

APPLICATION OF BUSINESS GAMES IN TEACHING TECHNICAL DISCIPLINES

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The paper presents the results of the theoretical justification and practical implementation of a business game for the development of professional competencies of technical university students when they study technical disciplines. Using the example of the curriculum for the specialty “Physical and chemical methods and instruments for product quality control” (qualification – certification engineer), the predominance of disciplines that form hard skills in future specialists is shown. It was also found that in two disciplines of the specialty there are more than 30% of topics for better assimilation of which business games can be used. Examples of two business games are given.

Keywords: technical university, specialty curriculum, competencies, forms of training, business game

Introduction. Among the many ways to motivate learning, one of the most effective is the organization of gaming activities. Currently, several variants of the business game have been developed (simulation, operational, role-playing, organizational and activity, organizational and communicative, etc.) [1]. Modern pedagogical science has determined the basic principles of the organization of games and the purpose of their application in the educational process [2]. The principles should include the following:

- 1) the game should be based on the free creativity and independence of students;
- 2) there must be an element of competition either between teams or between individual participants in the business game;
- 3) the game should take into account the age characteristics of students.

The goals of a business game can be didactic (improving the methodological components of the action competence, in particular when resolving decision-making situations in the performance of an activity) and methodical (training skills and experimenting with decision-making and their consequences, as well as finding strategies for solving a problem). It should also be noted that in addition to educational activities, the business game is widely used to assess the competence and improve the skills of internal auditors in organizations that use management systems [3].

Thus, we can conclude that business games are a pedagogical tool and an active form of learning that intensifies learning activities by modeling managerial, economic, psychological, pedagogical situations and makes it possible to analyze them and develop optimal actions in the future. However, it should be noted that there are no universal business games, and for each specific task related to improving the assimilation of theoretical knowledge and mastering practical skills within

a particular academic discipline, its own methodological approach and practical material is needed. Therefore, the theoretical substantiation and practical implementation of a business game for the development of professional competencies of students of a technical university in the study of technical disciplines is relevant and practically important.

Aim. Determine the place and role of business games in the formation of professional competencies among students of a technical university and develop guidelines for their organization (on the example of students studying at the Belarusian State Technological University (BSTU) in the specialty 1-54 01 03 Physical and chemical methods and instruments for product quality control).

Materials and methods. The objects of research were the curriculum and the matrix of competencies of the specialty 1-54 01 03 Physical and chemical methods and instruments for product quality control. In the work, such research methods as analysis, assessment, modeling of professional situations and their validation were used.

Results and discussion. According to the standard curriculum of specialty 1-54 01 03 Physical and chemical methods and instruments for product quality control, a graduate who has successfully completed training in this specialty must have universal (total – 15), basic (total – 16) and special competencies (total – 19). An analysis of the content of the competency matrix for this specialty is presented in Fig. 1, from which it is clear that the vast majority of competencies relate to hard skills and consist in the fact that a graduate must possess a variety of special and technical skills to successfully begin his career. It was also concluded that almost half of the modules provided by the state component and higher education institution component are aimed at developing professional competencies.

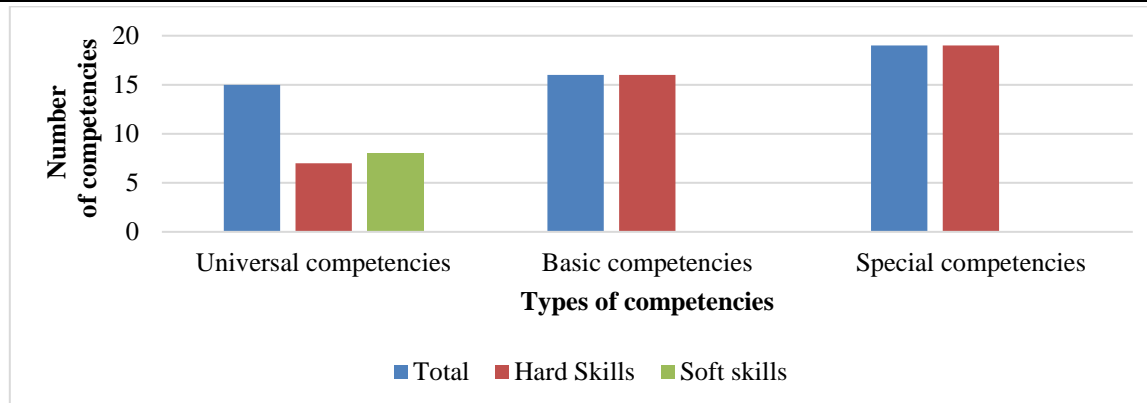


Fig. 1. Composition of competencies that a graduate of BSTU with specialty 1-54 01 03 must master

As for the specialization disciplines, they are combined into three modules, namely: two modules “Methods and means of testing and control” and the module “Technology” – and form in students the special and technical skills necessary for a specific specialization. Features of the formation of professional competencies among students studying in the specialty under consideration, regardless of specialization, consist in a combination of classroom lessons (laboratory and practical)

and independent work in the form of course design. Analyzing this information (Fig. 2), it is obvious that the contribution of different forms of classes to the mastery of professional competencies can be arranged in the following order: practical classes, laboratory workshop, course design. Obviously, practical classes are the form of training where the technology of business games will be most appropriate and in demand.

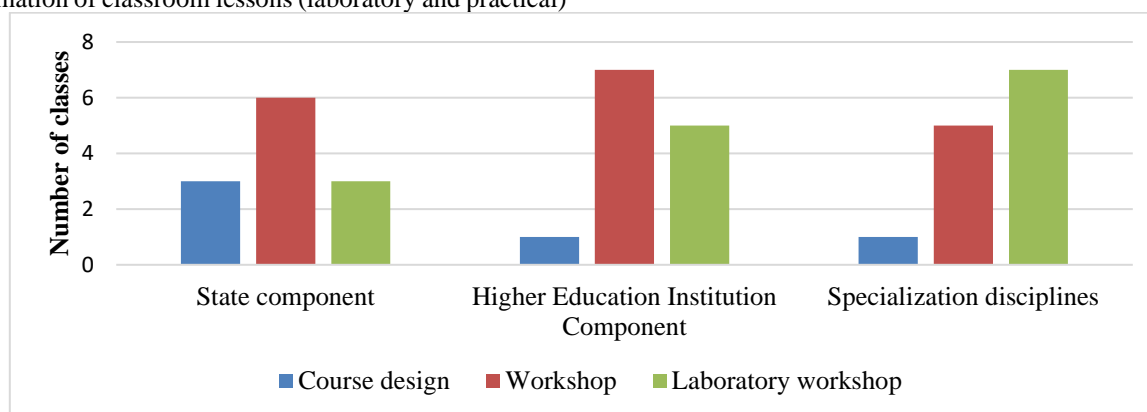


Fig. 2. Forms of classes for the formation of professional competencies

Based on the results of the analysis of the matrix of competencies given in the standard curriculum of specialty 1-54 01 03, to develop methodological recommendations for organizing business games that contribute to the development of future professional activities of graduates of a technical university, we selected two academic disciplines from two modules, namely:

- “Conformity assessment and accreditation” (module “Conformity assessment”, state component);
- “Quality Management Systems” (module “Quality Management”, component of a higher education institution).

The study of these disciplines includes classes such as lectures, practical exercises and coursework. As a result of mastering the educational material in the discipline “Conformity Assessment and Accreditation”, the student must “Know national and international legislation in the field of conformity assessment, as well as be able to perform work in the field of conformity

assessment” (BPC-15), respectively, in the discipline “Quality Management Systems” – “Know the main international and national standards in the field of quality management systems, be able to develop quality management system documents” (SC-9). Analysis of the content of the educational material of the educational disciplines under consideration made it possible to determine that the technology of business games is applicable in 35% of the topics in the discipline “Conformity Assessment and Accreditation” and in 25% of the topics in the discipline “Quality Management Systems”.

To develop a business game for the discipline “Conformity Assessment and Accreditation”, the topic “Law of the Republic of Belarus “On Protection of Consumer Rights” was chosen, for the discipline “Quality Management Systems” - “Internal Audit of the Quality Management System”. The structures of business games are shown in Tables 1 and 2.

Table 1

Structure of the business game “Purchase of goods (works, services)”	
Game elements	Characteristics
Pedagogical goal	Understand national legislation in the field of conformity assessment
Subject game (3 scenarios)	1) ham was purchased in a hypermarket. At home, upon careful study of the information on the label, it was discovered that the spices contain coriander, which causes allergies in the consumer.
	2) the dry cleaner ruined my winter down coat.
	3) a glass partition for the shower stall was purchased from an individual entrepreneur. After its installation, a manufacturing defect was discovered (extraneous black inclusions in the glass).
Scenario	Actions of the buyer, seller and lawyer
Game rules	Do not create a conflict situation, do not bring the matter to court
The final stage	Expert opinion, assessment of the actions of each group of participants by the teacher

Table 2

Structure of the business game “Internal audit of the quality management system”	
Game elements	Characteristics
Pedagogical goal	Master the basic international standards in the field of quality management systems (QMS)
Subject game	Carry out an internal audit of certain QMS requirements
Scenario	Actions of the audited unit and the auditor
Game rule	Determine the level of compliance of the QMS of a particular organization with the requirements of ISO 9001
The final stage	Expert opinion, assessment of the actions of each group of participants by the teacher

It should be noted that one or more students act as experts in these business games, and the teacher evaluates both the participants in the business game and the experts. The teacher's assessment consists, first of all, in indicating the positive (successful) actions of the participants and experts, and then in jointly analyzing what failed (or erroneous actions) by representatives of different sides of the business game. Based on the results of testing these business games, methodological materials were developed for practical classes in the disciplines “Conformity Assessment and Accreditation” and “Quality Management Systems”, which were included in electronic educational and methodological complexes in the disciplines of the same name [4, 5].

Conclusions. As a result of our research, we can draw the following conclusion.

1. The vast majority of competencies that graduates of BSTU in the specialty 1-54 01 03 Physical and chemical methods and instruments for product quality control must possess are classified as hard skills.

2. The professional competencies required for a graduate are varied: from knowledge in the field of properties and characteristics of various environmental objects to the ability to work with measuring devices and complex research equipment; from knowledge of legislation in the field of technical regulation to the ability to develop procedural and systemic documents of the organization.

3. The contribution of different forms of classes to the mastery of professional competencies (in order of importance) can be arranged in the following order: practical classes, laboratory workshop, course design. Practical classes are the form of training where the technology of business games is most appropriate and in demand.

4. A selective analysis of the content of the educational material of the disciplines of the standard curriculum of specialty 1-54 01 03 showed that the technology of business games is applicable when conducting

practical classes. At the same time, the number of educational topics, the assimilation of which is more effective through the use of business games, can reach 35% of their total number.

5. When developing a business game, it is necessary to determine the following structural elements: pedagogical goal, subject of the game, scenario, rules of the game and the final stage. It is also advisable to involve students as experts to assess the correctness of the participants' actions in the proposed situational task. It is advisable to include the developed business games in the electronic educational and methodological complex, open access to which allows students, future participants in the business game, to become familiar with its purpose and scenario in advance.

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