

Heuristic technologies of training in professional education

Эвристические технологии обучения в профессиональном образовании

Received: January 5, 2020

Accepted: March 12, 2020

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Abstract

The changed educational paradigm has identified new educational goals expressed in the form of competencies of students, which they must master to carry out future professional activities at a high level and ensure their competitiveness in the labor market. Within the framework of the competence approach, practice-oriented education is developing, so higher education institutions seek to implement technologies that actively support this direction. The purpose of the article is to analyze the experience of implementing heuristic technologies as one of the most effective in the preparation of a teacher of vocational training. Features and essence of heuristic technologies, their value in modern preparation of students are revealed. The article presents a study that reflects the use of heuristic methods to improve the preparedness of students to perform their professional activities. In the formation of the ability to analyze professional and pedagogical situations—one of the most important professional competencies of future teachers of vocational training, the method of organized strategies (the method of strategies for working with information) was applied. Heuristic teaching methods bring positive results in the formation of the ability to analyze professional and pedagogical situations. The ability to work

Аннотация

Сменившаяся образовательная парадигма обозначила новые образовательные цели, выражаемые в форме компетенций студентов, которыми они должны овладеть для осуществления будущей профессиональной деятельности на высоком уровне и обеспечения своей конкурентоспособности на рынке труда. В рамках компетентного подхода развивается практикоориентированность образования, поэтому высшие учебные заведения стремятся к реализации технологий, которые активно поддерживают данное направление. Цель статьи заключается в анализе опыта реализации эвристических технологий, как одних из самых результативных в подготовке педагога профессионального обучения. Раскрываются особенности и сущность эвристических технологий, их значение в современной подготовке студентов. В статье приведено исследование, которое отражает использование эвристических методов для повышения подготовленности студентов к выполнению своей профессиональной деятельности. В формировании способности анализировать профессионально-педагогические ситуации — одной из

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with information is an important part of the formation of this competence. We performed an analysis of the experience in implementing heuristic technologies, as one of the most effective in training a teacher of vocational training, revealed the features and essence of heuristic technologies, their significance in modern student training. Heuristic teaching methods bring positive results in the formation of the ability to analyze professional and pedagogical situations. Our methods of working with information contribute to more rapid training of teachers of vocational training. The results of testing students' skills to work with information showed that after the introduction of heuristic methods, the results became much better, which contributes to the formation of this competence. The obtained data can be used in the preparation of students in other areas of teaching pedagogical university.

Key Words: heuristic technologies, professional education, problem-based learning, personality-oriented technologies, students.

важнейших профессиональных компетенций будущих педагогов профессионального обучения, был применен метод организованных стратегий (метод стратегий работы с информацией). Эвристические методы обучения приносят положительные результаты в формировании способности анализировать профессионально-педагогические ситуации. Умение работать с информацией – важная часть формирования данной компетентности. Нами был выполнен анализ опыта реализации эвристических технологий, как одних из самых результативных в подготовке педагога профессионального обучения, раскрыты особенности и сущность эвристических технологий, их значение в современной подготовке студентов. Эвристические методы обучения приносят положительные результаты в формировании способности анализировать профессионально-педагогические ситуации. Используемые нами методы работы с информацией способствуют более оперативной подготовке педагогов профессионального обучения. Результаты проверки у студентов умений работать с информацией показали, что после внедрения эвристических методов результаты стали значительно лучше, что способствует формированию указанной компетентности. Полученные данные могут быть использованы при подготовке студентов других направлений обучения педагогического вуза.

Ключевые слова: профессиональное образование, проблемное обучение, студенты, личностно-ориентированные технологии, эвристические технологии.

Introduction

The modern system of higher education, acting on based on competence approach, aims at the formation of a competent specialist. The development of competencies is based on various activities in the course of independent, classroom work, practice of students. All of them are aimed at the formation of students' experience necessary for the implementation of future educational activities in the framework of secondary vocational education. Today, a large number of innovative educational technologies are used to comply with the requirements of the Federal state educational standard (Rakhimbayeva, et al 2019). However, the technologies used in traditional education have not lost their importance; they have been subject

to renewal and are becoming increasingly relevant in the education of high school students (Ivanova, et al 2019). Heuristic technologies are the only of effective technologies in this process (Vaskovskaya, et al 2018). There is a need to consider the educational process in the preparation of students using these technologies. They have become an integral part of modern educational life, as their essence lies in the formation of students' practical experience, which is an integral part of the competence approach (Vaganova, et al 2019a). The process of mastering knowledge and the formation of competencies is carried out through independent practical actions of students. The University in process of the vocational training teachers'

preparation in the framework of the implementation of heuristic technologies has scientific circles; problem creative groups; scientific associations, societies. The formation of General cultural and professional competencies of students is inextricably linked with the ability to work with information, so the use of heuristic methods should be aimed at improving this level.

Theoretical framework

Heuristic learning technologies have a long history. Having appeared in the time of Socrates, they were modified and acquired more modern forms, however, the main idea, consisting in the development of new knowledge through discovery, has not changed, it has become part of the competence approach, in which students become equal subjects of the educational process and receive information not in a ready form, and extracting it independently, processing a large amount of information and highlighting relevant parts of it. Thus heuristic technologies have gained importance (Smirnova, et al 2019). If the traditional approach to education meant that students received ready-made knowledge, modern heuristic technologies allow students to realize the fact of their ignorance and make it the object of research (Markova, et al 2019). The essence of heuristic technologies is the formation of students' experience of activities related to the future profession (Vaganova, et al 2019d). Heuristic technologies are closely related to problem learning technologies, as indicators of the effectiveness of the use of heuristic technologies is the formed ability to understand the existing problem and see ways to solve it, apply non-standard ways and consider it from different points of view, entering into a constructive dialogue with their fellow students and teachers (Sedykh, et al 2019). The signs of heuristic technology used in the training of future teachers of vocational training, scientists include: the problem of learning, which allows students to find many solutions to the same problem, develops the creative component of the personality of students, gives the opportunity to "immerse" in the conditions of future professional activity (Makhometa, et al.); in heuristic learning, students are divided into groups in order to solve different tasks, take on different roles, change them to participate in different activities and be fully prepared (Pometun, et al.); the teacher arranges the work of students in such a way that they develop not only knowledge, skills, but also gain experience and build competencies; the teacher takes the position of a consultant and serves as Advisor

(Koshechko, et al 2018), i.e. the interaction between the students and the teacher is carried out in equitable conditions and terms of collaboration, allowing students, taking part in collective activities that can build their individual educational trajectory (where actively used electronic equipment in order to select the most suitable students rate of learning) (Vaganova, et al 2019i); mandatory reflection (after completing each task and summarizing the results, students evaluate their own activities and identify shortcomings that should be addressed in the next work, thus improving the quality of education) (Vaganova, et al 2019b).

In the scientific literature, heuristic learning is often closely associated with personality-oriented learning, which once again confirms its relevance, since modern education puts the focus on the student's personality, interests and needs (Vaganova, et al 2019c). This is because heuristic learning technologies are associated with the development of cognitive independence of the individual (Nikonova, et al 2019a). According to I. S. Yakimenko, the technology of personality-oriented learning can be implemented in the classroom; however, it should be aimed at developing the independence of each student, the use of subjective experience of the student and the use of interactive forms of learning. V. V. Serikov notes that the implementation of heuristic technologies in conjunction with personality-oriented ones can be carried out by solving a practical problem within the framework of the game. That is, the students are given a task, then there is a constructive dialogue and the game itself is held. Such sequence of actions allows achieving positive results of formation of competences of students at the expense of careful independent work of students which is carried out at each of stages of performance of the task (Vaganova, et al 2019f).

Russian pedagogy has developed using foreign pedagogical experience, so within the framework of the implementation of heuristic training appeared technology projects (Prokhorova, et al 2018). The project is also based on a problem that requires integrated knowledge and research skills (Myalkina, et al 2018). The result of the project is a certain educational product. B. E. Raikov identifies 4 stages of logical thinking in the framework of using heuristic technologies. The first is observation and questioning; second-the construction of hypotheses, conjectural actions; third-the study of selected solutions and the choice of one of them as the most likely; fourth - the test of hypotheses and the final approval of any of them. Heuristic training involves writing

research papers at various levels: abstracts, coursework, certification (Klinkov, 2018). The tasks solved with the help of research activities can be described as follows: the development of the need for research activities, the creation of prerequisites for the development of students' creative abilities; the expansion of erudition (Kamenez, et al 2019).

Methodology

The formation of the ability to analyze professional and pedagogical situations is extremely important in the preparation of a teacher of vocational training. It is inextricably linked with the ability to use information in their activities. To assess the effectiveness of heuristic methods in the formation of the ability to work with information, we conducted a study among students enrolled in the profile "Law and law enforcement" in the number of 50 people. The study was conducted in 2017 (before the introduction of heuristic methods of working with information) and in 2018 (after the introduction).

For teachers of vocational training, it is important to form the competence "the ability to analyze professional and pedagogical situations". For its formation, the method of organized strategies was used. In our study, we used the method of information use strategy, which allows us to prepare students to work with a large amount of material, choose the necessary, relevant information, and analyze situations. Using statistical data processing, we have identified the results of tests on the ability of students to work with information. Heuristic teaching methods bring positive results in the formation of the ability to analyze professional and pedagogical situations. The ability to work with information is an important part of the formation of this competence. Our methods of working with information contribute to more rapid training of teachers of vocational training.

Results and discussion

The process of mastering educational material by students within the framework of implementation of heuristic technologies has a certain structure and sequence (Ilyashenko, et al 2019a). The teacher creates conditions for difficult situations, offers it to students, then students are divided into subgroups, distribute roles and relevant functions, formulate a problem (Ilyashenko, et al 2019b). Subgroups participate in discussions where the brainstorming method is actively used, allowing students to put forward hypotheses that

cannot be rejected in the first stages of the discussion (Ihnatenko, et al 2018). Activation of student participation in brainstorming is ensured by the absence of criticism, both from the teacher and from the students (Denysenko, et al 2018). Students in the process of discussing the problem themselves determine the viability of a hypothesis; their logical test is carried out (Chirva, et al 2018). Students draw appropriate conclusions (Bulaeva, et al 2018). So there are many solutions to one problem (in the process of discussion there are several hypotheses that matter). Subsequent research allows students to reject unnecessary hypotheses and draw appropriate conclusions. Also in the process of mastering the educational material, students implement projects (Nikonova, et al 2019b). They work on them both individually and in pairs. Projects can also be carried out in groups with a large composition (Garnevskaya, et al 2018). Teachers in the classroom organize the space in such a way that students are comfortable working with each other, discussing various issues (Bartkiv, et al 2018). The teacher tries to create an atmosphere of cooperation. The necessary educational and methodological support is formed (Abramova, et al 2018). Multimedia technologies (interactive whiteboard and projector) are used, various electronic resources are used, such as LMS Moodle, where additional reference literature is located, which students can use at any time, tools: chat, webinar, wiki are also used for the implementation of the project by students. The project is evaluated according to the following criteria: originality of ideas and solutions; degree of independence; ability to apply the theoretical knowledge in practice; the amount of new information involved in the project and the degree of awareness of this inclusion; the creative side of the project (the level of presentation of the project – oral presentation, report, multimedia presentation); practical significance of the results. Even furniture, which is arranged according to the needs of students and the objectives of the class (for individual and group work), can be used to perform the task. Figure 1 shows the work of a group of students (future teachers of vocational training) in the implementation of heuristic technologies. For teachers of vocational training, it is important to form the competence "the ability to analyze professional and pedagogical situations". We form this competence in the classroom on pedagogical disciplines. Teachers for their implementation and formation of the specified professional competence use one of effective methods of heuristic training-a method of the organized strategies. This method is designed to increase the level of training of

students for practical activities, to develop interest in research. The rules of the method of organized strategies include: in the process of working with information, it is necessary to record all suddenly emerging ideas (strategies) to solve the problem; constantly check and use

ideas. In our study, we used the method of information use strategy, which allows us to prepare students to work with a large amount of material, choose the necessary, relevant information, and analyze situations.



Fig. 1. Conducting classes using heuristic technologies as part of our study

This strategy was used in a group of students studying in the profile "Law and law enforcement". To implement the method of working with information, students were guided by the following provisions: to use the available information, collect additional material from related Sciences; to bring the experiences of others; to transform the information by the mission, its essence and specifics; to remove outdated information; to verify the validity, accuracy and reliability of the selected relevant information; to use the received new information. A group (consisting of two study groups profile "Law and law enforcement in the number of 50 people) students studied pedagogical disciplines

using heuristic methods. The level of work with information is important for the formation of the competence indicated by us. The work of students with information was checked using the following criteria: the student can highlight the main idea; the student selects relevant information; the student skillfully draws in his own and others experience, the student transforms the information by the task.

Figure 2 presents the results of 2017 (before the introduction of the heuristic method of organized strategies in the training of future teachers of vocational training).

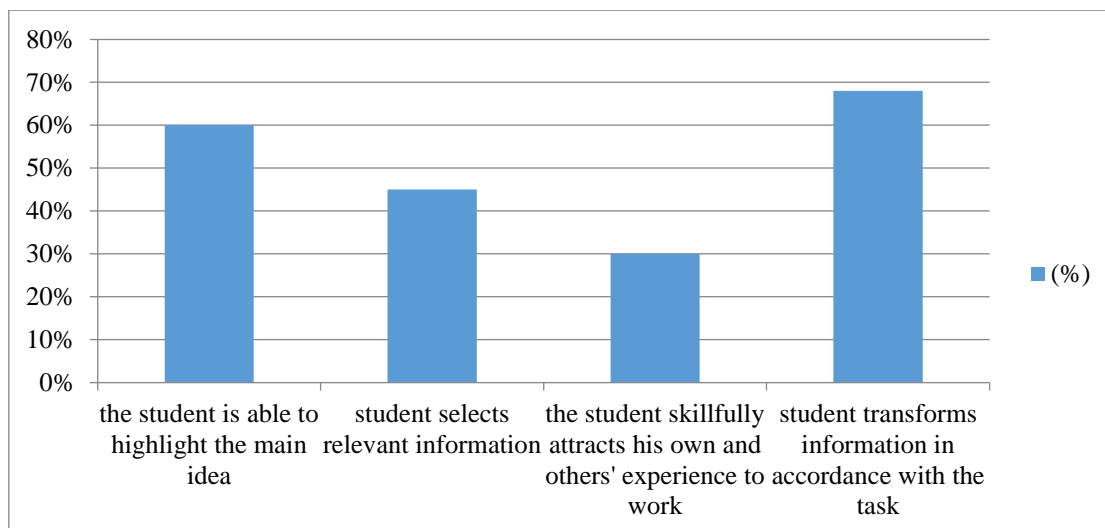


Fig. 2. The results of statistical processing of tests to identify students' ability to work with information (2017)

The results before the introduction of these heuristic methods were not high enough. The main idea in the materials, various scientific studies can correctly identify 60% of students, 45% of students can easily find relevant information for their research, only 30% of students can adapt the existing experience for

their work, 68% of students transform the information following the task.

Figure 3 highlights the results of 2018, when interactive technologies were actively used in the process of training future teachers of vocational training, including work with information that accompanied each work of students.

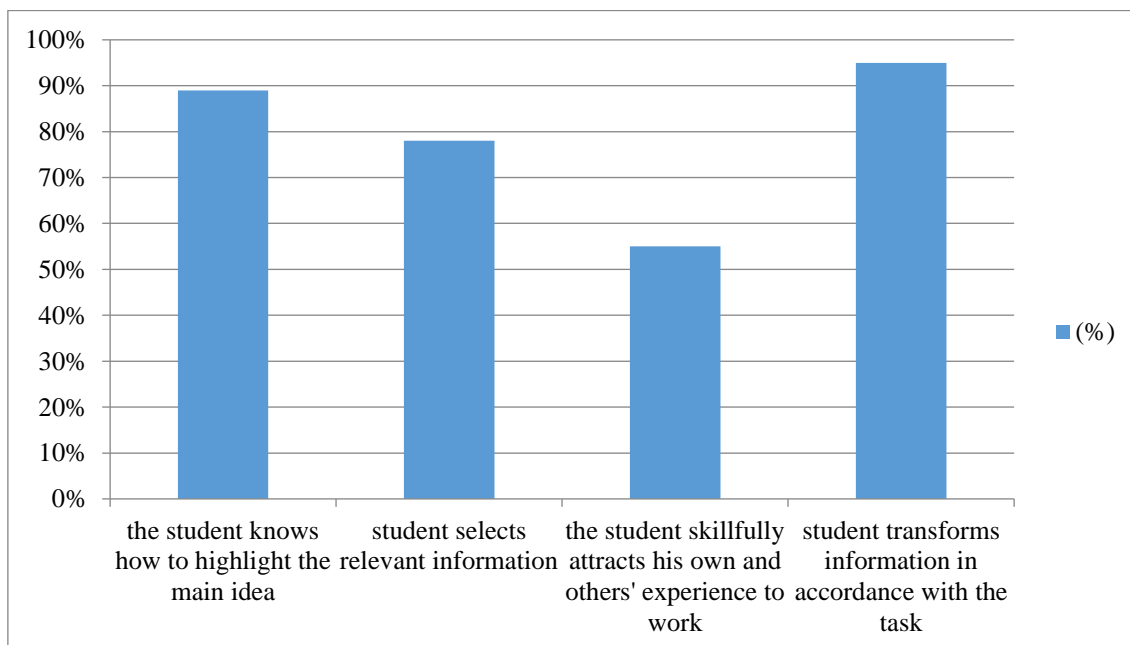


Fig. 3. Results of statistical processing of tests to identify students' ability to work with information as part of our study (2018)

89% of students can determine the main idea, 78% of students can determine the relevance of information, 55% of students attract different experiences to work, 95% of students transform information according to the task.

Figure 4 provides a visual comparison of the improvement of the results of work with information after the introduction of heuristic training methods.

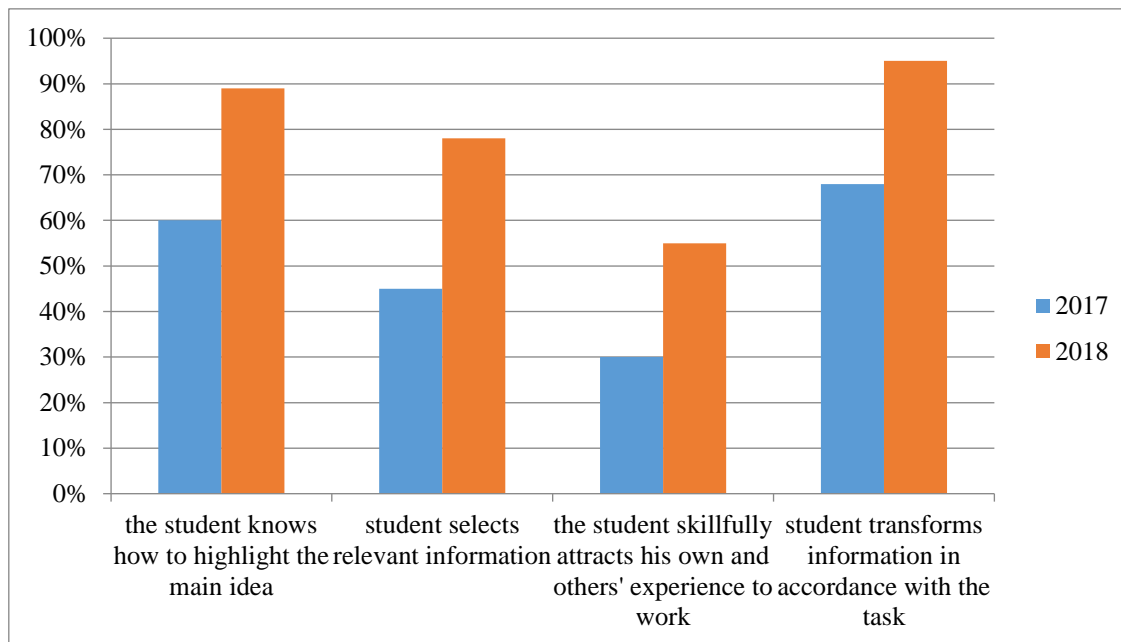


Fig. 4. The results of testing the ability of students to work with information (2017, 2018)

The figure shows that the percentage of students who can correctly use information in their activities has become much higher in 2018 than in 2017.

Conclusions

We performed an analysis of the experience in implementing heuristic technologies, as one of the most effective in training a teacher of vocational training, revealed the features and essence of heuristic technologies, their significance in modern student training. Heuristic teaching methods bring positive results in the formation of the ability to analyze professional and pedagogical situations. The rules of the method of organized strategies allow in the process of working with information to record all of the sudden ideas (strategies) of solving a problem. Under these conditions, students constantly check and use ideas; therefore a high level of work with information is developed. The ability to work with information is an important part of the formation of this competency. The methods we use to work with information contribute to more rapid training of vocational education teachers.

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