

# Technologies of active learning in the context of the risks of modern professional education

*Tatyana Scherbakova*<sup>1,\*</sup>, *Dinamutdin Misirov*<sup>2</sup>, *Marina Akopyan*<sup>2</sup>, *Larisa Ogannisyan*<sup>2</sup>, and *Ivan Danchuk*<sup>2</sup>

<sup>1</sup>Don State Technical University, 344003, Gagarin Square, 1, Rostov-on-Don, Russia

<sup>2</sup>Southern Federal University, 344065, Dneprovskiy str., 116, Rostov-on-Don, Russia

**Abstract.** The article includes a comprehensive analysis of the specifics of the system of active learning methods and a description of its resources in the professional training of future specialists in the context of modern modernization of higher education. Based on the results of the analysis of current trends in the development of a variety of technologies and formats of training in higher education, the criteria for determining their feasibility are identified. The paper presents an overview of the significant psychological characteristics of the teacher, acting as internal determinants of successful activity based on active learning methods. Various components of students' project activity are considered. The advantages of active teaching methods in the development of professional thinking, reflection of students' experience and competencies in ensuring the productivity of their advancement in educational and professional activities are revealed. Based on the analysis of the results of empirical research, the article describes the content features of modern students' ideas about the resources and risks of active learning methods for their role in achieving a high level of professional competence development. The psychological factors that determine the success of the use of active learning methods in professional education are identified.

## 1 Introduction

The modern state standard and the existing social order regarding the quality of vocational education and its results draw attention to the need to develop competence that ensures the competitiveness of specialists, here the primary role is played by methods of active training. It is in the format of active learning that students' resource capabilities are updated, they are included in the activity, and tension is reduced through the use of game simulation methods.

In the professional educational environment, the methods of active learning allow us to solve the important task of improving the communicative competence of students, contributing to the development of the technology of cooperation and team forms of work. The productive use of active learning methods requires special psychological training in the direction of the teacher's development as a tutor and moderator, with an emphasis on such

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\*Corresponding author: [tatiananik@list.ru](mailto:tatiananik@list.ru)

professional functions as actualization, interaction, and providing psychological comfort to the student.

The system of active learning methods is characterized by high resource capacity in terms of not only the formation of subject and meta-subject competencies of students, but also the development of their personality. The resources of the system of active learning methods include the following:

great opportunities for active participation in training sessions, students with different starting opportunities; high emotional saturation of the activity, which contributes to increasing cognitive motivation; the formation of teamwork skills;

expanding the possibilities of self-presentation of students; a different form of content presentation, which assumes capacity and at the same time appropriate timing; when presenting educational information, all representative systems are used; productive models of effective navigation in the information space are broadcast. However, in the practice of using active learning methods, there may be certain risks. These include: insufficient level of professional competence of the teacher as a moderator and coach; the predominance of the game component of the lesson over the educational content; psychological barriers to communication;

insufficient methodological equipment of the lesson; unproductive use of time and information resources.

The use of active learning technology in the system of professional education allows us to productively solve a number of tasks of training a competitive specialist: the acquisition of successful experience in interactive solutions to innovative problems;

the speed of decision-making in the conditions of entropy; increase of cognitive sensitivity; expansion of cognitive behavior patterns; development of evaluative, analytical, reflexive and predictive skills, the ability to operationalize theoretical knowledge, the formation of an effective individual cognitive style.

The choice of the method should be adequate to the development competence of psychological readiness of students for productive activity in terms of both full-time and distance learning.

The advantage of simulation methods is the ability to work with large information flows, contextual consideration of the problem from different angles, but there is not enough immersion in professional issues. This group of methods allows you to individualize the learning process, enriching the individual with a fundamentally new experience of cognitive activity. Insufficiently competent application of simulation methods can frustrate students, block their cognitive activity and actualize psychological defenses.

The use of active learning methods implies a systematic presentation of the following modules: motivation, diagnostics, reflection, training, and instrumentation. In psychology, it is shown that the emphasis on the methods of situational learning in modern professional education is due to the need to develop systematic and critical thinking, goal-setting competencies, design, and develop an individual style of activity [1]. Active learning methods are especially relevant when studying a cluster of disciplines with a large variety of content, where there is no ready-made answer to the question, it is assumed to develop solutions in the process of joint creative search. Also, the methods of situational learning contribute to the formation of the social aspect of the activity, the development of communicative competence in relationships with other team members.

Modern psychologists emphasize that active learning is associated with the modeling of content, enhances cognitive activity, actualizes the personal meaning of learning, setting a new format of the educational space. including the use of innovations and remote technologies [2, 3].

The transition to a system of continuing professional education involves the intensive development of various formats of active learning methods by future specialists as tools for

developing competence and intensifying cognitive activity, forming independent productive thinking and search and research activities.

The use of *igropractic* in the training of specialists during the period of study at the university in the construction of classes involves time and spatial restriction, activity, involvement, emotional saturation, psychological support, independence, and, at the same time, effective interaction of all team members.

At various stages of professional training, the relevance of the methods used to the intended purpose is important. The resourcing and effectiveness of such methods as solving typical tasks, designing; case studies, brainstorming, and a maze of actions in the formation of professional competence is confirmed by modern educational practice [4, 5, 6, 7].

In the course of the training game, professionally significant information is assigned to a new level, its integration into the structure of the cognitive sphere of the individual. Here, the student gains experience in developing a certain direction in joint activities, presenting creative projects. Students must demonstrate organizational, communicative, constructive, gnostic abilities, and the ability to work in a team.

The level of awareness of the causes of difficulties experienced in educational and professional activities increases, and the ideas about effective and ineffective algorithms of professional behavior are concretized [8].

The set and structure of *gestalts* in the perception of educational and professional information is dynamically transformed. The advantages of active learning methods are, first of all, that the student can simultaneously "feel" a real professional situation that requires a competent solution, and analyze the effectiveness of their own activity, reflect on the level of self-effectiveness. Here, meaning-making, the choice of an adequate semantic strategy for educational and professional promotion, is of particular importance. [9, 10].

As psychologists show, the method of analyzing situations encourages the student to analyze information flows in a structured way, turn to consulting services, thereby providing a theoretical basis for an individual solution to an updated problem. This method consists in the fact that it involves situations, constructing a hypothetical series, formulating a professional task, and making an optimal, expedient decision. Thus, the translation of the "case from practice" into didactic material with high learning potential is carried out (R. M. Granovskaya)

In the training of specialists in engineering and technical specialties, the "case study" method has a great educational resource. Here, the student, receiving a description of a problem situation, must independently analyze possible trends in its development, identify key issues, formulate and present a solution in the discussion space. This method allows you to create situations of success for students, which actualizes the internal motivation of educational and professional activities, motivates achievements, activates cognitive activity, and develops the skills of effective representation of their competence. The practice of using the case method today involves the implementation of a system of the following techniques: system analysis of the problem, modeling, setting up a thought experiment.

In the modern system of professional education, a large place is given to self-education as one of the ways to implement a personalized model for the development of graduate professionalism. In this context, there is a need to develop students' competence in terms of working with scientific information, this is all the more important in the context of the digital educational environment, which provides the opportunity to search and use the information array that responds to almost any professional request. At the same time, its qualitative use is possible only if there is a certain level of information competence and creativity, based on adequate technologies [11].

A special place among innovative educational technologies is occupied by the project method. In the current situation, the nature of such problems is set by the meaning and content of innovations in vocational education, where the state and social order is traced.

Today, research projects are becoming increasingly popular in professional education, but their preparation also requires special training and a high culture of working with information [12, 13].

As an assessment of creative, project tasks, research works, such parameters are considered as: justification of the choice of the research problem, independence of the selection and study of the main and additional sources in the designated problem field, analysis of different points of view, the presence of one's own attitude, the relevance of the research concept method, the competence of the experiment design, the depth of interpretation of the results, the level of generalization of conclusions, the presence of presentation in the professional community and practice. At the same time, it is important that the time allocated for independent work is used most efficiently.

The set of planned tasks includes: working out projects; questions for independent work with information and forming your own conclusions; solving professional problems, forming a portfolio, writing an essay.

To implement the didactic principle of effectiveness, feedback on the subject of course activities is necessary, as well as tracking the professional growth of students during their training at the university.

Resource-based educational opportunities of the project are related to the fact that the result of the work here is a product created by the focus group in the process of creative activity, meaningfully close to the production cycle.

The project method allows updating and generalizing the subject experience of the subject of educational and professional activity, which contributes to the development of an individual style of intellectual activity, stimulating the construction of an individual educational trajectory of advancement in the development of the profession, meeting the need for research and creative activity, self-realization and personalization.

The development of an innovative educational structure in the system of professional training generates actual practical tasks related to the possibility of implementing interactive technologies [14]

- creation of a complex digital environment in the educational space, availability of multi-level programs of activity of a teaching and developing nature, their modularity and mobility;

- development of information competence and psychological readiness of students for the productive use of information resources;

- development of modern multimedia textbooks;

- designing the current system of psychological support for the development of the student's personality in the conditions of innovative learning formats.

The brainstorming technique is quite productive in stimulating the creative activity of future specialists, which makes it possible to solve complex educational and professional problems in an unconventional way by developing creativity and hypothetical thinking.

Electronic brainstorming is widely used in the modern world. This technique triggers a system of various intellectual actions: intensive search of information, its structuring and processing, interpretation and comprehension, generation of ideas, forecasting, choice of an option from among possible solutions, implementation, reflection, correction, control.

The success of the system of methods of active learning in professional education is determined by the level of professional competence of teachers, the experience of organizing classes of this type and the degree of acceptance of the ideology of active learning and understanding of the principles of building pedagogical interaction with students in this mode [15].

The analysis of the practice of using the system of active learning methods in the structure of professional training of modern specialists makes it possible to systematize the requirements for the competence of the teacher:

- a high level of knowledge of modern scientific theory in the relevant subject area, knowledge of trends in the creation and implementation of innovative technologies;
- ability to apply technology facilitative updating intrinsic motivation, meaning making in the educational process;
- the ability to show "cognitive pluralism", tolerance to the opinions of opponents;
- clear logic of information presentation, continuity and consistency of the proposed tasks, along with the flexibility of the training format;
- a competent style of professional behavior that allows you to maximize the use of the educational resource of this training technology;
- flexibility and mobility of the cognitive sphere along with personal stability and emotional stability;
- ability to model a productive, creative educational environment;
- knowledge of techniques of indirect psychological influence and contextual learning;
- the speed of reaction in situations of uncertainty or " psychological and informational pauses»;
- creativity, variability and flexibility of thinking;
- sensitivity to innovative ideas;
- "cognitive noise immunity", which helps to identify the main and significant positions in information flows;
- high level of general culture, broad outlook, erudition, communication skills;
- pronounced ability to manage teamwork.

Of great importance today is the clarity and volume of the teacher receiving feedback from students, which allows them to improve both the classes themselves in the system of active learning methods, and their professional behavior, educational, and autopsychological competence [16].

The research of psychologists comprehensively presents the features of the optimal construction of classes using active learning technology:

- modeling of psychologically safe educational situations that allow for a free exchange of opinions and the expression of alternative trends, assertiveness of communication, the use of constructive assessments;
- building subject-subject interaction, both in the teacher-student dyad, and between the members of the study group;
- the use of the principle of a collective teacher with the delegation of the evaluation function by the members of the study group;
- development of students ' analytical, reflexive and evaluative skills in interpreting facts and information;
- harmonious integration of educational content and game forms of its presentation;
- organization of intellectual cooperation, joint search and cognitive activities to extract the necessary arguments and information to solve the problem;
- establishing clear rules and time limits for passing the modules that form the structure of the lesson;
- the use of vector analysis of the studied issues, the use of the principle of immersion in the discussion of problems.

The implementation of the indicated positions ensures the optimal use of the educational resource of active learning technologies.

## **2 Purpose of Investigation**

Study of the resources and risks of implementing active learning methods in the context of modern professional education.

### 3 Methods of Investigation

The complex of research methods includes a questionnaire survey of students using the questionnaire "Understanding of active learning methods", content analysis of the essay "Experience of active learning", a structured analysis of the practice of using active learning methods in higher education. The sample of respondents was made up of students of the 3rd-4th year of various training profiles of DSTU and SFU, in the number of 125 people.

### 4 Results and discussion

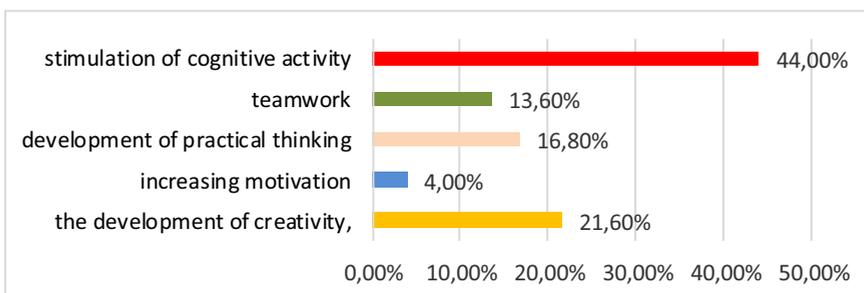
The results of the study allow us to identify the psychological result of using the technology of active learning in the system of professional education of future specialists. Competent construction of a system of methods of active learning in the educational practice of the university produces a number of effects:

- generation of creative intellectual activity of students;
- increasing the motivation of educational and professional activities, the formation of a stable personal meaning of learning;
- development of creativity, flexibility, reflexivity, variability, critical thinking;
- increasing the level of formation of communicative competence;
- development of a productive cognitive individual style;
- improvement of the individual system of ways of obtaining, processing and creative representation of information;
- formation of competencies for solving innovative problems and designing in the conditions of entropy;
- accumulation of individual experience in adequate problem formulation, problem formulation, and effective solution development;

It is important to emphasize that the content of classes implemented in the system of active learning methods should be relevant to the intended purpose of the modules of the educational professional program.

### 5 Discussion of the results

Describing the methods of active learning and interpreting their definitions, respondents identify such aspects as: involvement of students in creative activities; stimulation of search and research activity; assistance in the development of self-presentation skills; diversity of intellectual and practical activities; psychological equality of participants; use of a complex of verbal and non-verbal communication techniques. Evaluating the advantages of active learning methods, students identified a number of positions (Fig. 1)

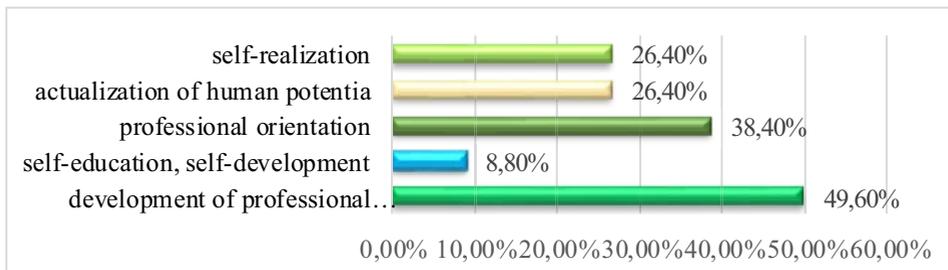


**Fig. 1.** The role of the active learning method.

From the respondents' point of view, the most significant positive effect of using active learning methods is to stimulate cognitive activity, followed by the development of creativity. Their importance in the development of practical intelligence and the formation of teamwork skills is also noted. It is interesting that, according to students, the influence of active learning methods on increasing motivation is less significant. Obviously, this reflects the idea that the motivation of students does not depend on the format of training, but is determined by the factors that determine the success of professional self-determination.

Analyzing the focus of active learning methods, students emphasize, first of all, their impact on the development of professional competence and the strengthening of the focus on the development of the profession. Their role in the actualization of potential and the promotion of self-realization is also emphasized. At the same time, students consider that the role of active learning technology in self-education and self-development is small (Fig. 2)

Obviously, this view is the result of a lack of understanding of the resources of active learning methods and a lack of experience in using their adaptive potential as a kind of simulators in the process of self-improvement.



**Fig. 2.** The role of technological education in self-education and self-development.

Of interest is the psychological portrait of a teacher who is able to successfully implement active learning methods, compiled by students. In the content of the psychological portrait of a teacher of this type, students included the following characteristics: competence, knowledge of their subject, creativity, adequacy, openness, love for the profession, activity, discipline, the ability to clearly set a goal, perseverance, tolerance, the ability to arouse interest, erudition, goodwill, emotional balance, the desire for self-improvement, the ability to correctly assess their capabilities.

The analysis of the survey results showed that the vast majority of students have a positive attitude to the methods of active learning in their professional training. At the same time, respondents also note the presence of difficulties when working in the format of active learning technologies, such as the need to respond quickly to a question, high competitiveness in the group, communication barriers, increased anxiety during public entry.

Students note that the most interesting, for them, are the project method, brainstorming and case study, while teachers most often use problem lectures, workshops and discussions. Thus, there was a contradiction between the students' request, their interest in certain teaching methods, and the actual classes offered by the teachers. This situation can provoke the risk of a decrease in interest in classes and insufficient activity in the development of educational material.

As follows from the results of the study, students reflect not only the advantages, but also the risks of using active learning methods, among them are the following: large time costs for high-quality training; passivity of a certain part of the participants; insufficient elaboration of evaluation mechanisms; discipline problems; inadequacy of the class format to the content originality of the topic; unequal participation of all group members

## 6 Conclusions

Thus, the use of active learning methods in modern professional education has great resource opportunities in the formation of professional competence of students. Productive interaction in the process of active learning involves the harmonization of the game and content components, the presence of psychological readiness of the teacher and the student to work in this format. A significant condition for the successful implementation of active learning technology is the presence of a teacher with a set of professionally significant qualities and knowledge that allow them to successfully carry out the activities of a moderator, game technician and facilitator.

## References

1. T.N. Shcherbakova, *Methods of active learning in a multicultural educational environment: resources and risks* (Publishing house of GBU DPO RO RIPK and PPRO, Rostov n/D, 2019)
2. I.A.Z. Aidrus, R.R. Asmyatullin, *Higher education in Russia* **5**, 139-145 (2015)
3. V.V. Prokhorova, E.M. Kobozeva, O.N. Kolomyts, *Education and Law* **6**, 198-202 (2016)
4. N.V. Biryukova, *The world of science, culture, and education* **2(75)**, 99-101 (2019)
5. A.K. Aganesova, A. Duysenbaeva, *International journal of experimental education* **7**, 129-132 (2013)
6. V.V. Yushkova, *Professional education. Capital* **9**, 40-41 (2012)
7. D.N. Misirov, T.N. Shcherbakova, *Proceedings of the Southern Federal University. Pedagogical Sciences: scientific and pedagogical journal* **12**, 042-048 (2012)
8. D.N. Kozhevnikov, *Bulletin of Moscow University. Series 20: Pedagogical Education* **2**, 28-37 (2016)
9. I.V. Abakumova, E.S. Zorina, *International Journal of Cognitive Research in Science, Engineering and Education* **5(2)**, 41-46 (2017)
10. E. Azarko, I. Abakumova, I. Kupriyanov, *E3S Web of Conferences* **210**, 18004 (2020)
11. M.M. Kashapov, *Integration of education* **21(4)**, 683-694 (2017) DOI:10.15507/19919468.089.021.201704.683-694
12. A.P. Kazun, L.S. Pastukhova, *Education and science* **20(2)**, 32-59 (2018) DOI: 10.17853/1994-5639-2018-2-32-59
13. K. Vahtikari, *World Conference on Timber Engineering* **27**, 315–322 (2012)
14. T.G. Vezirov, R.D. Huseynov, I.S. Huseynova, E.A. Pirmagomedova, *Education and Law* **11**, 305-309 (2018)
15. T. Shcherbakova, D. Misirov, S. Semergey, V. Erovenko, *E3S Web of Conferences* **210**, 22016 (2020)
16. T. Scherbakova, D. Misirov, M. Akopyan, L. Ogannisyan, *E3S Web of Conferences* **175**, 15013 (2020)