

INNOVATIVE METHODS IN THE TRAINING OF VETERINARIANS

MÉTODOS INOVADORES NA FORMAÇÃO DE VETERINÁRIOS

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ABSTRACT: The purpose of the study is to analyze the process of integration of the method of case study with the elements of business games in the educational process of an agrarian university. By means of participant and non-participant observation in experimental student groups, the authors prove that the sophisticated innovative case study technology used in the classroom in the form of independent work combined with a business game creates conditions for the development of professional clinical thinking in students, as well as for the improvement of their creative and research abilities. It is found that the development of applied cases for independent work with their further use in business games during practical classes contributes to deeper assimilation of the learning material and provides for the development of both universal and professional competencies.

KEYWORDS: Case study. Business game. Innovative teaching methods. Veterinary medicine. Student group. Competency-based approach. Clinical thinking.

RESUMO: *O objetivo do estudo é analisar o processo de integração do método de estudo de caso com os elementos dos jogos de empresas no processo educacional de uma universidade agrária. Por meio da observação participante e não participante em grupos experimentais de alunos, os autores comprovam que a sofisticada e inovadora tecnologia de estudo de caso utilizada em sala de aula na forma de trabalho independente aliada a um jogo de negócios cria condições para o desenvolvimento do pensamento clínico profissional nos alunos, bem como para o aprimoramento de suas habilidades criativas e de pesquisa. Constata-se que o desenvolvimento de casos aplicados para trabalho independente com sua posterior utilização em jogos de empresas durante as aulas práticas contribui para uma assimilação mais profunda do material de aprendizagem e proporciona o desenvolvimento de competências universais e profissionais.*

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PALAVRAS-CHAVE: *Métodos de ensino inovadores. Grupo de estudantes. Abordagem baseada em competências. Pensamento clínico.*

RESUMEN: *El estudio tiene como finalidad analizar el proceso de integración del método de estudio de casos con los elementos de los juegos empresariales en el proceso educativo de una universidad agraria. Mediante la observación participante y no participante en grupos experimentales de estudiantes, los autores comprueban que la sofisticada e innovadora tecnología de estudio de casos utilizada en el aula en forma de trabajo independiente combinada con un juego de negocios crea condiciones para el desarrollo del pensamiento clínico profesional en los estudiantes. , así como para la mejora de sus capacidades creativas e investigadoras. Se encuentra que el desarrollo de casos aplicados para el trabajo independiente con su posterior uso en juegos de negocios durante las clases prácticas contribuye a una asimilación más profunda del material de aprendizaje y permite el desarrollo de competencias tanto universales como profesionales.*

PALABRAS CLAVE: *Métodos de enseñanza innovadores. Grupo de estudiantes. Enfoque basado en competencias. Pensamiento clínico.*

Introduction

Modernization of education carries with it the need to optimize the technology and methods of the educational process (NIKITINA, 2014). The same purpose is served by the competency-based approach, which bears great innovative potential (GONCHARENKO, 2018, p. 647). Many years of teaching experience allow us to argue that in current conditions, interactive teaching methods are of vital importance in improving student training and act as a prerequisite for the effective implementation of the competency-based approach (GONCHARENKO, 2018). Interactive methods and forms of education can be considered innovative since, as per the paradigm of innovation by the Austrian theorist J. Schumpeter (SCHUMPETER, 1982), their implementation as stand-alone and in combination with each other not only generates new forms and models of education and teaching with the use of innovations and technologies but also fosters students' creative thinking, stimulates the search for new methods of production the society needs, and translates new patterns of behavior. A teacher who employs innovative methods needs to be ready to constantly look for and discover new methods of teaching that would meet the needs of society and particular categories of students (ZMIEVSKAIA, 2003).

Our review of studies on the introduction of case studies and business games in university education, as well as of theoretical literature describing the emergence of these teaching methods (ALADKO; BOTALOVA, 2021; AVDEEVA; VYSOKOE; ZYKOVA,

2015, p. 82; BOEHRER, 1994, p. 34; DEMCHENKO; PANKOVA, 2017; DUBININA; NIKITINA, 2014, p. 4; GAVRILYUK; KRYUCHEVA; SEMENKOVA, 2018; GINZBURG; KORIAK, 1897, p. 63; GONCHARENKO, 2018; KRASIKOVA, 2009; SCHUMPETER, 1982; SHVEDOVA, 2020, p. 276; ZMIEVSKAIA, 2003, p. 4), shows that this issue requires more thorough development in the context of veterinary education. This shapes the relevance of the problem addressed in this study: the use of case study with business game elements in the structure of training of veterinary specialists. The need for a theoretical substantiation and practical integration of the case study method with business game elements in the educational process of developing the professional competencies of students in agrarian universities constitutes the purpose of the study.

Research objectives:

1. to disclose the essence of the case study and business game methods;
2. to adapt the method of simultaneous use of case studies and business games in training veterinarians by means of developing complementary stages of work;
3. to formulate conditions for the successful implementation of the method.

According to a definition by Nikitina (2014, p. 5), an educational case is understood as “a certain type of task that project not only on the theoretical aspects of one of the academic subjects but, as a rule, are multidisciplinary, aimed simultaneously at the formation of practical professional skills and high motivation of students, thereby allowing to combine the components of competence in a single whole”.

Business games as an educational technology focus on the formation of new knowledge, skills, and abilities and are used to prepare students for their future professional functions.

Methods

The object under study is university students studying in the specialty of “Veterinary medicine” in the conditions of competency-based training.

The subject of research is the process of training veterinary specialists through the method of case study with the elements of business game on the material of veterinary disciplines within the competency-based approach.

The suitability of the innovative teaching technology for training veterinary specialists is tested by means of the general scientific methods of logic, comparison, and analysis, as well as the methods of participant (the authors teaching the discipline) and non-participant (the teachers attending open lessons) observation. For three years, between 2019 and 2021, at our

main place of work at the Northern Trans-Ural State Agricultural University (Tyumen, Russia), we were observing two experimental groups of 3rd-year students in the specialty “Veterinary medicine” studying the course “Pathological anatomy” (45 female, 5 male; 19-20 years old) in the context of using the case study method with the elements of business game in practical classes. In the three years, six innovative lessons were conducted in six groups. Every year, two of the groups were made the experimental groups, and one group engaged in traditional practical training. In addition, conversations were regularly held to reflect with students in the experimental groups on the conducted lessons, the use of case study in independent work, and the opportunities of business games. It should be noted that the specialty “Veterinary medicine” rates high not only in the Tyumen region, but also across Russia (MOE OBRAZOVANIE, n.d.), so all students studying in this specialty are deeply motivated for the result and, accordingly, the transition to new teaching methods was taken by them positively.

Results

The case method is mainly used by teachers in the form of educational or illustrative cases in classes and rarely as applied cases. Being aware of the need to change under the requirements of modern society, we have reached an understanding that a future professional in veterinary medicine, becoming a creative person, has to be primarily guided by the principle of independence in their future work. In this light, the creation of applied cases was assigned to students as part of their preparation for practical classes, i.e. introduced as a part of independent work.

Accordingly, the student groups were given methodological guidelines for creating cases with problem situations and ways to search for information and compiling a package of documents for the subsequent business game, which more than any other educational technology suited the discussion of the problem situation in the class. In this way, we have developed a method of case study with the elements of a business game that fully complies with the Federal State Educational Standard 3(++), in which clinical thinking is viewed as one of the professional competencies of a future specialist.

In the course of our pedagogical practice (over 15 years) in the agrarian university in the specialty “Veterinary medicine”, we have found that the most favorable moment to employ the methods of case study with business game elements is the final stage of teaching a particular discipline in the 3rd or 4th year, as by this time students already acquire comprehensive knowledge of animal anatomy and physiology, which allows them to cope with situations

simulating professional practice.

Practical sessions based on the methodology of case study with the use of business games consist of three equally important parts:

First, the teacher defines the topic of the practical class and formulates the learning goal and objectives focusing on the specific process of social interaction that takes place during the autopsy: from the origination of the need for an autopsy of an animal corpse to writing the autopsy report.

Second, the algorithm for the game is developed with a special emphasis on case study.

Third, the business game is conducted and analyzed.

An important decisive factor in conducting an interactive practical lesson is its topic. Proceeding from our experience, we suggest that these topics of pathological anatomy could be diseases of the respiratory system, diseases of the digestive system, infectious septic diseases, chronic infectious diseases, etc.

Once the topic is defined, the general learning goals are to be established. These goals must clearly outline:

- the purpose of the business game;
- the situational task and the competencies it is intended to develop;
- the expected results.

The main body of work is conducted during students' independent preparation. Therefore, it is vital to provide accurate guidelines and a clear algorithm of action so that the students could properly prepare for the practical lesson:

1. Case preparation (independent work): methodological material is given, and the group is divided into subgroups to create a case outside of class hours and assign roles for the business game;
2. Conducting the business game using the results obtained during the preparation of the case;
3. Results and analysis.

As part of independent work, students study the theoretical foundations of the assigned study and look into practical examples (protocols of pathologo-anatomic autopsies of animals) in order to determine the main disease, complications of the disease, and concomitant diseases and put forward a hypothesis about the cause of the animal's death.

Of critical importance is the proper search for theoretical and practical information and its analysis and synthesis since this part of work lays the foundation for students' understanding of thanatogenesis and allows for a correct diagnosis. It is necessary to know at the theoretical

level the diseases that doctors of various specializations (therapists, oncologists, cardiologists, surgeons, neurologists, etc.) deal with. Here are a few examples of the use of theoretical and practical information on the general topic of “Respiratory system diseases in cattle”. Specific features of the pathomorphological picture in general in respiratory system diseases in animals are well described in the textbook “Pathological anatomy of animals” by A.V. Zharov. It contains a brief description of all diseases of the respiratory system. The textbook reveals a variety of clinical and morphological manifestations. However, for a more in-depth study of this topic, students are encouraged to use the following works: “Bronchopneumonia of calves, its pathogenesis, functional morphology and pharmacotherapy with prolonged composite drugs” (MAGOMEDOV, 2007), “Peculiarities of clinical and morphological manifestation of bronchopneumonia of calves” (VITKOVSKII; TURITSINA, 2018), “Morphofunctional characteristic and therapy of bronchopneumonias caused by the association of parainfluenza-3 virus, *Mycoplasma bovis* and *Haemophilus somnus* in calves” (GRECHANYI, 2011), and Iashina (2009) “Pathomorphology of associated bronchopneumonia of calves in the conditions of Nizhny Novgorod region and immunocorrection with xymedon hydrochloride”. These papers describe the main pathological signs of respiratory diseases, the features of their manifestation in cattle, and a deeper study and the possibility of differentiating between non-infectious and infectious pathologies.

All of this data, together with the autopsy report, will lead the students to a correct diagnosis.

Each group’s case should consist of the following set of documents:

1. Hypothesis;
2. Theoretical rationale for a presumptive diagnosis;
3. Results of tests;
4. Protocol of the pathological anatomical study in accordance with GOST R 57547-2017 “Pathological anatomical study of the corpses of non-productive animals. General requirements”.

The objective of the summarizing practical lesson “Respiratory system diseases in cattle” is to collect all data on pathological anatomical signs of respiratory system diseases in cattle and learn to establish a correct pathological anatomical diagnosis and form a conclusion about the death of the animal.

Writing a scenario is a challenging and important moment for students as they have to come together and choose a leader who could assign tasks to each member of the group and write the scenario. The task of the teacher is to find such a leader and to carefully observe the

actions of participants in the game, keep record of all the decisions made, consider the time and interaction of individual groups and participants; analyze the decisions and actions of the game participants; evaluate the intermediate decisions of the players (GONCHARENKO, 2017). The scenario for a summarizing practical lesson on the general topic of “Respiratory system diseases in cattle” may be as follows:

1. Identification of roles with descriptions of professional functions. Students, divided into small groups of 7 to make a case, are assigned the roles of a lab technician, 3 general practitioners, a veterinary pathologist, and 2 veterinary paramedics. Professional specialization supports the process of establishing a pathological diagnosis and writing a report. The teacher acts as the main expert.

2. Reason for convening the concilium. Each group should present its own rationale.

3. Concilium. Concilium is a meeting of several doctors of one or more specialties, which is needed to establish a diagnosis. Opposing opinions of specialists are presented and hypotheses are put forward and then proven or disproven with the use of documents prepared in the group’s cases. The decision of the concilium of doctors is drawn up in the protocol.

4. Preparation of a motivated pathologist's report on the death of an animal.

5. Results and analysis of the game. The final part of the practical session consists of an analysis of the issues to be seen in the game; an analysis of the basic theoretical (methodological) and medical provisions and the decisions made, including the mistakes made.

At the end, the results of each team’s work are reflected on. The expert-teacher or a specially created group of experts summarizes the results of the game and evaluates the work of the teams using the following criteria:

- argumentation of the position (correctness of the case);
- the culture of conducting the consilium (culture of speech, evidence base and role transitions);
- activity and organization of the teams.

The practical lesson on the summarizing topic of “Respiratory system diseases in cattle” conducted with the use of the case study method with business game elements during the observation period (2019-2021) was invariably aimed at students’ mastery of new knowledge, methods, and skills of self-study. The students were guided to recognize what useful and new they would learn in class, where they could apply what they had learned, what benefits they would get from learning the material with the help of innovative methods, and what methods should be used to get satisfaction from the very process of learning. Naturally, the students were also asked to assess the degree to which the set goals were met and draw up conclusions. It

should be pointed out that the material to be covered was itself conducive to the development of students' thinking and practical activities, their ability to independently figure out difficult situations and formulate justified conclusions. This, however, took place not in a chaotic manner but under the guidance of the teacher who not only established the volume of the material but analyzed it proceeding from the content of the topic and identified possible means of developing students' thinking. This ensured the interconnection of educational, upbringing, and developmental tasks.

Conversations with students were held after the fact, i.e. a week and sometimes a month after the practical training. The conversations focused on revealing a reflective position and allowed us to discover the personal changes the students had experienced. Among such changes, the most significant in the context of our research are the following:

1. readiness to identify the problem and to put forward a hypothesis;
2. readiness to refer to personal experience,
3. readiness to reflect on one's own behavior;
4. readiness to work in a team;
6. readiness to act using modern research methods and exercising one's professional skills strictly within the normative field.

Approbation of the method in practical classes confirms the correctness of the chosen way to achieve the goal: the formation of competencies, including professional competencies (PC-1, ID-3 PC-1), according to the Federal State Educational Standard for Higher Education – Specialist degree in specialty 36.05.01 Veterinary medicine (as amended and supplemented), revision as amended by N 1456 of November 26, 2020 (FEDERAL STATE EDUCATIONAL STANDARD FOR HIGHER EDUCATION, 2020).

As a result of the practical lessons, students learn about the functioning of organs and systems and the development of structural changes in the diseased organism, which is the knowledge necessary to make a pathologoanatomical diagnosis and conclude on the cause of death of an animal; learn to distinguish vital pathological changes from postmortem processes in a corpse to be able to identify specific pathognomonic signs of diseases to establish the cause of an animal's death; master the methods of autopsy and techniques of organ extraction in cattle, horses, young animals, carnivores, and birds.

Observation of the experimental groups and assessment of students' activities during practical classes allows us to conclude that the use of the case study method combined with business game elements contributes to the development of universal competencies, such as the development of systemic and critical thinking (UK-1), the formation of skills in project

development and implementation (UK-2), and teamwork skills and detection of leadership inclinations (UK-3) (MOE OBRAZOVANIE, n.d.). Furthermore, the students taught using the case study method combined with business game elements successfully master 81.3% of the material covered (assessed in the experimental groups through a system of testing at the end of the class), while in the groups attending traditional practical lessons, the share of the retained material is only 15% (assessed through a system of testing at the end of the class). Retesting on the topic “Respiratory system diseases in cattle” conducted two weeks later confirms the initial results: the experimental group scored 95.6% on the test, while the traditional training group got 67.2%, improving the result due to independent preparation for the test.

The case method combined with business game elements has a positive influence not only on the students and future veterinarians but the teachers, too, causing them to be more deliberate in the chosen methods and pedagogical technologies aimed at the result and to ensure the conditions necessary for conducting innovative classes.

Discussion

The results obtained in the current study are compared with those presented in previous research. It can be confidently asserted that both Russian (AVDEEVA; VYSOKOE; ZYKOVA, 2015; DEMCHENKO; PANKOVA, 2017; DUBININA, 2016; GADZHIKURBANOVA, 2013; GINZBURG; KORIAK, 1897; KUTENEVA, 2019; LYSENKO, 2020; NIKITINA, 2014; PEROVA, 2020) and foreign scholars (BOEHRER, 1994; GERRING, 2004; KERR, 2015; MYERS, 2009) agree with our opinion (GRECHANYI, 2011) that the implementation of innovative teaching methods is a topical task for today’s education. Innovative teaching methods, such as case study and business games, are considered to be superior to the traditional methods as they involve greater emotional and intellectual engagement of students in solving the assigned task (ALADKO; BOTALOVA, 2021; AVDEEVA; VYSOKOE; ZYKOVA, 2015, p. 82; DEMCHENKO; PANKOVA, 2017; DUBININA; NIKITINA, 2014, p. 4; GINZBURG; KORIAK, 1897, p. 63; KRASIKOVA, 2009; LYSENKO, 2020; LYSENKO, 2020; NIKITINA, 2014; ZMIEVSKAIA, 2003, p. 4). Kuteneva Argues (2019, p. 100) that business games and other active learning methods form such “qualities as: the ability to make decisions and carry responsibility for them, act in rapidly changing circumstances approximated to real settings, etc. Thus, having worked on a number of problem situations and specific ways to solve them with the help of active learning methods, future specialists later learn to approach the tasks at hand in a creative way and independently look for non-standard solutions the most effective

in each particular case”.

Observation of students in the process application of case study and business games conducted by Demchenko and Pankova (2017) shows that each student makes their own contribution to the course of the work that involves active exchange of information, knowledge, ideas, and methods of action, as well as to the development of communication skills and intellectual fitness, which makes the learning process itself productive.

Our findings regarding the mastery of the material in the student groups taught with the use of case studies combined with business game elements are supported by data from classical pedagogical literature (SMAGIN, 1965) lecture-based presentation of material ensures the assimilation of more than 20% of the information, discussion-based learning – 75%, and a business game – about 90%.

The case study and business game methods not only win students’ positive attitude to the classes conducted with these technologies but become the way of thinking of a modern teacher, creating a special paradigm. Applying advanced teaching methods, the teacher themselves learns to think and act creatively (DEMCHENKO; PANKOVA, 2017) despite the labor-intensity of preparation for this type of class. An important component of the educational process is the conditions under which the use of new technologies and methods will be conducive to professional advancement. In this regard, Kurianov and Polovtsev (2011, p. 5) highlight the following pedagogical conditions:

Readiness to overcome difficulties, knowledge of the essence, structure, laws, mechanism of action, and content of mental phenomena, means of pedagogical influence, critical evaluation of results, mastery of the method of activation of learning, preparation of pedagogical tools, sustainability and consideration of the needs of students.

At the same time, reviewing scientific literature, we can conclude that research on the application of innovative technologies is mainly approbated and implemented in the complex of managerial and humanitarian disciplines, while the practical application in natural science disciplines is less common (AVDEEVA; VYSOKOE; ZYKOVA, 2015; ALADKO; BOTALOVA, 2021; DEMCHENKO; PANKOVA, 2017; KRASIKOVA, 2009; KUTENEVA, 2019; LYSENKO, 2020; PEROVA, 2020; GAVRILYUK; KRYUCHEVA; SEMENKOVA, 2018; MYERS, 2009). This makes the study of innovative approaches, including the combined use of case study and business game elements, promising from both the methodological and scientific standpoint. The rare scientific works devoted to the combination of case study with business game (PEROVA, 2020; SHVEDOVA, 2020; PERCIVAL; ELLINGTON, 1980) also

point to the promise of their study since, as our research demonstrates, this pedagogical technology yields positive results and can be used in teaching various disciplines, both the humanities and the natural sciences (DMITRENKO, 2004).

Conclusion

Teaching students with the use of new forms of education is yet another step on the way to bringing up a creative, active, and professionally qualified person. The value of the use of business games with preliminary preparation of cases in classes lies in the fact that students develop the qualities necessary for future professional practice. Among these qualities, we can highlight the ability to not only propose hypotheses, search for the necessary information, identify one; professional aptitudes, and detect and solve problems, but also the ability to assess the abilities of other students.

The conducted adaptation of a method for the simultaneous use of case study and a business game in training veterinarians by means of designing complementary stages of work demonstrates that the developed innovative method of teaching through case study combined with business game elements is a promising form of educational activity that forms the skills of clinical thinking in future veterinarians and contributes to the development of universal and professional competencies.

The study confirms that whatever activity students perform, it must have a complete structure – from students' understanding and setting of goals and objectives through the implementation of actions, techniques, and methods, and to the exercise of self-control and self-assessment.

A teacher who uses innovative teaching methods and creates new pedagogical technologies gets richer themselves, becoming an agent of the new education of the 21st century.

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