Cognitive competence of graduates, oriented to work in the knowledge management system in the state corporation "Rosatom"

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Abstract. This article describes an approach to the determination of the level of formation of competences of university graduates, oriented to work in the state corporation "Rosatom" in a knowledge management system. With the use of cluster analysis graduate classes were identified, focused on knowledge transfer, analysis and the search for new knowledge, creative transformation of knowledge. In addition, the class innovators were identified, which were fully formed the necessary cognitive competences.

1. Introduction

Knowledge management is a fundamental factor in the development of innovative high-tech enterprise of any industry and solves two main tasks. The first problem is related to the increase of efficiency, use of knowledge for productivity growth to increase at the expense of performance or reduce costs. The second objective is focused on the creation of innovations, new products and services [1].

Especially true knowledge management for the state corporation "Rosatom", the world leader in the level of scientific and technical developments in the field of reactor design, nuclear fuel fabrication, construction and operation of nuclear power plants and nuclear power plant personnel qualifications, creation of radiation technologies [2].

The question of what cognitive competencies should have staff in the field of treatment and the capitalization of corporate knowledge, is still under discussion. This is vividly demonstrated by the III International Forum of Rosatom Knowledge Management, held in April 2016.

The works devoted to the professional development of cognitive competencies is understood beneath the mastery of staff separate ways of acquiring new knowledge [3, 4].

Three types of professional cognitive competencies are considered: the professional competence of the transfer of knowledge, professional competence and knowledge discovery search, professional competence of creative transformation of knowledge [3]. Diagnosis of professional cognitive competencies can be performed on the basis of the analytical methods professiografii including a description of the professional features, professional tasks and problems of performance features. Each professional task is a generalized model of professional situation that a specialist can meet in their professional practice.

In this regard, one of the goals of higher education is to prepare graduates as the innovators - people who are able to generate, locate, implement innovations [4].

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Cognitive competence-graduate innovator must lie in the integration of different knowledge, skills, belonging perhaps to different areas of activity. These include the ability to identify problems and methods for solving them; ability to work in a team, to participate in the project activities, creative independence, the ability to take a critical look at the current state of affairs, etc. In [1] the basic cognitive competencies of innovators author includes technical skills, leadership, people skills and conceptual abilities, ie skills analysis of the behavior of people, structures and dynamics of long-term relationships.

This study focuses on evaluating the level of formation of a number of cognitive competencies of graduates in physics disciplines needed innovators. These include the ability to work with people (team work, team management, conflict resolution) and conceptual abilities (problem solving, decision making, self-motivation). Assessment of leadership skills is the next stage of our research.

2. The proposed approach

Assessing the level of formation of cognitive competences was conducted as follows. Using standard test Eysenck, Thomas and Belbin following individual personality traits have been identified: extraversion-introversion, neuroticism-stability, choice of team role preferences, preferences, behavioral strategies in conflict [5, 6].

Eysenck test enabled with basic indicators (extraversion-introversion and neuroticism-stability) to evaluate the direction of the person on the inner or the outer world, as well as to identify the level of emotional stability. These characteristics affect the fulfillment of their obligations, including to carry out professional activities. Belbin test reveals preferred for human role in the success of the team: coordinator (Co), shaper (S), plant (P), monitor evaluation (ME), implementer (I), resource investigator (RI), team worker (T), completer finisher (CF).

To select the properties of human behavior in a conflict situation is used Thomas test. According to the results determined as preferable to test one of the two final strategies of conflict resolution - co-operation and compromise. In a compromise, one party wins and the other loses, both sides lose, or (strategy B). With the cooperation of both parties of the conflict wins (strategy A).

To determine the level of formation of the respective competences of the students were brought 15 jobs situation analysis. Assignments are made of two types. The first type is related to the performance of analytical tasks in the form of classification problem solving, which involves thinking, observation, comparison and analysis of many of the facts, the second type of job requires the acceptance of the test unequivocal military solution in extreme situations.

Informally, these tasks are divided into three parts, under which the subjects are determined to achieve with the management team, the ability to work in teams, manage conflicts. motivation level was determined based on the identified gaps between the inclinations of man and the results of his achievements. Thus, the results obtained allow to measure the value of the level of formation of appropriate cognitive skills.

3. Research outcomes and discussion

The study was conducted among a large number of senior students of the two faculties of MEPhI. The first sample constituted the Faculty of Management students and high-tech economy (Y), studying in the areas of training management, economics and business informatics. The second sample was made up of students of the Faculty of Physics and Technology (F), which is the parent in Russia to train specialists in the development of nuclear power plants, nuclear non-proliferation, physics separation processes, physical materials. These training areas were selected for the reason that on the one hand, students are oriented to work in the nuclear industry, on the other - have a well-formed professional competence in the field of collective management, teamwork, conflict management.

Figure 1 shows the results of a comparative analysis of the number of different personality types in the samples for students to managers and future graduates of physical specialties. For administrators the highest number of students corresponds to the normal subjects (25%), a melancholy, choleric (28%) and choleric (11%) types.

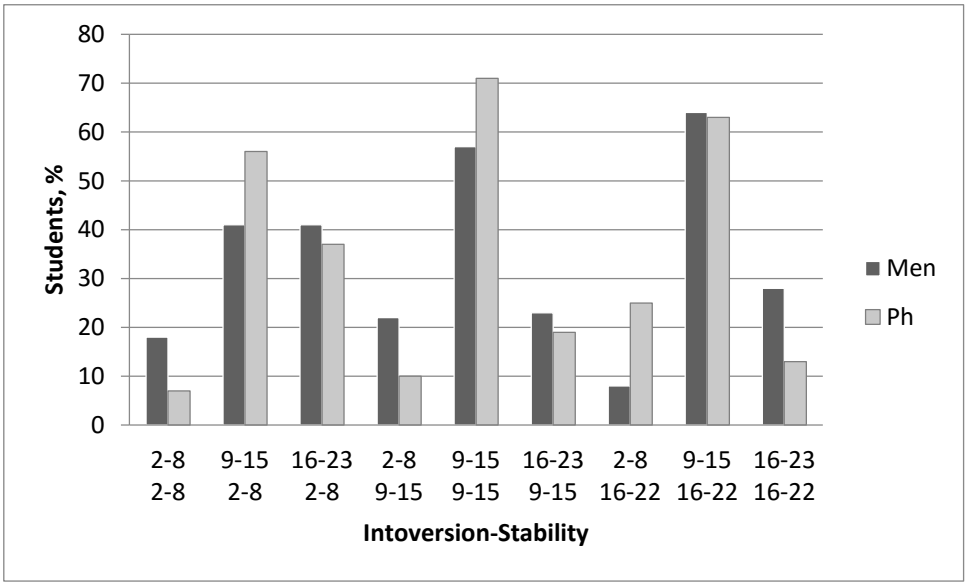


Figure 1. Personality types among students of different specialties.

For graduates of physical specialties of the highest number of students belongs to the normal (42.5%), sanguine, phlegmatic (17.2%), choleric (11.5%) and sanguine (11.5%) types.
Table 1 shows results of various tasks accomplishment. In both groups no less than 80% of students accomplished no less than 60% of tasks. Successful accomplishment of tasks both in terms of type and category differs in both sample groups significantly. Managers successfully cope with the tasks in the resolution of conflicts. At that time, both for the future physicists these tasks are difficult.

Table 1. Results of tasks accomplishment for M and Cis students**.**

	M	**Ph**
Conflict resolution tasks	73%	40%
Team working tasks	38%	39%
Team leading tasks	56%	53%
Analytical tasks	35%	47%
Decision making tasks	65%	53%

Next, cluster analysis was carried out in the field of 12 attributes: introversion, stability, conflict conduct strategy A, strategy B, roles of "Coordinator" (Co), "Shaper" (S), "Plant" (P), "Monitor Evaluation" (ME), "Implementer" (I), "Resource Investigator" (RI), "Teamworker" (T), "Completer Finisher" (CF).

Clustering was performed for different numbers of clusters, from 2 to 10. For each cluster identified the mean values of clustering variables in the original scales, as well as the average values of the variables sumA and sumS characterizing the level of response to questions on Analytics and decision making. If the number of points given to the role, less than 5 – it is considered spam when more than 10 is preferred.

All samples are clearly separated main clusters, in which the subjects coped well with analytical tasks and assignments on decision making. Have been allocated to clusters for which both tasks were impossible. In addition, were selected as clusters where the subjects coped well with only analytical tasks or with the tasks on decision making.

As a result of clustering identified five classes:

• "Successful" that can easily cope with all types of jobs;

• "Analysts", who can easily cope with the analytical tasks, but poorly on tasks with decision-making;

• "Solvers", to which job decisions were considerably easier than analytical;
• "Losers", for which any type of task was very difficult;
• "Neutral", for which all the tasks were of average difficulty.

In general, it can be noted that of all variables the largest contribution to the characteristics of the classes made just by the role values; strategy type and the personality type of the subjects (introversion and stability) is influenced not so pronounced.

The ratio of these classes for different departments is shown in Fig. 2.

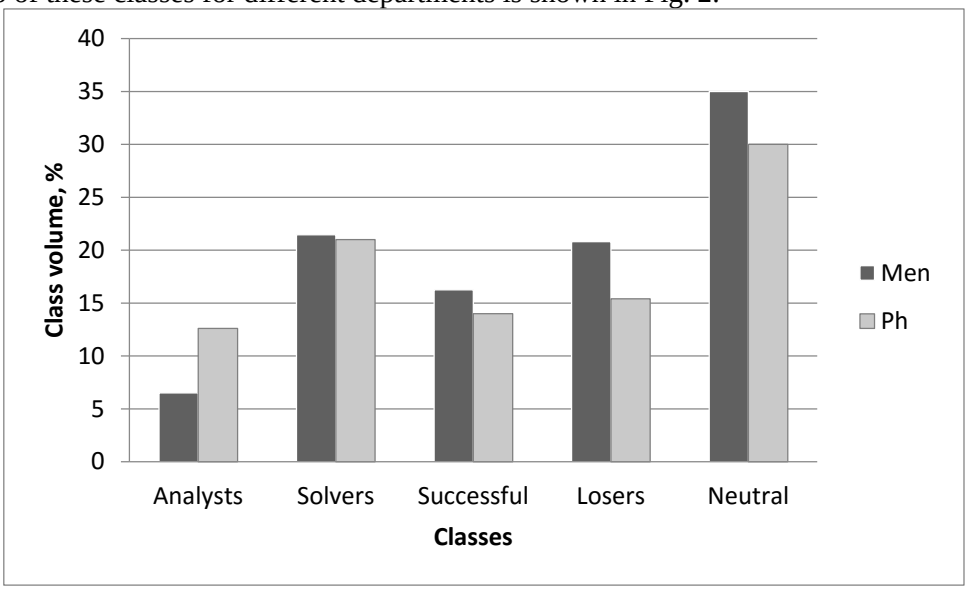


Figure 2. The ratio of allocated classes.

For each of the classes were identified rules for deciding the ownership of the test to a particular class. Overall, this study has allowed to achieve objectivity in the process of estimating the level of formation of relevant cognitive competencies.

Class "Neutral" have formed cognitive competence for knowledge transfer. Class "Solvers" (20% - 21%) more in line with efforts to transform the creative knowledge. For the class of "Analysts" (6% - 13%) is characterized by the search and knowledge discovery.

The amount of class "Successful" is 14% -16% of the total volume of graduates depending on the areas of training. This class corresponds to the fully formed cognitive competencies of innovators.

The results allowed to formulate a number of recommendations on the use of educational technologies for various areas of training.

The results of the tasks on the ability to work in team showed less than 40% - not too high a result. To form the respective competencies necessary to enter into the learning process of project learning in small groups for some subjects. This project will allow training in practice to form a teamwork skills, conflict management, etc.

The results obtained in solving these types of tasks, such as analytical and decision-making, talk about the balance of the educational process at the faculty of "F".

For the training areas "Y" of the Faculty of superiority in the decision-making tasks for natural and meet the requirements. Nevertheless, the proportion of students who have successfully completed the analytical task is small and is only 35%. This means that the natural science disciplines unit formally implemented, teachers do not take into account the peculiarities of training of graduates of economics.

4. Conclusions

Thus, the survey has made it possible to assess the level of formation of cognitive competencies of graduates, oriented to work in the state corporation Rosatom. In the aggregate, 80% to 85% of graduates of MEPhI have cognitive competence, sufficient to work in the field of nuclear knowledge management.

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