimulate students' interest to sessions through using of a variety of methods and forms of work (game, visual, discussion);

2. To create problem situations and search conversations;

3. To organize (coordinate) educational activities of students in a given direction;

4. Continually support the cognitive activity of students and promote the maximum possible disclosure of their potential;

The results of this stage included the activation of cognitive and creative activity of students, the increase of their interest towards the academic discipline, the development of their communicative and research competencies.

At the stage of problem situations students were tasked with various problem situations (cases) for their solving through group discussions. The key idea of this stage was to construct these cases independently from teacher. Students were identifying for themselves actual ethical problems, on the basis of which learning cases with ethical content were created. Working in a group, students created a case, which described a situation that contained a certain ethical problem. Modeling problem situations,

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students tried to penetrate into the essence of the phenomenon (problem) in question and during the process of constructing their cases, they have been searching and finding new ways of their interpretation.

Then groups received cases designed by other groups and suggested their own solutions. The role of the teacher at this stage was to coordinate the search activity of students, refraining from assessing of presented cases.

The advantages of using the basic principles of the case-study method were the following: 1) improving the effectiveness of vocational training; 2) stimulation and maintenance of high motivation for the learning process; 3) the improvement of the skills of situation analysis, development of skills in working with information; 4) modeling and forecasting of possible solutions to the problem; 5) development of decision-making skills; 6) development of skills to defend personal position and development of skills for critical evaluation of different points of view on the problem. An additional advantage of using cases in the proposed technology was the work with a variety of interpretations that stimulated the creative and cognitive skills of students and enabled them to design their new knowledge (to create knowledge), what is correlated with the basic positions of the constructivism approach in education.

The stage of collective interpretations included representation by students their semantic images in the framework of the selected problem situation to the single educational field, formed during discussions. The role of the teacher at this stage was to coordinate the discussions and create competitive conditions between the students. Students planned a search plan and put forward various options for solving cases. The teacher was creating a problem situation and was organizing a collective discussion in order to find possible solutions. Students, based on their previous experience and knowledge, were expressing their own assumptions about how to solve the problem situation and were summarizing previously acquired knowledge, chose the most rational version of its solution.

Three steps of collective interpretation were singled out:

1. Analysis of the problem situation. At this stage, students collected the maximum amount of information, using their own experience and information sources.

2. Exchange of views. At this stage students searched the right vector of way out of the problem situation. The result of this stage was largely determined by the organization of discussions.

3. Finding possible alternatives in solving a problem. The result of this step was the most complete list of possible solutions to the problem.

The stage of individual interpretation included constructing of own understanding of the material by the students within the framework of the problem situation. At this stage, from the variety of solutions to problems and hypotheses proposed in a collective discussion, the student has been choosing an acceptable option for himself based on personal interpretations.

The stage of reflection involved the consideration of new knowledge, its systematization and exchange of views on the accomplished work. The stage of reflection as a final step consisted of mutual exchange of impressions, opinions, feelings of the members of the group and the teacher about the work done. The information, received during this stage, made it possible to diagnose the effectiveness of the educational process, to evaluate the results of the activities of the teacher and students during sessions. Also, the results of this stage gave the teacher the material for future modifications, changes and improvements in technology.

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Finally, it should also be noted that the work of students with problem interpretations during the realization of the proposed technology included two main forms: problem-based and creative.

The problem-based form of the work presupposed the organization of problematic situations by the teacher (various ethical dilemmas and tasks) with collective discussion of possible approaches to their solution. Students, based on previous experience and knowledge, expressed suggestions on how to solve the problematic situation, generalized previously acquired knowledge, identified the causes of phenomena and chose the most rational options for solving the problem.

The creative form of work assumed the development of the initiative of the students and the manifestation of their creative qualities. Students through various discussions and exchange of opinions (personal interpretations of problem situations) developed fantasy, imagination, flexibility and divergence of thought processes.

The final result included mastering of ethical skills (ethical competencies) by students.

### 6.2. Approbation of technology

The technology of problem interpretations was tested at the Institute of Psychology and Education of Kazan Federal University among students in the framework of discipline "Professional Ethics". The verification of the effectiveness of this technology included integration of results from students: their feedback, the assessments of their knowledge, the analysis of their problem-based discussions and monitoring the process of them going through the stages.

The experiment has covered two groups of respondents – students of the Institute of Psychology and Education enrolled in the programmes "Clinical Psychology" (Group 1) and "Psychology" (Group 2).

The main tool for analyzing the effectiveness of the proposed technology was “The questionnaire for assessing the productivity (effectiveness) of sessions” – specially created during research. This questionnaire was designed at the beginning of the technology implementation jointly with students. And there were three control points of analyzing the technology effectiveness by this questionnaire in each of the groups: at the beginning (the first assessment), in the middle (the second assessment), at the end (the third assessment).

“The questionnaire for assessing the productivity (effectiveness) of sessions” involved three blocks (components):

1. Organizational component (regulation of sessions; discipline; sticking to the plan and etc.).

2. The procedural component (the level of cognitive activity; feedback; the interactive component of the session; using of game and discussion forms of work; the effectiveness of group and individual work, etc.).

3 The outcome component – it presented the results of the session (the contribution of the session to the development of competences; the level of mastering the material; novelty, etc.)

According to the results of the first diagnostic measurement (first assessment) in Group 1, the results of every item of the questionnaire were analyzed through systematizing empirical data. Among them: “Hygiene” ($\tilde{x}$=5.7), which shows quite comfortable conditions of students work (room, lighting, airing the auditorium); “Effectiveness of the group work” ($\tilde{x}$=7.1) and “Effectiveness of individual work” ($\tilde{x}$=6.2). Also, this is “Accessibility (understandability) of the studied material” ($\tilde{x}$=7.2); “Feedback

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among members of the group and the teacher" ($\tilde{x}$=14.7), "Psychological climate during the session" ($\tilde{x}$=7.3).

The overall results of the first measurement in Group 1 are shown in Table 01.

**Table 01.** Efficiency of the technology of problem interpretations at first control point (Group 1)

| Components | $\tilde{X}$ | Potential maximum |
|---|---|---|
| The organizational component | 15,5 | 20 |
| The procedural component | 200,25 | 240 |
| The outcome component | 47,25 | 60 |

The results of the second measurement (intermediate assessment) showed high values on following points of the questionnaire: "The structure of the session organization" ($\tilde{x}$=8.9) – indicated compliance with the regulation of sessions and sticking to the plan; "Using of discussion as learning form during sessions" ($\tilde{x}$=9.5) – the result of which was the formation of communicative and research competences. Also high values were: "Effectiveness of the group work" ($\tilde{x}$=8.4) and "Effectiveness of individual work" ($\tilde{x}$=8.5); "Level of creativity during session" ($\tilde{x}$=18), "Psychological climate during the session" ($\tilde{x}$=8.7).

The overall results of the second measurement in Group 1 are shown in Table 02.

**Table 02.** The efficiency of the technology of problem interpretations at second control point (Group 1)

| Components | $\tilde{X}$ | Potential maximum |
|---|---|---|
| Organizational component | 16,6 | 20 |
| The procedural component | 212,1 | 240 |
| The outcome component | 53,6 | 60 |

The results of the third measurement (final assessment) showed high values on following points of the questionnaire: "The level of visibility during session" ($\tilde{x}$=7); "The effectiveness of the group work" ($\tilde{x}$=7); "Psychological climate during the session" ($\tilde{x}$=7).

The overall results of the third measurement in Group 1 are shown in Table 03.

**Table 03.** Efficiency of the technology of problem interpretations at third control point (Group 1)

| Components | $\tilde{X}$ | Potential maximum |
|---|---|---|
| Organizational component | 19,5 | 20 |
| The procedural component | 230 | 240 |
| The outcome component | 58,7 | 60 |

According to the results of the first diagnostic measurement in Group 2, the results of every item of the questionnaire were also analyzed through systematizing empirical data. Among them: "Accessibility (understandability) of the studied materials" ($\tilde{x}$=8), which indicates the student's satisfaction with the pace and way in which information was presented to them; "Using discussion as learning form during sessions" ($\tilde{x}$=8); "Feedback among members of the group and the teacher" ($\tilde{x}$=15).
The overall results of the first measurement in Group 2 are shown in Table 04.

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**Table 04.** Efficiency of the technology of problem interpretations at first control point (Group 2)

| Components | $\tilde{X}$ | Potential maximum |
|---|---|---|
| The organizational component | 14,5 | 20 |
| The procedural component | 200 | 240 |
| The outcome component | 50 | 60 |

The results of the second measurement (intermediate assessment) in Group 2 showed high values on following points of the questionnaire: "Accessibility (understandability) of the studied material" ($\tilde{x}$=7.6); "Feedback among members of the group and the teacher" ($\tilde{x}$=16); "Using of audiovisual means during session" ($\tilde{x}$=7.7); "Effectiveness of the group work" ($\tilde{x}$=7,7); "Satisfaction with the session" ($\tilde{x}$=15.7).

The overall results of the second measurement in Group 2 are shown in Table 05.

**Table 05.** Efficiency of the technology of problem interpretations at second control point (Group 2)

| Components | $\tilde{X}$ | Potential maximum |
|---|---|---|
| Organizational component | 17 | 20 |
| The procedural component | 219 | 240 |
| The outcome component | 52,5 | 60 |

The results of the third measurement (final assessment) in Group 2 showed high values on following points of the questionnaire: "Accessibility (understandability) of the studied material" ($\tilde{x}$=7); "Feedback among members of the group and the teacher" ($\tilde{x}$=14.5); "Using of game as learning form during sessions" ($\tilde{x}$=7); "Effectiveness of the group work" ($\tilde{x}$=6.8) and "Effectiveness of individual work" ($\tilde{x}$=6.8).

The overall results of the third measurement in Group 2 are shown in Table 06.

**Table 06.** Efficiency of the technology of problem interpretations at third control point (Group 2)

| Components | $\tilde{X}$ | Potential maximum |
|---|---|---|
| Organizational component | 18,5 | 20 |
| The procedural component | 222,4 | 240 |
| The outcome component | 54,8 | 60 |

In general, the results of the assessment of all sessions showed the overall effectiveness of the proposed technology of problem interpretations for the development of the ethical competencies of psychology students.

## 7. Conclusion

The technology of problem interpretations has been developed and tested. It is based on the idea of self-construction of knowledge by students during the educational process and allows developing of ethical competences of students-psychologists.

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Technology includes three main approaches: about the zones of nearest development, about the student as an initiator of development and self-development during educational activity, about constructivism in education. Also it combines the key ideas about constructing and self-constructing, problem-based learning and creativity.

Approbation of technology has proved its effectiveness among students – psychologists in the framework of discipline "Professional ethics".

Algorithm of technology can be used in mastering knowledge within the framework of various disciplines with an ethical focus.

Research materials can be used by graduate students and teachers of higher educational institutions who are interested in improving the effectiveness of teaching students through the use of innovative educational technologies.

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