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**FORMATION OF ADAPTATION RESOURCE FOR RAILWAY
TRANSPORT UNIVERSITY STUDENTS
PROFESSIONALIZATION**

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Abstract

The paper is devoted to the analysis of the adaptation resource of professionalization (ARP) of future railway engineers. It is proved that the basis of ARP is professional health. The specific character of the training (ARP) of students is manifested in the nature of the relationship between intellectual factors and socio-psychological conditions in the structure of ARP. The organization of the intellectual and socio-psychological components of the ARP provides the formation of students individually expressed productive models of mastering the specialty, adequate to the requirements of the professional standard. Experimental identification of features of the formation of intellectual and socio-psychological components of the ARP allowed to present models of levels of its staged development. The authors justify the necessity of the development and implementation of special programs of social and psychological support for the professional adaptation of future engineers in the context of the continuous complication of railway equipment and the conditions of its operation, as well as the attitude towards oneself as a future engineer. The obtained data can also be used to develop proposals for physical and mathematical training, which will be aimed at the phased development of ARP to a level that ensures the independence of professionalization.

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Keywords: Adaptation resource of professionalization, mental capacity for information processing, ensuring the optimal operation of railway equipment; the main elements of socio-psychological component of ARP, modeling the levels of ARP phased formation



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1. Introduction

One of the main problems of training future specialists is the formation of multilevel professional adaptation. Mental adaptation is a basic factor in the adaptation process in a technical university. It is connected with the manifestation of logical, abstract and spatial thinking in the course of professionalization. The increase in the number of first-year students with insufficiently developed forms of engineering thinking leads to a significant increase in maladaptive students (up to 32.5% of those who are not successful after the first term exams) (Smyk et al., 2019; Tinto, 1975). Socio-psychological adaptation, as a significant condition for the formation of professional adaptation, predetermines the awareness of the choice of an engineering profession, motivation, persistence and independence of educational and professional achievements. Many studies confirm that the lack of development of social and psychological adaptation in the stressful situation of the first term exams leads to the increase in negative emotions, provoking manifestations of various forms of social maladaptive traits such as smoking, aggressiveness, alcoholism, unwillingness to study at a technical university in general, etc.

Adolescence is a difficult stage of ontogenesis, characterized by crisis periods of professionalization (Povarenkov & Shadrikov, 1990). It is also characterized by increased sensitivity to the conditions of professionalization with sufficiently matured cognitive structures. Researchers believe that it is the socio-psychological characteristics of a student's personality that ensure successful adaptation in university, expanding the range of professionalization factors that he can adapt to (Maklakov, 2001). Modern students, to a greater extent than age teachers, are sensitive to the processes of a rapid change of generations of railway equipment, the renewal of technologies and changes in the forms and methods of professionalization.

The division of adaptation into primary and secondary has become classic. Primary adaptation covers the period of the initial inclusion of a student in educational process, environment of educational institution and in a team; secondary adaptation covers the subsequent period of professional development. Babansky (1982) characterized the adaptation of students as a sequential passage of three stages: the defining stage, when school stereotypes are broken and a new one is formed (1-3 semesters); cumulative stage (4-6 semesters) and final stage (7-10 semesters).

2. Problem Statement

It is known that training at a railway transport university has a pronounced pragmatic orientation towards the engineering component and leaves aside the mastery of the value aspects of labor associated with social and psychological adaptation. At the same time, it is known that it is value aspects that ensure the preservation of professional health for the long term. In accordance with the theory of "human vital forces" developed by Grigorieva and Demina (2000), this concept is reduced to the ability of people to realize and improve their lives through various forms, methods and means. The basic indicators and characteristics of vital forces of a person are: health, physical development and mental state, social level, formation of knowledge, skills and abilities.

The direction to the technologies of future, the ability to find technically competent solutions in extreme situations that are adequate to problem situations, require developed professional health from a

railway specialist. The adaptation resource of professionalization (ARP) of a student is the most significant source of vitality and development of professional health.

A large percentage of expulsion already in the first year, associated with low physical and mathematical training, as well as with the unwillingness to take responsibility for the success of professionalization, poor informatization of rural settlements (from where most applicants arrive) indicate that the adaptation resource of professionalization of most students is depleted and it will be more and more depleted with the course of time. This throws doubts on the full-fledged mastery of them within the framework of university training with the entire set of professional actions declared in the Professional Standard.

3. Research Questions

The formation of ARP of future railway engineers has not yet become the subject of extensive independent analysis. The problem of co-organization of intellectual and socio-psychological components in the structure of ARP, leading to the expansion of the potential for professional self-development, has not been sufficiently developed. There is a specificity of this formation, which is manifested in the nature of the relationship between intellectual factors and socio-psychological conditions in the structure of ARP. The practical relevance of the study is in the substantiation of the need for the development and implementation of special programs of socio-psychological support for the professional adaptation of future engineers in the context of the continuous complication of railway equipment and the conditions of its operation, as well as attitude towards oneself as a future specialist in railway transport. The aim of such programs is to develop high rates of ARP, adequate to adolescence through the expansion of the possibilities of socio-psychological adaptation, which ensures professional self-development.

4. Purpose of the Study

The purpose of the study is to substantiate the formation of the adaptation resource of professionalization (ARP) as a significant condition for maintenance of professional health and successful professional activity.

5. Research Methods

Methodological approaches to the problem of the formation of the adaptive resource of professionalization are of a complex nature (Grigorieva & Demina, 2000). In our opinion they are as follows:

- a holistic approach to the study of the problems of the development of human psyche, developed by B.G. Ananiev, L.A. Golovey, P.F. Lesgaft, B.F. Lomov and others);
- a subject-activity approach, revealing the main directions of the formation of a person with active goal-setting, consciously building and regulating activities (K.A. Abulkhanova-Slavskaya, A.V. Brushlinsky, S.L. Rubinstein, etc.);
- the works on the psychological adaptation of a personality by P.K. Anokhin, I.P. Pavlov, G. Selye, I.M. Sechenov;

- the research on the psychology of first-year students by K.A. Abulkhanova-Slavskaya, B.G. Ananiev, N.A. Verbitsky, R.M. Granovskaya;

In order to solve the research tasks, the following methods were used:

- Express diagnostics of the working capacity and functional state of a person created by M.P. Frost. It was necessary to identify the features of the manifestation of the components of intellectual adaptation;
- Social and psychological adaptation of personality (SPA) by K. Rogers, R. Diamond. With its help, the features of the manifestations of the main elements of social and psychological adaptation in the structure of ARP were revealed.

The study involved 60 first-year students of Trans-Baikal Institute of Railway Transport including 30 people are graduates of urban schools and 30 freshmen graduates of rural schools.

6. Findings

We consider professional health as the ability of a specialist to ensure high indicators of labor productivity while maintaining the necessary and sufficient compensatory and protective properties of a body that ensure physical health, as well as the ability to withstand a life scenario adequately to positive attitudes associated with the readiness to implement the “Self-concept” in adulthood at the field of engineering work.

In the context of the problem of maintenance of professional health and successful professional activity, we consider the formation of ARP of a future engineer as the maturation of a complex of special cognitive-personal system structures ensuring the readiness to master professional actions in the educational environment of a university.

The process of adaptation of a student of railway transport acts as an independently organized professionalization, a special mechanism of self-education, focused on the continuous complex conditions of future engineering work. The co-organization of the intellectual and socio-psychological components as part of ARP ensures the formation of individually expressed productive models of mastering a profession that are adequate to the requirements of the Professional Standard. ARP of a future railway transport specialist consists of the possibilities and methods of manifestation of intellectual factors of adaptation that provide engineering thinking and socio-psychological conditions for adaptation associated with the readiness for continuous self-improvement in the field of engineering work. The intellectual and socio-psychological components of ARP of future engineers are integrated into stable systems that have a pronounced developing adaptive potential.

The implementation of ARP of a student is a willingness to realize stable intellectual resources of engineering thinking under the influence of continuously changing personality-determined socio-psychological conditions.

There is the interconnection between genetically determined intellectual factors in the development of engineering thinking and socially determined socio-psychological conditions for the development of ARP of a future engineer in the unity of his continuous professional self-development. They are objectively dependent on each other and in general form one of the integral characteristics of successful professionalization. Genetically determined intellectual factors and environmental socio-psychological

conditions have a very wide range of influences - from rare to strong and a huge number of combinations. In this regard, each student forms his own unique ARP, which due to the capabilities of the intellectual factor allows ensuring the breadth and quality of social and psychological responses to the impact of the educational environment of a university.

The basis of the intellectual component of ARP of a student is the special functioning of the neurobiological mechanisms of his brain, which ensure the development of abilities for mathematics. Researchers distinguish two groups of significant cognitive factors associated with the solution of mathematical problems. The 1st group of factors does not appear to be specific for mastering only mathematics, but determines the possibility of the overall success of knowledge of most areas of academic knowledge (Altman, 2013; David, 2011). These factors include: the amount and method of information storage in working memory, methods of processing spatio-temporal patterns and cyclical processes, as well as the nature of control over inhibition processes and the general level of the development of visual-spatial abilities. The 2nd group of factors ensures the success of mastering specific mathematical knowledge. It combines the ability to roughly estimate the quantity and distinguish numerical values, which form the understanding of mathematical methods, as well as the conjugation of mathematical methods with the ways of functioning of technical objects and the flow of technological processes. There are many individually justified options for the development of intelligent components as part of ARP. Wide variability is associated with the level of student resistance to increasingly complex information flows, deterioration in the quality of environmental processes affecting the processes of preservation of attention and memory processes, as well as the ability to apply mathematical methods to the operation of real technical means, etc. (David, 2011). The authors determine a single indicator of the development quality of the intellectual component of ARP - mental capacity for information processing, which ensures the optimal operation of railway equipment.

Socio-psychological components present a significant condition for the formation of ARP. They depend on various environmental circumstances: the characteristics of a family and school education of the future engineer, the developmental capabilities of the educational environment of a university and the region as a whole, etc. In general, they determine the presence and quality of professional and life goals, responsibility for their implementation, awareness of the value of the engineer's labor, positive labor motivation, striving for continuous professional self-improvement, etc. Rean et al. (2006) noted that the success or failure of a student's adaptation to a university depends on the manifestation of personal qualities that ensure the self-development of a future specialist.

Maksimova and Karaseva (2016) believe that a qualitatively new atmosphere of vocational training in comparison with the previous institutions of socialization, which is formed from the totality of mental, emotional and physical stress, creates new, complicated requirements not only to the psychophysiological constitution of a freshman or his intellectual capabilities, but also to an integral personality, first of all, to the level of his social and psychological competence.

According to the studies of the psychological content of the adapting personality, carried out by Posokhova (2001), we have determined the leading elements of the socio-psychological component of ARP of a student -railway worker:

- the awareness of the constantly changing circumstances of engineering work;

- the reflection of the image “I am the future engineer of railway transport”, the desire to improve this image based on the analysis of the work of successful production workers, increase in the need for self-manifestation of internal resources of productive labor;
- the possibility of self-regulation of emotional states in difficult working conditions, rapid transformation of ways to resolve “traumatic” situations under the existing regulations of actions.

We present the results of the formation of the mental capacity of 1st year students (graduates of urban and rural schools) when processing information that ensures the optimal operation of railway equipment. We determined it as an integral indicator of the intellectual component of ARP.

The results of the comparison of the mental capacity of students are presented in Table 1.

Table 1. Number of participants (in%) with indicators of mental capacity according to the Moroz method

Health state types	Rural school graduates (N = 30)	City school graduates (N = 30)
Normal	5,6	12,3
Slightly reduced	59,5	59,6
Reduced	27	27
Significantly reduced	7,9	1,1

The results show that the number of participants with normal mental capacity is much higher among urban school graduates. The opposite trend is observed in terms of significantly reduced mental capacity. It is necessary to note that the social living conditions of rural school graduates significantly reduce important indicators of mental development. It is important to note that there is a decrease in the number of experienced teachers of mathematics and physics in rural areas. In the context of mental capacity, rural school graduates fall into the risk group associated with the quality of physical and mathematical training. They need additional support in this direction.

A comparative study of the indicators of socio-psychological conditions in the composition of ARP of graduates of urban and rural schools was carried out according to the method of socio-psychological adaptation of personality (SPA) by K. Rogers and R. Diamond. The results of the comparison of the number of subjects with different adaptation indicators are presented in Table 2.

Table 2. Number of participants (in%) by indicators of socio-psychological adaptation

Indicators	Rural school graduates(N = 30)	City school graduates (N = 30)
Desire to dominate	31	47
Internality	56	69
Emotional comfort	34	69
Acceptance of others	63	63
Self-acceptance	43	73
Adaptation	34	64

Similar results in terms of acceptance of others among graduates of urban and rural schools indicate the similarity of the options for family education and relationships in the peer group adopted in Russian society. The result is the formations of similar scenarios for the formation of one's own "Self" in relation to social and normative criteria: social approval, morality, purposefulness, success.

However, there is a decline in the number of rural school graduates in other indicators. It is seen that the largest difference is observed in the adaptation indicator. This indicator records the doubts of graduates about the choice of the optimal socio-professional status for them and the need for socio-territorial inter-regional and intra-regional movements. As a result, the graduates of rural schools show the states of excessive emotional tension in problematic situations of professionalization, high severity of stress and low resistance to it. This indicates that the socio-psychological conditions in the composition of ARP of rural school graduates block the manifestation of intellectual factors and reduce the possibilities of the formation of ARP.

The result of the identification of the features of the formation of intellectual and socio-psychological components of ARP was the modeling of the levels of its gradual formation. The main principles of modeling were as follows:

- The principle of psychological determinism, explaining the interdependence of the formation of intellectual and socio-psychological components in the structure of ARP;
- The principle of consistency, indicating the basic need for the formation of intellectual components and the possibility of the formation of socio-psychological components dependent on them;
- The principle of self-activity (on the basis of activity, reflexivity, optimality), which substantiates the mechanism for the outgrowth of the externally controlled process of the formation of ARP into a self-developing process.

As the criteria that fix its quality, the following are determined: mental capacity for processing information, ensuring the optimal operation of railway equipment; awareness of the constantly changing circumstances of engineering work; reflection of the image "I am the future railway engineer", desire to improve this image based on the analysis of the work of successful production workers, increase in the need for self-manifestation of internal resources of productive labor; possibility of self-regulation of emotional states in difficult working conditions; fast transformation of methods to overcome "traumatic" situations in the conditions of the existing regulations of actions.

We consider the levels of formation of ARP as the stages of development of psychological rehabilitation potential of professionalization (PRPP) of a student.

High level of formation of ARP provides a high degree of independence of professionalization. There is a harmonious relationship between the intellectual and socio-psychological components of ARP, which provides internal self-regulation. At this level, high indicators of mental capacity are manifested. The structure of the ideas "I am a future railway engineer" has a high degree of realism and adequacy to the Professional standard. Such students create effective educational and professional communications. Depending on changing circumstances, they are able to adjust the ways of mastering professional actions. They are optimistic in their intentions and focused on the productivity of their lives in accordance with their own goals.

The average level of formation of ARP manifests itself as moderately delayed. The interrelation of the intellectual and socio-psychological components of ARP has a group character, which entails failures of the self-regulation processes of individual elements of ARP. This level is characterized by the average indicators of mental capacity. A future specialist is not able to apply mathematical methods to specific technical objects in all situations. In the structure of the ideas “I am a future railway engineer” there are certain elements of adequate correlation of modern requirements for specialists with their own capabilities. Some deformations of socio-psychological development are observed. The increased level of personal anxiety is more often expressed. Therefore, inertia and isolation in situations of educational and professional interaction is typical. The possibility of self-regulation of emotional states in difficult working conditions is insufficiently expressed. There is a weak transformation of the methods to overcome “traumatic” situations in the conditions of the existing regulations of actions during the solution of educational and professional situations.

The low level of formation of ARP causes the slowdown of professionalization. The interrelation of the intellectual and socio-psychological components of ARP does not provide self-regulation of the manifestations of the individual elements of ARP. At this level, there are low indicators of mental capacity. The ideas “I am a future engineer of railway transport” are poor for such students, there is a large number of illusory ideas. They often do not assess themselves critically as future specialists and demonstrate an unproductive self-assessment of their readiness for professional activity. Personal anxiety has significant deviations from the normal one. They get stuck in negative feelings of educational and professional disadvantage, experiencing an urgent need for constant support and do not want to show independence.

It is possible to state that students with different levels of development of ARP require special programs of physical and mathematical training and socio-psychological support, which will be aimed at the gradual development of ARP to a level that ensures the independence of professionalization.

7. Conclusion

1. As a result of the research, it was found that the general level of formation of ARP of the graduates of rural schools is significantly reduced in comparison with the graduates of urban schools. This is manifested in the deformation of professionalization.

2. The modeling of three levels of formation of ARP is carried out; at every level a special type of interconnection of individual elements of the intellectual and socio-psychological components of ARP is expressed.

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