

ICEST 2021**II International Conference on Economic and Social Trends for Sustainability of Modern Society****STRUCTURAL SCHEME OF PRACTICE-ORIENTED SKILLS
FORMATION IN THE PROFESSIONAL TRAINING PROCESS**

I. N. Pozharkova (a)*, A. Yu. Troyak (b), E. Yu. Troyak (c)

*Corresponding author

(a) FSBEE HE The Siberian Fire and Rescue Academy EMERCOM of Russia, 1, Severnaya street, Zheleznogorsk, Russia, pozharkova@mail.ru

(b) FSBEE HE The Siberian Fire and Rescue Academy EMERCOM of Russia, Zheleznogorsk, Russia, troyaksasha@yandex.ru

(c) FSBEE HE The Siberian Fire and Rescue Academy EMERCOM of Russia, Zheleznogorsk, Russia, trev191186@gmail.com

Abstract

The article identifies and substantiates the Russian universities EMERCOM cadets practice-oriented skills structure in their professional training process, considers possible ways and conditions for the practice-oriented skills effective formation. The Russian Emergency Situations Ministry higher educational institutions cadets concept "practice-oriented skills essence" is revealed and their list is specified. A practice-oriented skills formation structural diagram in the Russian Emergency Situations Ministry higher educational institutions cadets professional training process has been developed, which is represented by interrelated components: normative-target, content-technological, reflexive-evaluative. Practice-oriented skills formation the criteria, parameters and levels in the Russian Emergency Situations Ministry universities cadets professional training process being determined. Organizational and pedagogical conditions for the Russian universities EMERCOM cadets practice-oriented skills have been identified and developed, including cadets orientation to mastering actions aimed at successfully solving professional problems; knowledge enrichment, skills and competencies under the professional standards requirements by solving situational problems at a specialized training ground; cadets introduction to production and technological activities during practical training in fire departments, their effectiveness was checked.

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Keywords: Structural scheme, practice-oriented skills, organizational and pedagogical conditions, EMERCOM



1. Introduction

The EMERCOM cadets higher educational institutions should already have practice-oriented skills at the training stage, allowing them to participate in firefighting, emergency rescue and emergency recovery operations in the emergencies' elimination. Currently, the cadets' effective professional training in the EMERCOM cadets' higher educational institutions is hampered by the theoretical foundations' insufficient development, software and methodological support and organizational and pedagogical conditions for the practice-oriented skills effective formation in students.

We have studied the EMERCOM cadets higher educational institutions professional training process, proposed the conditions and methods for the practice-oriented skills formation, systematized in a structural scheme form, conducted a pedagogical experiment to introduce the identified and developed organizational and pedagogical conditions into the Siberian Fire and Rescue Academy educational process, and also carried out practice-oriented skills formation effectiveness assessment as a proposed organizational and pedagogical conditions implementation result.

2. Problem Statement

Russia's universities EMERCOM cadets Practice-oriented skills are a practically worked outset, consistently reproduced actions based on practice-oriented knowledge and aimed at successfully solving professional problems. According to Karelin et al. (2017), from the fire-technical profile educational organizations' development analysis, it can be concluded that historically there have been fire-fighting units professional activity in two areas: fires prevention (prophylaxis) and their extinguishing. However, at the Russian system EMERCOM development present stage, an educational organization graduate must have practice-oriented skills not only in the fires prevention and extinguishing field but also in conducting emergency rescue and emergency recovery operations in the emergencies' elimination, due to the emergency response additional functions.

As shown Buckman and Nordal (2018) and Lv et al. (2018), the fire-technical educational organizations' cadets' practice-oriented skills formation theoretical issues are poorly studied, while the unresolved problems are both the practice-oriented skills specification necessary for a cadet, and their formation process organization. Therefore, we attempted from a systemic, activity-based and competence-based approaches standpoint, taking into account the requirements for training results, to develop a theoretically substantiated structural scheme for the practice-oriented skills formation, which components implementation in the educational process will contribute to the practice-oriented skills effective formation in the EMERCOM cadets higher educational institutions process.

3. Research Questions

In this work, the following issues study was carried out:

- A structural scheme development for the practice-oriented skills formation in the EMERCOM cadets' higher educational institutions process.

- To identify and develop organizational and pedagogical conditions for the formation of practice-oriented skills in the EMERCOM cadets higher educational institutions professional training process and check their effectiveness.

4. Purpose of the Study

This work-study purpose is to identify and substantiate the EMERCOM cadets' higher educational institutions practice-oriented skills structure in their professional training process, to consider possible ways and conditions for the practice-oriented skills effective formation.

5. Research Methods

The methodological basis of the research described in this article was: a systematic approach that allows considering the EMERCOM cadets professional training as a system; an activity-based approach that determines the EMERCOM cadets higher educational institutions practice-oriented skills formation vector; a competence-based approach that allows us to consider practice-oriented skills as a future specialist competence component.

Also, in our work course, we relied on philosophical, psychological, pedagogical, methodological, methodological literature and regulatory legal acts general theoretical research methods, namely, analysis on the research problem, hypothesis building, process modelling; used empirical research methods - questioning, testing, pedagogical observation, conversation, pedagogical experiment. The methods of Yovaishi (1999) and Ilyin (2009) were used in the reflexive and evaluative indicators study. To establish the characteristics' coincidences and differences reliability studied in the practice-oriented skills pedagogical experiment, we applied the mathematical statistics method, Pearson's goodness-of-fit test, according to Hazari et al. (2019).

5.1. A structural scheme development for the practice-oriented skills formation in the EMERCOM cadets' higher educational institutions process

The EMERCOM cadets' higher educational institutions process practice-oriented skills formation in a systematic approach context should take into account the following provisions:

- The developing practice-oriented skills goal should be clear to cadets.
- The knowledge necessary for the practice-oriented skills formation is taught to cadets in a sequence determined by the educational material logic (system).
- The actions study and implementation included in the practice-oriented skill is carried out from simple to complex in compliance with the actions sequence.
- Performing the actions included in the practice-oriented skill is possible after understanding their implementation sequence.
- The studied actions systematic repetition (working out) is necessary.

Thus, when constructing a practice-oriented skills formation structural scheme in the Russia EMERCOM cadets' professional training process, we proceeded from the fact that it should reflect (Figure 1):

- Requirements of regulatory documents to the Russia Emergency Situations Ministry cadets professional training quality.
- Stages of formation of practice-oriented skills in the Russia Emergency Situations Ministry universities cadets professional training process.
- The practice-oriented skills formation levels main criteria and parameters.
- The EMERCOM cadets higher educational institutions forming practice-oriented skills process content.
- Organizational and pedagogical conditions for practice-oriented skills formation.

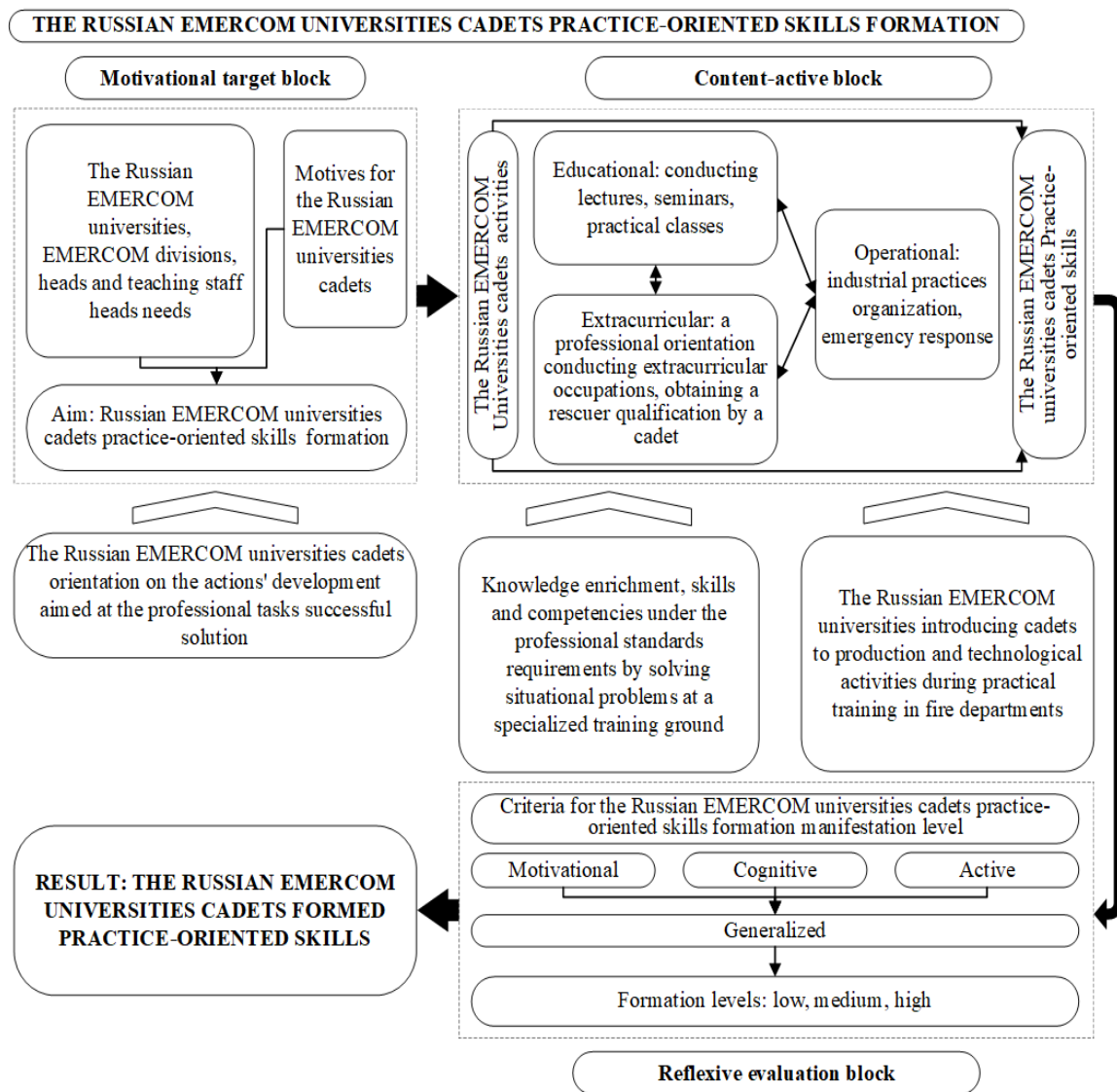


Figure 1. A structural scheme development for the EMERCOM cadets' higher educational institutions process practice-oriented skills

For our study, we have chosen a scheme' structural type, which allows us to represent the object under study as an integral system, including its constituent parts - blocks, their components, subsystems, interconnected by certain structural relationships, according to De Winter et al. (2016).

The scheme developed by us (Figure 1) includes three interconnected components that form an integral system: normative-target, content-technological, reflexive-evaluative.

The structural scheme normative-target component development was carried out by us on the state and society recognizing the order principle basis, the needs of the university, fire and rescue units and cadets as backbone factors for ensuring the practice-oriented skills formation.

In the practice-oriented skills formation structural scheme content-technological component, we include training programs for cadets under the Higher Education Federal State Educational Standard requirements, the Russia Emergencies Ministry University and employers; cadets' independent work content, practice programs.

The scheme reflexive-evaluative component provides the cadets' practice-oriented skills formation comprehensive assessment. It includes preparedness qualitative characteristics - practice-oriented skills formation criteria and levels, to which we include professionally significant values, motives for obtaining a chosen profession, special disciplines knowledge within the content skills and experience in accordance with the requirements for learning outcomes in specialty 20.05. 01 "Firundveloping a structural diagram, taking into speciality he cadets" professional training peculiarities, we have identified the following criteria for the practice-oriented skills formation: motivational, cognitive, activity-based, generalized.

5.2. Methods for assessing the organizational and pedagogical conditions' effectiveness for the practice-oriented skills formation

To assess the cadets' practice-oriented skills formation levels, we propose to use a standard scale: low, medium and high levels.

According to Adolf and Troyak (2020), for the practice-oriented skills effective formation in the cadets' professional training process, we identified the following organizational and pedagogical conditions:

- The Russian universities EMERCOM cadets orientation on the actions' development aimed at the professional tasks successful solution;
- Knowledge enrichment, skills and competencies under the professional standards requirements by solving situational problems at a specialized training ground;
- The Russian higher education institutions EMERCOM introducing cadets to production and technological activities during practical training in fire departments.

Experimental work on the proposed structural scheme the identified and developed organizational and pedagogical conditions effectiveness approbation and assessment for the cadets' practice-oriented skills formation was carried out identified and in the period from 2016 to 2018 at the Siberian Fire and Rescue Academy, with the involvement of Faculty of Fire Safety Engineers, students in the speciality 20.05.01 "Fire safety" 100 cadets, the Siberian Fire and Rescue Academy specialized department teaching staff 9

people: tactics and rescue operations, fire equipment; the employer 8 representatives - the Russia EMERCOM Main Directorate specialists in the Krasnoyarsk Territory.

To participate in the experiment, a control group (CG) was formed in the amount of the 50 cadets course first platoon, during the lessons in which the traditional training system was used, and an experimental group (EG) in the amount of the 50 cadets second platoon, in which the proposed organizational and pedagogical conditions. The formative experiment was carried out for 4-6 study semesters.

Under the scheme reflexive-evaluative component, before the beginning (4 semesters) and after the end (6 semesters) of the experimental work, we conducted a study of the motivational, the cadets' practice-oriented skills formation-level cognitive and activity criteria.

6. Findings

The assessing the motivational, cognitive, activity and generalized criteria results at the experimental work beginning and end are presented in the Table 1 and the diagram (Figure 2).

Table 1. The practice-oriented skills formation level

Criterion	Groups	Levels					
		Low		Medium		High	
		Control		Control		Control	
		Input	Final	Input	Final	Input	Final
Motivational	CG	48	18	50	62	2	20
	EG	52	12	46	54	2	34
Cognitive	CG	54	18	46	72	2	10
	EG	56	10	38	50	6	40
Activity level	CG	64	10	36	58	0	18
	EG	52	6	48	52	0	46
Formation level	CG	60	18	40	62	0	20
	EG	52	6	48	46	2	48

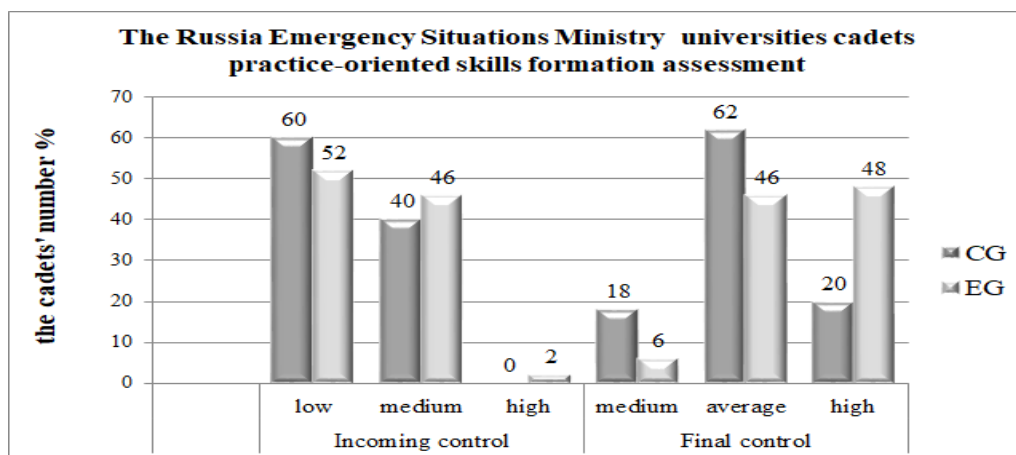


Figure 2. The cadets practice-oriented skills formation levels

The experimental and control groups result from statistical analysis at the experimental work end time confirms the statistically significant differences' presence: under the Pearson criterion, the value χ^2 , characterizing the differences in the practice-oriented skills formation levels in the experimental and control groups, after the experiment is 9.950, which exceeds the tabular $\chi^2_{\text{tabl}} = 5.991$ at a confidence level of 95% and the freedom degrees number equal to 2, according to De Winter et al. (2016).

The results obtained are generally consistent with the different firefighter training systems studies data. In particular, Broomé et al. (2014), Firmin et al. (2018), Holmgren et al. (2019) and Pozharkova et al. (2020) presented a practice-oriented approach to use statistically significant results in the development of the skills of students in the fire-technical profile. At the same time, in such studies, the emphasis, as a rule, is placed on the individual practice-oriented skills formation, while in our work the formation of them in a complex is considered, taking into account the specifics of the tasks facing the Russia Ministry of Emergencies higher education educational institutions cadets.

7. Conclusion

The proposed structural scheme reflects the relationship between the practice-oriented skills formation components in the process of Russia Emergency Situations Ministry training: motivations and values, practice-oriented knowledge, practice-oriented actions, and theoretically justify the training cadets educational process modernization studying in the speciality 05.20.01 "Fire safety". The experimental work results prove the structural scheme developed adequacy as the theoretical analysis a result, as well as the fact that the organizational and pedagogical conditions identified and developed set is necessary and sufficient for the practice-oriented skills effective formation in the Russia Emergency Situations Ministry universities cadets' professional training process.

It should be noted that the study does not exhaust the Russian universities EMERCOM cadets forming practice-oriented skills problem all aspects. The relationship aspects between professional training in the Russian Emergencies Ministry educational institutions and the Russian Emergencies Ministry professional training in the fire and rescue units need further research.

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