POTENTIAL OF CASE-TECHNOLOGY IN THE FORMATION OF STUDENTS' RESEARCH COMPETENCE IN PRACTICE-ORIENTED LEARNING

POTENCIAL DA TECNOLOGIA DE CASO NA FORMAÇÃO DA COMPETÊNCIA DE PESQUISA DOS ALUNOS EM APRENDIZAGEM ORIENTADA À PRÁTICA

POTENCIAL DE LA TECNOLOGÍA DE CASOS EN LA FORMACIÓN DE LA COMPETENCIA INVESTIGADORA DE LOS ESTUDIANTES EN EL APRENDIZAJE ORIENTADO A LA PRÁCTICA

Tatiana Ivanovna SHUKSHINA[1]
Yuliya Andreevna DEMYASHKINA[2]
Petr Vasilevich ZAMKIN[3]
Irina Ivanovna AVERYANOVA[4]
Guseyn Gardash Ogly ZEYNALOV[5]

ABSTRACT: The article presents the results of research on the formation of students' research competence. The authors conduct an analytical review of Russian and foreign scientific sources covering this pedagogical phenomenon. It is demonstrated that an essential role in the formation of research competence today is played by active learning technologies, which include case technologies. The potential of practice-oriented cases for classroom work used when working with students in pedagogical education and, as well as the potential of educational-research cases for extracurricular club work with school students, is revealed. The forms of cases as a means of developing research competence, requirements for them, and the implementation stages are described. The article also provides the results of practice-oriented learning carried out as part of experimental work with the use of case technologies. The authors' materials can be used in the process of developing students' research competence in both higher and secondary education institutions.

KEYWORDS: Research competence. Learners. Potential. Stages. Practice-oriented learning.

RESUMO: O artigo apresenta os resultados da pesquisa sobre o problema da formação da competência de pesquisa de alunos. Os autores realizam uma revisão analítica de fontes científicas russas e estrangeiras que cobrem esse fenômeno pedagógico. Demonstra-se que um papel essencial na formação da competência de pesquisa hoje é desempenhado pelas tecnologias ativas de aprendizagem, que incluem tecnologias de caso. Revela-se o potencial

[1] Mordovian State Pedagogical University named after M. E. Evseviev, Saransk – Russia. Doctor of Pedagogy, Professor. ORCID: https://orcid.org/0000-0001-7786-9589. E-mail: t_i_shukshina@mordgpi.ru
[2] Mordovian State Pedagogical University named after M. E. Evseviev, Saransk – Russia. Specialist for scientific and methodological work. ORCID: https://orcid.org/0000-0001-6185-2475. E-mail: yudemyashkina@yandex.ru
[3] Mordovian State Pedagogical University named after M. E. Evseviev, Saransk – Russia. Candidate of Pedagogy, Associate Professor. ORCID: https://orcid.org/0000-0002-9935-9333. E-mail: p.zamkin@yandex.ru
[4] Mordovian State Pedagogical University named after M. E. Evseviev, Saransk – Russia. Graduate Student. ORCID: https://orcid.org/0000-0003-3219-3647. E-mail: averan_21@list.ru
[5] Mordovian State Pedagogical University named after M. E. Evseviev, Saransk – Russia. Doctor of Philosophy, Professor. ORCID: https://orcid.org/0000-0002-9426-6349. E-mail: zggo@mail.ru

dos casos orientados para a prática para o trabalho em sala de aula utilizado no trabalho com alunos na educação pedagógica e, bem como o potencial dos casos de pesquisa educacional para o trabalho extracurricular de clubes com alunos da escola. São descritos os formulários dos casos como meio de desenvolver a competência de pesquisa, os requisitos para eles e as etapas de implementação. O artigo também fornece os resultados da aprendizagem orientada para a prática realizada como parte do trabalho experimental com o uso de tecnologias de caso. Os materiais dos autores podem ser usados no processo de desenvolvimento da competência de pesquisa dos alunos em instituições de ensino superior e médio.

PALAVRAS-CHAVE*: Competência de pesquisa. Alunos. Potencial. Estágios. Aprendizagem orientada para a prática.*

RESUMEN*: El artículo presenta los resultados de una investigación sobre el problema de la formación de la competencia investigativa de los estudiantes. Los autores realizan una revisión analítica de fuentes científicas rusas y extranjeras que cubren este fenómeno pedagógico. Se demuestra que un papel esencial en la formación de la competencia investigadora en la actualidad lo juegan las tecnologías de aprendizaje activo, entre las que se incluyen las tecnologías de casos. Se revela el potencial de los casos orientados a la práctica para el trabajo en el aula utilizados cuando se trabaja con estudiantes en educación pedagógica y, así como el potencial de los casos de investigación educativa para el trabajo extracurricular del club con estudiantes escolares. Se describen las formas de los casos como medio para desarrollar la competencia investigadora, los requisitos para los mismos y las etapas de implementación. El artículo también proporciona los resultados del aprendizaje orientado a la práctica llevado a cabo como parte de un trabajo experimental con el uso de tecnologías de casos. Los materiales de los autores se pueden utilizar en el proceso de desarrollo de la competencia de investigación de los estudiantes en instituciones de educación superior y secundaria.*

PALABRAS CLAVE*: Competencia investigativa. Aprendices. Potencial. Etapas. Aprendizaje orientado a la práctica.*

Introduction

In the context of profound processes of school modernization, dynamism, and uncertainty of ongoing changes, the role of the research component in various types of educational activities is increasing. Research competence is a prerequisite for openness to innovation, the ability to construct the educational process in the exploratory mode.

The most significant role in the formation of research competence today is played by the so-called active learning technology, which, according to A.A. Verbitskii (2016), marks a transition from the majorly regulating, algorithmized, programmed forms and methods of organizing the didactic process to the developing, problem-based, research, and search ones

providing for the emergence of cognitive motives and interests, the conditions for creativity in learning.

The analysis of scientific and scientific-methodological literature, educational practice, and our research experience shows that one of the effective technologies allowing to organize the formation of research competence of students is the case technology. Its use in practice-oriented education proves to be productive and effective for both future teachers and school students.

Literature review

At present, Russian studies indicate the insufficient level of development of research competence in learners (BEREZHNOVA; 2017). Scientific literature covers several aspects related to the essential characteristics, structure, and process of research competence formation: the definition of research competence (SOTNIK, 2006), the component composition of research competence (ZHURAVLEVA, 2018; AKBAEVA, 2016; SAVOSTIANOVA, 2010; LUKASHENKO, 2012), the functional description of research competence (VAKHTINA, 2013), research competence formation mechanisms (PANKINA, 2018; RYNDINA, 2011, NIKITINA, 2014; KHAMIDULLINA, 2014), and the potential of research competence in the professional activity of students in pedagogy (BUYANOVA, 2020; SHUKSHINA, 2016).

Foreign educational practice is in search of effective methods and technologies for the development of research competence in students (NUMA-SANJUAN, 2019). In universities in Europe and the USA, as well as in leading Russian economic and technical universities, complex research-type tasks, research cases, implemented in the educational process within the so-called undergraduate research experiences (UREs) or course-based undergraduate research experiences (CUREs) are widely used (JAMIESON, 2020; STEMBERGER, 2020).

To develop the skills of conducting research, the technology of "case study" has been extensively developed in foreign practice. This technology originated at Harvard Business School at the beginning of the 20th century and was originally used in business education. Along with case studies, foreign educational practice actively utilizes "case-based learning" (learning based on real situations), which is considered by scientists as one of the varieties of educational games (learning games) (SCHOTTMAN, 2014). Case studies have allowed to qualitatively change the approach to learning through familiarization with the original case

materials and the development of one's conclusions and findings (TRETIAKOV, 2016). Currently, a case study is considered in a broader sense as "a research strategy aimed at a consistent and detailed study of a single object, considering the various available ways of collecting information" (STREKALOVA, 2014).

However, in the Russian practice of university teacher training, such tasks and cases are only fragmentarily included in the content of academic disciplines and practical training programs. Along with this, the possibilities of case technology as a way to individualize the educational trajectory of a student and a mechanism to improve the quality of education and reinforce its practice-oriented approach are insufficiently used in research activities.

Methods

The present study focuses on exploring the effect of case technologies on the formation of research competence in students. The objectives of the study are: to conduct an analytical review of Russian and foreign sources addressing the issues of research competence formation in students (future teachers and school students); to demonstrate the pedagogical capabilities of case-technology in the formation of students' research competence; to experimentally test the effectiveness of case-technology in the formation of students' research competence in the process of practice-oriented learning.

The research is based on the general methodological principles of scientific objectivity, systematicity, and activity. Specific scientific orientations of the study are predetermined by the scientific concept of competence-oriented education integrating among other things the research and contextual aspects.

The main research methods are: theoretical – analysis of scientific literature and pedagogical phenomena (conceptual and terminological, comparative, analysis and synthesis, classification, generalization); empirical – an experiment, the study of regulatory documents, educational and methodological documentation, testing, survey, the study and synthesis of educational experience, assessment, as well as comparative analysis and synthesis of empirical data obtained in the pilot study. Respondents in the study are 36 2nd-4th-year pedagogy students at the Mordovia State Pedagogical University named after M.E. Evsevev, as well as 96 10th-11th-grade school students of the Municipal General Education Institution "Secondary General School № 26" in the city of Saransk.

Results and discussion

Case technology is the most effective way of organizing practice-oriented learning. This technology has broad popularity in different countries in the organization of training at different levels of the educational process as a response to the social needs of modern society. The use of cases allows meeting the demand of professional practice for training specialists with a high level of self-organization and the ability to think critically, work with large volumes of information and facts, perform complex analytical tasks, find non-standard solutions, and achieve target results. The complex of these qualities is now becoming a determining factor in increasing the competitiveness of a graduate of an educational organization.

Despite the major pedagogical potential of case technologies in the formation of meta-subject learning outcomes of students in general and project-research competencies in particular, its implementation in Russian schools is fragmentary and non-systemic. Furthermore, the possibilities of case technology as a way of individualizing a student's educational trajectory are not used in full.

Cases as a means of developing the research competence can be presented in one of two forms:

– practice-oriented cases for classroom work used with student teachers;

– educational-research cases for extracurricular club work with school students.

Let us examine the potential of using each type of case in more detail.

Practice-oriented cases as part of the work with student teachers can be implemented by presenting algorithms for conducting research, based on which certain practice-oriented professional tasks can be solved. Methodological recommendations allow recording the results of work on a case at its stages. The practice-oriented nature of cases is determined by the possibility of technologization and optimization of professional tasks. Such cases are methodologically rich, interactive, and represent a means of mastering theoretical provisions and the practical use of the material (KUZEVANOVA, 2011). The main idea of a case is that it serves as a model for acquiring new knowledge about the situation and behavior in it (ANIKUSHINA, 2010).

When designing a practice-oriented case, the following conditions must be met:

– the case must be focused on achieving specific professional-educational goals and account for the specific features, level of training, and professional orientations of students;

– the presence of methodical support: presenting students with materials that summarize the theoretical knowledge obtained earlier (the use of schemes, graphs, structured statistical descriptions, etc.) (IULDASHEV, 2006);

– the presence of navigation in the information sources, the content of which can serve as the components of cases through their inclusion in the content of a case or in the list of references necessary to understand the case.

Educational research cases for extracurricular work with school students are focused on mastering the universal research procedures based on educational situations. The following requirements are set for such cases:

– the case needs to contain a description of a real problem, the experience of solving which is significant for students or valuable for them personally;

– the content of the case should stimulate students to search for information, have an element of novelty, and provide variability in finding the ways to solve the problem;

– the content of the case has to be clearly structured and understandably and logically presented (NIKITINA, 2014);

– the structure of the case has to provide a plan for problem resolution (an algorithm) closely approximated to practical research situation;

– the opportunity to train analytical skills and predict the events and possible results of case solving needs to be ensured (ANIKUSHINA, 2010);

The connection between the practice-oriented cases for work with student teachers and the educational-research cases for extracurricular work with school students is ensured through the identification of case components that university students master in solving professional contextual tasks to later design the components of educational-research cases for school students.

Based on an analysis of various options of decomposition of research competence proposed in studies by A.A. Gubaidullin, L.A. Golub, Iu.S. Dimitriuk, M.M. Novozhilova, Y.V. Ryndina, N.A. Sukhina, O.G. Chugainova, and others, the interrelated components within the structure of students' research competence are identified as the cognitive, technological, and assessment-reflection components. The cognitive component involves the set of knowledge on the methodological, organizational, and content-processual foundations of research activity. The technological (operation and activity) component is represented by the complex of research skills, as well as the experience of their use in educational, educational-professional, and professional activity. The third structural component,

assessment-reflection, implies recognition and acceptance of values and meanings of research activities in education and professional activities, stable interest in the process of research and research methods, the ability for reflexive evaluation and self-assessment of the results of research.

Work on the implementation of the two forms of cases and their presentation to student teachers and school students involves three main stages.

The first stage presupposes the preparatory work of future teachers on the contextual practice-oriented tasks through the selection of diagnostic methods and the study of the degree of formation of students' motives, knowledge, and skills in the sphere of research activity. The obtained data further serve as the baseline material for student teachers' design of the content of educational-research cases and their presentation to school students. In this, the methodical support is developed with consideration of one's role as a tutor in organizing extracurricular club research work of school students.

The second stage involves the creative work of student teachers on creating a case and developing the methodical support for its completion by school students. This work involves research, methodological, and design activities on the part of the teacher. The main content of future teachers' work on implementing the case technology is the selection of materials (package of documents) containing the description of real research situations.

The third stage is marked by the introduction of the case technology into school students' extracurricular club work. This stage is carried out in the process of student teachers' teaching practice. Student teachers present to school students the case tasks developed by them at the second stage of work on the implementation of the case technology. School students familiarize themselves with the content of educational-research cases and complete the tasks independently while university students act as consultants. In the organization of club research work, counseling and monitoring of assignments take place immediately during the lesson. Additional consultations are scheduled if necessary.

Observance of the above-mentioned stages of work on a case allows creating a universal algorithm that consistently involves students – both future teachers and school students – in practice-oriented research activities.

Tatiana Ivanovna SHUKSHINA; Yuliya Andreevna DEMYASHKINA; Petr Vasilevich ZAMKIN; Irina Ivanovna AVERYANOVA and Guseyn Gardash Ogly ZEYNALOV

Experiment data

Analysis of the results of experimental work conducted in SGS № 26 in Saransk shows that 25% of student teachers using case technology in practice-oriented learning as part of teaching practice reached the high level of formation of research competence (an increase by 16%), the average level (an increase by 41%), and the share of the low level decreased by 27%. Considerable changes in the level of research competence development are also observed in school students: the high level of formation of research competence is demonstrated by 17% more students, the average level – by 38% more students, and the low level – by 13% fewer students. Thus, the purposeful use of case technologies proves the effectiveness of work on the development of research competence in learners. Furthermore, positive changes have occurred both among university students and in the school students in groups where practice-oriented learning with the use of research cases was implemented.

Hence, the main idea is to use the potential of the developed cases as part of practice-oriented learning to form research competence.

Conclusion

The results of the analysis of information sources on the studied problem, as well as personal experience of pedagogical and research work, prove the importance of studying the problem of developing students' research competence. The value of the materials presented in the article is due to the fact that the successful formation of research competence in students (both future teachers and school students) is promoted by the use of case technologies within the framework of practice-oriented learning.

Our materials can be used in the educational process of educational organizations in both higher and secondary pedagogical education and general secondary education.

REFERENCES

AKBAEVA, M. D. Poniatie "Issledovatelskaia kompetentnost: v pedagogicheskoi teorii [The concept of "Research competence" in pedagogical theory]. **Pedagogical Journal**, v. 6, n. 6A, p. 268-282, 2016.

ANIKUSHINA, E. A.; BOBINA, O. S. **Innovatsionnye obrazovatelnye tekhnologii i aktivnye metody obucheniia**: metodicheskoe posobie [Innovative educational technologies and active teaching methods: a methodological manual]. Tomsk: V-Spektr, 2010.

BEREZHNOVA, E. V.; KRAEVSKII, V. V. **Osnovy uchebno-issledovatelskoi deiatelnosti**: uchebnoe posobie [Fundamentals of educational and research activity: textbook]. 11th ed., ster. Moscow: Akademiia, 2017.

BUYANOVA, I. B.; GORSHENINA, S. N.; NEYASOVA, I. A.; SERIKOVA, L. A.; SHUKSHINA, T.I. Training a Specialist in the Field of Upbringing for Designing an Individual Route. **AD ALTA: Journal of Interdisciplinary Research**, v. 10, n. 1, p. 59–62, 2020.

IULDASHEV, Z. IU.; BOBOKHUZHAEV, SH. I. **Innovatsionnye metody obucheniia**: Osobennosti keis-stadi metoda obucheniia i puti ego prakticheskogo ispolzovaniia [Innovative teaching methods: Features of the case-study teaching method and ways of its practical use]. Tashkent: IQTISOD-MOLIYA, 2006.

JAMIESON, L. M.; SAUNDERS, M. V. Contextual Framework for Developing Research Competence: Piloting a Validated Classroom Model. **Journal of the Scholarship of Teaching and Learning**, v. 20, n. 3, p. 1-19, 2020.

KHAMIDULLINA, L. K.; RAKHMATULLIN, T. G. Formirovanie issledovatelskoi kompetentnosti pedagoga v protsesse obucheniia v vuze [Formation of teachers' research competence in the process of university education]. **Pedagogical Education and Science**, v. 5, p. 150-152, 2014.

KUZEVANOVA, E. V.; SAVCHENKO, E. E. Organizatsiia samostoiatelnoi raboty studentov v ramkakh case-tekhnologii [Organization of students' independent work within the framework of the case-technologies]. *In*: ALL-RUSSIAN SCIENTIFIC AND TECHNICAL CONFERENCE OF STUDENTS, GRADUATE STUDENTS AND YOUNG SCIENTISTS, 4., Krasnoyarsk. **Proceedings** […]. Krasnoyarsk, 2011.

LUKASHENKO, S. N. **Razvitie issledovatelskoi kompetentnosti studentov vuza v usloviiakh mnogourovnevoi podgotovki spetsialistov** [Development of university students' research competence in the conditions of multilevel specialist training]. Tyumen State University. Tyumen, 2012.

NIKITINA, N. I.; GREBENNIKOVA, V. M. Interaktivnye tekhnologii razvitiia v vuze professionalnoi kompetentnosti budushchikh magistrov sotsialnoi raboty [Interactive technologies of professional competence development in future masters of social work in university]. **Scientific World**, v. 2, p. 84-93, 2014.

NUMA-SANJUAN, N.; MÁRQUEZ, D.; RODOLFO, A. The «Incubators» as Research Spaces for the Novice Researcher. **Journal of Educational Psychology – Propositos y Representaciones**, v. 7, n. 1, p. 241, 2019.

PANKINA, V. V.; ZHUKOVA, N. V.; SINICHKIN, D. V. Formation of research skills in 9th grade students at chemistry lessons. **Perspektivy Nauki i Obrazovania**, v. 2, n. 32, p. 129-133, 2018.

RYNDINA, IU. V. Formirovanie issledovatelskoi kompetentnosti budushchego uchitelia v protsesse professionalnoi podgotovki [Formation of research competence in a future teacher in the process of professional training]. **Man and Education**, v. 3, p. 183-188, 2011.

SAVOSTIANOVA, I. L. Model issledovatelskoi kompetentnosti studentov ekonomicheskikh spetsialnostei vuzov [Model of research competence of university students in economic specialties]. **Professional Education in Russia and Abroad**, v. 2, p. 118–121, 2010.

SCHOTTMAN, I. M.; SÉBASTIEN, G.; FRANCK, T. B. Evaluating Learning Games during their Conception. *In*: EUROPEAN CONFERENCE ON GAME BASED LEARNING, 8., Berlin. **Proceedings** […]. Berlin, Germany: ECGBL 2014. p. 364–371.

SHUKSHINA, T. I.; GORSHENINA, S. N.; BUYANOVA, I. B.; NEYASOVA, I. A. Practice-Oriented Teachers' Training: Innovative Approach. **International Journal of Environmental and Science Education,** v. 11, n. 16, p. 9125-9135, 2016.

SOTNIK, V. G. **Formirovanie issledovatelskoi kompetentnosti studentov v protsesse organizatsii samostoiatelnoi proektno-issledovatelskoi deiatelnosti** [Formation of students' research competence in the process of organizing independent project-research activity]. 2006. Dissertation (Ph.D. in Pedagogy) – Leningrad State University, Saint Petersburg, 2006.

ŠTEMBERGER, T. Educational Research within the Curricula of Initial Teacher Education: The Case of Slovenia. **Center for Educational Policy Studies Journal**, v. 10, n. 3, p. 31–51, 2020.

STREKALOVA, N. D. Uchebnye keisy: opyt razrabotki i ispolzovaniia v obuchenii strategicheskomu menedzhmentu [Educational cases: experience of development and use in teaching strategic management]. *In*: **Proceedings of the interdisciplinary scientific seminar of the personnel reserve «Problems and perspectives of using the case-study method: interdisciplinary experience»**. Higher School of Economics, Saint Petersburg, 2014.

TRETIAKOV, V. P. **Porozhdaiushchie igry**. Prakticheskoe rukovodstvo k primeneniiu [Generating games. A practical guide]. Kharkiv, Gumanitarnyi tsentr, 2016.

VAKHTINA, E. A. Uchebno-issledovatelskaia kompetentnost studenta kak osnova professionalnoi kompetentnosti budushchego spetsialista [Educational and research competence of a student as the basis of professional competence of a future specialist]. **Advances in current natural sciences**, v. 3, p. 135-137, 2013.

VERBITSKII, A. A. Teoriia kontekstnogo obrazovaniia kak kontseptualnaia osnova realizatsii kompetentnostnogo podkhoda [Contextual education theory as the conceptual basis

for the implementation of the competency-based approach]. **The Collection of Humanitarian Studies**, v. 2, n. 2, p. 8–12, 2016.

ZHURAVLEVA, O. N. *et al*. Formation Model of Pupils' Research Competences [Model formirovaniia issledovatelskikh kompetentsii shkolnikov]. **Modern Journal of Language Teaching Methods**, v. 8, n. 12, p. 368–376, 2018.

How to reference this article