

# Resilience as a Factor of Professional Development of Railway Engineering Students

Evgenia Ivanovna Kasyanova

Doctor of Philosophy, Associate Professor

Transbaikal Institute of Railway

Transport - a branch of Irkutsk State University of Railway

Engineering

Chita, Russian Federation

e-mail: [ukasjanov@gmail.com](mailto:ukasjanov@gmail.com)

Nina Innokentievna Vinogradova

Doctor of Psychology, Associate Professor

Transbaikal State

University

Chita, Russian Federation

e-mail: [vin57@list.ru](mailto:vin57@list.ru)

**Annotation**—The article analyzes resilience of future railway engineers. At the stage of vocational training, the analysis of developmental characteristics of students and their basic components is of particular importance, since resilience is one of the important factors for ensuring psychophysiological safety. The authors examine the impact of resilience on the professional development of students. The data can be used to develop recommendations aimed at reducing risks of the "human factor" in ensuring train traffic safety.

**Keywords**—*professionalization, general level of resilience, involvement, control, risk taking, coping strategies.*

## I. INTRODUCTION

Ensuring railway safety is an important task determining the development of the national economy and society. In general, safety is a complex problem. However, one of the pressing issues is the "human factor" - human errors. One of the effective ways to solve railway safety problems is to improve quality of professional training of railway engineering students, their resilience, which allows a person to resist stresses.

The need to master basic professional skills affects:

- the development of student anxiety for their quality;
- the compliance of the level of professionalism with qualification requirements;
- distortion of the professional career strategy (connected with the extension of the "retirement age").

Structural changes in the work determine the reduction in the adaptation period for young workers. They are likely to get injured, disappointed in their profession.

Resilience is an integral characteristic that allows a person to resist stresses and turn them into new opportunities for the personal development.

The formation of personal components of resilience ensures the finding of an individual vector of professional development.

The purpose of the study is to identify significant components of the development of resilience in engineering students.

The research aims to study factors and mechanisms of development of resilience and its impact on the professional development.

## II. METHODS AND MATERIALS

The methodological basis is:

- a holistic approach to the study of problems of human development developed by B. G. Ananyev, V. M. Bekhterev, L. A. Golovey, P. F. Lesgaft, B. F. Lomov, etc.);
- a subject-activity approach that explains trends of human development (K. A. Abulkhanova-Slavskaya, A. V. Brushlinsky, S. L. Rubinshtein, etc.);
- a synergistic approach justifying the presence of a large number of possibilities for solving professional and life tasks (V. I. Arshinov, E. N. Knyazev, S. P. Kurdyumov, etc.);
- stress coping models that affect the choice of behavior and quality of resilience (L. I. Antsiferova, L. K. Kitaev-Smyk, V. D. Nebylitsin, S. S. Kobasa, Peggy A. Thoits, etc.).

To solve the tasks the holistic diagnostic technology was used. As a result of the comparative study of resilience components, the most significant ones can be distinguished and marked as leading factors of professionalization. Using the "Resilience" methodology (version by E. N. Osin, E. I. Rasskazova) [1, 2] we identified level indicators of resilience and its individual components.

The test used for overcoming difficult life situations (coping strategies questionnaire SVF120 by V. Janke, G. Erdman, adaptation by N. E. Vodopyanova) [3] allowed us to determine the leading mechanisms for solving important life tasks associated with productive professionalization.

The study involved 60 first-year and 60 fifth-year students of TBIRT.

**III. RESULTS**

Sociologists have established that the cycle of changing the profession has become smaller (2-3 times during life). For quite objective reasons, the vocational education system does not keep pace with technological processes; therefore, it must search for new forms. The development of professional competence is a difficult task, since annually, according to the estimates of American scientists, a specialist must update 5% of theoretical and 20% of practical professional knowledge, which requires continuous professional self-education. In the USA, a unit of measuring obsolescence of knowledge is “half-life of competence”, when the competence is reduced by 50%. This period has been declining over the past decades. For example, in 1940, knowledge became obsolete after 12 years, in 1960 - after 8-10 years, for a modern graduate, this period is 2-3 years.

The resilience of students allows them to overcome adverse, difficult and even extreme situations of vocational training, show responsibility for their own actions, be ready to change themselves, choose the best options for solving important educational and professional tasks in accordance with their own biological and social rhythms [4]. The identification of reasons for the non-productive development of professionalism of future railway transport workers involves an analysis of the characteristics of the development of resilience at the stage of training.

The general ideas by S. L. Rubinstein on the meaning of personality development through the integration of its elements [5] were specified by B. G. Ananyev [6]. He came to the conclusion that development is integration that is formation of large “blocks”, systems of structures whose synthesis life acts as the most general structure of personality. The most common personality structure is professionalism. It manifests itself as the most integrated characteristic of a person, having several projections. At the level of vertical changes, it includes subsystems: individual morphological and physiological prepersonal qualities (individual typological); psychological personal and professional grounds; technological activities and process manifestations. We suggest that professional development is based on the resilience.

According to S. Muddy [7], resilience includes three independent components: involvement, control, and risk acceptance, which determine the system of personal beliefs about himself and the world that help overcome stressful situations.

At the first stage, we studied general indicators of resilience in two groups of students. As a result, significant differences in the resilience indicators in groups of first- and fifth-year students were found. They are presented in Table 1.

**TABLE I DISTRIBUTION OF DISABLED STUDENTS IN GROUPS BY RESILIENCE INDICATORS**

Response nts	Nu mber	Involvement			Control			Risk acceptance			resilience		
		Levels			Levels			Levels			Levels		
		l	a	h	l	a	h	l	a	h	l	a	h
1st year stude nts	40	30	10	-	8	30	2	32	8	-	23	19	-
5th year stude nts	40	8	28	6	1	4	35	3	34	4	-	10	30

Using the Fisher’s test, we checked the statistical significance of differences in resilience in groups of students with medium and low levels of resilience development: involvement ( $F = 3,769$  at  $p < 0,01$ ), risk acceptance ( $F = 4,215$  at  $p < 0,01$ ).

The data in Table 1 indicate a significant difference in the severity of the indicator "involvement". The underdeveloped quality of involvement emphasizes the mental regulation of the behavior of first-year students, the feeling of impossibility of professionalizing. In general, this indicates the problems of the development of a communicative skill that hinders the productive professionalization.

An analysis of the ways that first-year students solve significant educational and professional problems shows that determinants of this phenomenon are their low educational base, unformed mobility, poor contacts with fellow students, inadequate perception of the “I am a future professional” image, low self-esteem.

According to the results of observations of freshmen who did well at school, stable friendship develops by the end of the second month of studies. At the same time, students with low scores do not form friendly relations with fellow students This due to the fact that by the time of admission to the university they have already developed negative personality traits that reduce resilience. They often have high expectations for learning, they are very touchy, tend to blame others for their educational “mistakes”, tend to be infantile. The indicators of involvement reduce quality indicators for the general level of resilience in the first-year students [8].

For the fifth-year students, this indicator is average. A high level was observed in a small number of students. This indicates that the involvement rate is a deterrent to the development of resilience which will affect the slowdown in the professional development of specialists.

Let us analyze the degree of formation of the “control” indicator in the structure of resilience in the first-year students. A comparative analysis of the data shows that 70% (30 people) demonstrate an average level of control. This indicates that they can assume responsibility for choosing their own way of professionalization. They understand that the result of their professional training will determine the success of a professional career. Future work with complex technical labor means forces future engineers to think about the degree of coordination of their psychophysical capabilities. However, the absence of specialized disciplines, an analysis of professional labor actions and a relatively low general

education level do not ensure high volitional regulation of behavior and reduce quality of professionalization. It can be stated that the control indicator regulates the resilience of the first-year. The value of the control indicator in the structure of resilience of the 5th year students is high. Therefore, this indicator does not act as an obstacle to the resilience and does not inhibit the professional development.

Table 1 shows that the indicator “risk acceptance” is the most “falling” in the structure of resilience of the 1st year students. Only 20% (8 people) of students have an average indicator. The overestimated self-esteem of their educational opportunities disorients students in the analysis of opportunities for solving educational and professional problems. They are guided by the simple option of vocational training, which generates passivity and unwillingness to act in conditions of uncertainty. The basis of psychological unreadiness for justified risk acceptance in choosing a way of professionalization is an unwillingness to take responsibility for the quality of professional training.

Most of the fifth-year students have an average indicator which indicates that they have not understood the nature of productive professionalization; have not learned to overcome psychological barriers that arise in educational activities; do not demonstrate forecasting, modeling and decision making skills in conditions of professional uncertainty.

Low indicators of involvement cause the decline in qualitative indicators of risk acceptance among the fifth-year students which explains the overall prevalence of average resilience.

Using the test “Overcoming Difficult Life Situations” (coping strategies questionnaire by V. Janke, G. Erdmann, adapted by N. E. Vodopyanova), we tried to determine leading mechanisms for solving important life tasks associated with productive professionalization.

The questionnaire includes 20 strategies to overcome difficult life situations, of which 10 are "positive" strategies aimed at reducing stress, and 10 are "negative" ones that can increase the stress level. “Positive” strategies are divided into three ranges (positive No. 1, 2, 3).

No. 1 includes the following strategies: reducing the value of a stressful situation, self-approval, self-justification.

No. 2 includes: distraction, substitution, self-assertion, psychomuscular relaxation.

No. 3 includes the control over the situation, self-control, positive self-motivation.

“Negative” strategies include: fleeing from a stressful situation, social isolation, “hackneyed record”, helplessness, self-pity, self-accusation. The test results are presented in Table 2

TABLE II DISTRIBUTION IN GROUPS OF STUDENTS ACCORDING TO THE LEVEL OF CHOICE OF COPING STRATEGIES

Respondents	Number	Positive Strategies No. 1			Positive Strategies No. 2			Positive Strategies No. 3			Negative strategies		
		Levels			Levels			Levels			Levels		
		l	a	h	l	a	h	l	a	h	l	a	h
1st year students	40	6	32	2	2	36	2	2	26	12	12	28	-
5th year students	40	4	28	8	6	30	4	5	14	21	32	8	-

A comparative analysis of the results of the questionnaire on the choice of coping strategies showed that the first-year students' choice of “positive” and “negative” strategies is at the average level.

Within the positive strategy No. 1, 80% of students had an average level, which indicates the predominant lack of personal responsibility for the results of professionalization and the desire to reduce involvement in the educational process. The fifth-year students had results similar to the first-year students.

The average level of development of the positive strategy No. 2, which implies a rejection of classroom activities associated with tension and distractions from stressful situations, was observed in 90% of the first-year students. By the fifth year of studies, students “do not change” when choosing these strategies. The average level of the positive strategy No. 3 development related to the control over one’s own behavior, self-control and an ability to perform actions independently was observed in 65% of the first-year students and 72% of the fifth-year students.

The first-year students' choice of negative strategies, suggesting a meek trend to avoid stressful situations arising in educational activities, isolation from others, attributing the

stress to their own erroneous actions, criticizing oneself in choosing a wrong professionalization strategy was distributed as follows: the low level - 30% (12 people), the average level - 70% (28 people). This proves that first year students find it difficult to predict the effectiveness of the chosen coping strategy. By the fifth year of studies, the number of students choosing negative strategies is declining. However, a significant number of students have an average level.

**IV. CONCLUSION**

1. Five-year students demonstrated an average level of resilience. Its indicators are located in the range of medium and low values.

2. The poorest links in the structure of resilience were indicators of involvement and risk taking. They can be considered as the most significant factors ensuring resilience of students. We suggest a causal relationship between these two factors. Low values of the engagement rate decrease the effectiveness of the risk-taking indicator. The students' choice of positive coping strategies demonstrates an unproductive mechanism for solving educational, professional and life tasks.

3. Development of resilience is ensured by the indicator "control". This indicator acts as a factor in the professional

development of young specialists due to the ability to adjust goals, change individual operations in the performance of labor actions depending on specific circumstances of the work and rational forms of self-control.

### **References**

- [1] D. A. Leontyev, E. I. Rasskazova, Vitality test, Moscow, Sense, 2006. p. 63
- [2] E. N. Osin, E. I. Rasskazova, "A short version of resilience: psychometric characteristics and application in an organizational context" *Bulletin of Moscow University. Series No. 14. Psychology*, No. 2, pp. 147-165, 2013
- [3] N. E. Vodopyanova, *Psychodiagnosis of stress*, St. Petersburg, Peter, 2009. p. 336
- [4] A. N. Fominova, *Resilience of the individual*, Moscow, MPGU, 2012, p. 152, available at: <http://fpp-mpsu.ru/uploads/all/all-h5bSrV5uy1.pdf>
- [5] S.L. Rubinstein, *Problems of General Psychology*, Moscow, Meaning, 2002, p. 496.
- [6] B. G. Ananyev, *Man as a subject of knowledge*, St. Petersburg, Peter, 2001. p. 246
- [7] S. R. Maddi, D. M. "Khoshaba, Hardiness and Mental Health", *Journal of Personality Assessment*, Vol. 63, No 2, pp. 265-274, 1994. available at: [http://www.tandfonline.com/doi/abs/10.1207/s15327752jpa6302\\_6](http://www.tandfonline.com/doi/abs/10.1207/s15327752jpa6302_6)
- [8] J.L. Núñez, L. Jaime. "The Mediating Effect of Intrinsic Motivation to Learn on the Relationship between Student's Autonomy Support and Vitality and Deep Learning" Cambridge University Press, 2016 DOI: <https://doi.org/10.1017/sjp.2016.43>