Features of the Factor Structure of the Time Perspective and Components of the Orientation of Students of a Transport University with Different Levels of Academic Productivity

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Abstract: In the context of the technological and social changes taking place in the transport industry, young people are forming new standards for organizing future activities. In this context, the study of the changes taking place in the minds of students studying at a transport university acquires special acuteness. From a psychological standpoint, attitudes towards self-realization in future professional activity are formed in students at the level of attitude to time, components of personality self-awareness - self-esteem and the level of aspirations, as well as meaningful orientations and are manifested in actual educational and professional activities. In an empirical study on a sample population of students in transport directions of training with different levels of academic productivity, differences were identified and the factor structure was compared as a reflection of such attitudes, combining indicators of time perspective, self-awareness and directional components.

1 INTRODUCTION

The problem of improving the quality of professional training of specialists for the transport industry is associated with the priority areas of the state in the field of technological and economic superiority of the transport industry on the basis of improving the quality of training of human resources. In the context of social changes taking place in Russia, when new standards of life are being formed in people, new meanings and values are acquired, the study of the components of attitudes towards self-realization in professional activity and their transformations becomes an urgent problem.

A person's attitude to time and a person's idea of himself in time include the ability to set real time goals, to adequately assess time boundaries in changing life circumstances. Numerous social moments of the past, present and future, experienced by the subject through the system of personal meanings, allow him to correlate his capabilities and goals, distribute life events in terms of importance for a given period of time and build realistic plans for the future. Looking to the future allows a person to correctly understand the values of the present, to preserve a significant event from the past for the sake of the future, to imagine the future as a realized goal.

In the context of technological and social transformations in the transport industry, young people are developing new standards for organizing future activities. In this context, the study of the changes taking place in the minds of students studying at a transport university acquires special acuteness. In general, in theoretical terms, it is argued that the orderliness of the picture of the future provides a high level of motivational involvement and academic productivity of students at the stage of professional training (Lewin, 1951; Gorman, 1977; Zimbardo, 2005; Zimbardo, 2004; Zimbardo, 1999; Harber, 2003; Munnishs, 1993; Valle, 1989). However, there is little concrete empirical evidence for this in the transport industry.

Thus, contradictions arise between:

– the need for scientifically grounded ideas about the structural features of the time perspective and directional components in subjects with different levels of academic productivity and a lack

of theoretical and empirical studies of their relationship;

– the need of organizations in the transport industry for targeted training of workers and managers who are able to correlate their capabilities and goals, to carry out operational and long-term planning of activities, and the lack of a scientifically grounded system for assessing and developing a time perspective in the context of a professional orientation.

In this regard, the problem arises of insufficient theoretical concepts and empirical data on the structural features of the organization of the future in the minds of students in transport directions of training. Thus, the study of the structural features of the time perspective and the components of the orientation of students with different levels of academic productivity can become an empirical basis for developing a system for supporting the training of specialists for the transport industry in accordance with the new standards for organizing future activities.

2 MATERIALS AND METHODS

2.1 Methodological Basis of the Research

As a methodological basis for the study, the principle of a systems approach (Lomov B.F.) in psychology, understanding of the psyche as a complex system of interrelated functions, processes, states (Balin V.D., Vekker L.M., Karpov A.V., Merlin V.S., Platonov K.K.), the subjective approach (Rubinstein S.L., Brushlinsky A.V.).

2.2 The Theoretical Basis of the Research

The theoretical basis of the research was formed by F. Zimbardo's concept of time perspective, K. Levin's field theory and model of living space, and A. N. Leontyev's activity approach.

2.3 Research Methods

Theoretical study and analysis of the works of domestic and foreign authors on the problem of professional orientation, time perspective and their relationship (Lewin, 1951; Gorman, 1977; Zimbardo, 2005; Zimbardo, 2004; Zimbardo, 1999; Harber, 2003; Munnishs, 1993; Valle, 1989). A set

of methods of psychological diagnostics: the method of time perspective of Zimbardo F. (modified by O. Mitina, E. Sokolova, A. Syrtsova), the test "Life-meaning orientations" (Leontiev D.A.), the method "The level of correlation of "values" and "accessibility" in various spheres of life" (Fantalova EB), the test "Finding a quantitative expression of the level of self-esteem" (Budassi SA), the method "Schwarzlander motor test".

Mathematical and statistical processing of psychodiagnostic data was carried out using the statistical software packages SPSS and Statistica. To check the correspondence of the distribution of indicators to the theoretical normal, the Kolmogorov-Smirnov test was used. For comparative analysis, Student's t-test was used. To identify differences in the structure of relationships, exploratory factor analysis using the principal component analysis was used.

2.4 Experimental Research Base

The study involved second-year students of the Electromechanical Faculty of the Ural State University of Railways ($n = 209$).

3 RESULTS AND DISCUSSION

The first hypothesis was the assumption that there are significant differences between students with different levels of academic productivity in terms of time perspective, life-meaning orientations, level of aspirations and the ratio of value and accessibility of values.

Academic productivity was measured by indicators of academic performance and activity in extracurricular activities (participation in scientific and sports events). Accordingly, the group with high academic productivity included students studying mainly for marks "good" and "excellent", systematically participating in scientific and sports events, showing interest in the events of the university. The group with low academic productivity included students with no interest in university events, with predominantly satisfactory grades and academic debt.

After collecting and processing empirical data in order to select the methods of statistical processing, the normal distribution was checked using the Kolmogorov-Smirnov test. The results are shown in Table 1.

Of the thirteen measurements, only two have a distribution that is statistically significantly different

Table 1: Checking the normal distribution of features using the Kolmogorov-Smirnov test.

	The test "Life-meaning orientations" (Leontiev D.A.)					The method of time perspective of Zimbardo F. (modified by O. Mitina, E. Sokolova, A. Syrtsova)					Test "Finding a quantitative expression of the level of self-esteem" (Budassi SA).	Schwarzlander motor test	The method " The level of correlation of "values" and "accessibility" in various spheres of life"
	Goals in life	Life process	Result of life	Locus of control - I	Locus of Control - Life	Negative past	The hedonistic present	Future	Positive past	Fatalistic present			
Kolmogorov-Smirnov Z statistics	0,79	0,65	1,06	0,81	1,52	0,79	0,81	1,07	0,93	0,81	0,59	1,39	0,82
Asymptotic significance (two-sided)	0,52	0,73	0,19	0,48	0,019	0,53	0,54	0,23	0,32	0,59	0,83	0,03	0,47

from the normal one, which makes it possible to apply parametric criteria for further calculations. To compare students with high and low levels of academic productivity in terms of time perspective, life-meaning orientations, level of aspirations and the ratio of value and accessibility of values, the Student's t-test was used. The comparison results are shown in Table 2.

Statistically significantly higher results on the scale "Life performance or satisfaction with self-realization" were obtained among students with a high level of academic productivity (Xav = 27.02). Students with a low level of academic productivity have lower indicators (Xav = 22.97), which may indicate dissatisfaction with the part of life they have lived. The average results obtained by the Budassi personality self-assessment method among students with a high level of academic productivity are significantly higher than among students with a low level of academic productivity (Xav = 0.3 and Xav = 0.03, respectively). Low indicators according to this method mean a fuzzy and undifferentiated idea of a person about his "ideal I" and "real I", that is, students with a high level of academic productivity have higher self-esteem and, in general, more adequate. Thus, the assumption that the levels of the severity of the temporal perspective and components of the orientation of the personality in students with different levels of academic productivity differ, was

confirmed only on two scales "Life efficiency" and "Personality self-esteem".

Differences in the level of expression of empirical indicators are not the only empirical criterion for differences; it is necessary to assess the differences in the structure of relationships between indicators. The relationship between the indicators can be nonlinear, and besides, we were more interested not in the relationships themselves and their number, but in the grouping of these relationships, therefore, to identify the structure of the relationships of the variables, a factor analysis was carried out. Based on the essence of factor analysis and the empirical data obtained, we assume that the general attitudes of self-realization in life, which will be factors, are behind the interconnections of the substructures of orientation, temporal orientations and personality structures. The academic productivity of students is a reflection of their attitudes at the level of activity, which allows us to put forward the following empirical hypothesis. It is assumed that if the attitudes of students with different levels of academic productivity differ, then the factor structure of these groups should also differ.

Table 2: Significance of differences among students with different levels of academic productivity according to Student's *t*-test.

Variables		*t* criterion	Average indicators	
			Students with a high level of academic productivity	Students with low level of academic productivity
The test "Life-meaning orientations" (Leontiev D.A.)	Goals in life	-0,215	31,28	31,71
	Life process	0,872	27,87	27,33
	Result of life	2,213*	27,02	22,97
	Locus of control - I	0,381	21,32	20,78
	Locus of Control - Life	0,311	29,61	27,12
The method of time perspective of Zimbardo F. (modified by O. Mitina, E. Sokolova, A. Syrtsova)	Negative past	-0,454	30,83	32,53
	The hedonistic present	1,322	56,89	54,21
	Future	-1,132	44,98	47,19
	Positive past	-0,395	32,53	33,23
	Fatalistic present	-0,532	23,88	25,02
The test "Finding a quantitative expression of the level of self-esteem" (Budassi SA)		2,412*	0,36	0,08
The method "Schwarzlander motor test"		-1,74	-0,32	0,41
The method "The level of correlation of "values" and "accessibility" in various spheres of life "(Fantalova EB)		-0,623	37,45	39,54

Note: * - the differences are significant (p <0.05).

Table 3: Total explained variance in students with high level of academic productivity.

Variables	Initial eigenvalues			Sums of squares of rotational loads		
	Total	% Dispersion	Cumulative %	Total	% Dispersion	Cumulative %
1	3,767	28,977	28,977	3,322	25,552	25,552
2	2,731	21,008	49,985	2,218	17,062	42,614
3	1,800	13,845	63,830	2,083	16,020	58,634
4	1,136	8,742	72,572	1,812	13,939	72,572

3.1 Description of the Results of Factor Analysis in the First Group of Students with a High Level of Academic Productivity (N = 99)

The criterion assessment shows that the value of the Kaiser-Meyer-Olkin (KMO) sample adequacy measure demonstrates a satisfactory sampling adequacy for factor analysis (KMO = 0.654). Bartlett's sphericity criterion shows a statistically significant result (178.544, p <0.01): the correlations between the variables differ significantly from 0. Thus, if the factorial model converges, then it can be statistically trusted.

As a result of factor analysis in a group of students with a high level of academic productivity, four factors with eigenvalues greater than one were extracted, which explain 72.5% of the aggregate (total) variance (table 3).

Table 4 shows the transformed factor loadings matrix after rotation.

The first factor among students with a high level of academic productivity can be interpreted as "The meaningfulness of life", since this factor has collected variables that describe a person's life-meaning orientations (belief in freedom of choice, the desire to build their life in accordance with their goals, the presence of life goals, satisfaction emotional richness of life).

The second factor can be interpreted as a "Trans-perspective of life," since this factor includes variables that are associated with time (nostalgic attitude towards the past, healthy orientation towards the future and carefree attitude towards the present).

Table 4: Factor loadings matrix for students with a high level of academic productivity after rotation.

	Variables			
	1	2	3	4
Life process	0,872	–	–	–
Result of life	0,845	–	–	–
Locus of control - I	0,792	–	–	–
Goals in life	0,740	–	–	–
Positive past	–	0,849	–	–
Future	–	0,827	–	–
Negative past	–	–	0,802	–
Fatalistic present	-0,482	–	0,695	–
The level of claims the method of "Schwarzlander motor test"	–	–	0,690	–
Locus of Control - Life	–	–	–	0,754
The hedonistic present	–	0,560	–	0,668
The test "Finding a quantitative expression of the level of self-esteem" (Budassi SA)	–	–	-0,489	-0,631
The method "The level of correlation of "values" and "accessibility" in various spheres of life "(Fantalova EB)	–	–	–	0,460

The third factor collected variables that describe a negative assessment of one's past, a belief that the current situation should be perceived as inevitable, and low self-esteem. These variables can be interpreted as "Perception of the training situation".

The fourth factor can be interpreted as "Mismatch between the motivational-need sphere and the perception of time", since the variables associated with this phenomenon describe the belief that a person is given control over his life, freely make decisions and embody them, a carefree attitude to the present against the background mismatch in the motivational-need sphere.

3.2 Description of the Results of Factor Analysis in the Second Group of Tested Students with a Low Level of Academic Productivity (N = 110)

The value of the Kaiser-Meyer-Olkin (KMO) measure of sample adequacy demonstrates the acceptable adequacy of the sample for factor analysis (KMO = 0.723). Bartlett's sphericity test shows a statistically significant result (156.883, p <0.05): the correlations between the variables differ significantly from zero.

As a result of factor analysis in a group of students with a low level of academic productivity, three factors with eigenvalues greater than one were extracted, which explain 61.5% of the aggregate (total) variance (table 5). Table 6 shows the transformed factor loadings matrix after rotation.

The first factor can be interpreted as "The meaningfulness of life", since this factor collected variables that describe satisfaction with the life process, a positive assessment of the past and motivation for the future, the belief that a person is given control over his life, freely make decisions and implement them.

The second factor can be interpreted as "Perception of the training situation", since the variables associated with this phenomenon describe belief in one's ability to control events in one's own life, positive self-esteem, a carefree attitude towards the present, and a positive attitude towards the past.

The third factor collected variables describing the presence of goals in life, the mismatch in the motivational-need sphere, and the conviction that the future is not predetermined and can be influenced by one's own actions. These variables can be interpreted as "Discrepancy between the motivational-need sphere and the perception of time".

Thus, the factors in the two groups have a similar orientation, but different content load, respectively, a different factor structure. The first factor in both groups of subjects includes variables related to life-meaning orientations and variables of temporal perspective. But these variables have different meanings. For students with a high level of academic productivity, the meaningfulness of life is associated more with the present, while for students with a low level of academic productivity; meaningfulness is associated with the future.

Table 5: Total variance explained in students with low level of academic productivity.

Variables	Initial eigenvalues			Sums of squares of rotational loads		
	Total	% Dispersion	Cumulative %	Total	% Dispersion	Cumulative %
1	4,685	36,039	36,039	4,290	33,001	33,001
2	2,092	16,089	52,128	2,095	16,117	49,118
3	1,214	9,338	61,466	1,605	12,349	61,466

Table 6: Rotated component matrix in students with low level of academic productivity.

	Variables		
	1	2	3
Locus of Control - Life	0,885	–	–
Result of life	0,859	–	–
Life process	0,769	–	–
Goals in life	0,703	–	0,511
Negative past	-0,703	–	–
Locus of control - I	0,696	0,440	–
Future	0,423	–	–
The test "Finding a quantitative expression of the level of self-esteem" (Budassi SA)	–	0,807	–
The hedonistic present	–	0,786	
Positive past	–	0,591	
The method "The level of correlation of "values" and "accessibility" in various spheres of life "(Fantalova EB)	–	–	0,842
Fatalistic present	-0,524	–	-0,590
The level of claims the method of "Schwarzlander motor test"	–	–	–

The second factor in the first group of subjects collected variables of time perspective. This may indicate that students with a high level of academic productivity live in real time, perceive the past as inevitable, look positively into the future and adequately assess their present. In the second group of subjects, this factor does not stand out.

The third factor in the first group of subjects and the second factor in the second group of subjects refer to the perception of oneself in a situation of professional training. Students with a high level of academic productivity, due to a negative perception of past events and a high level of aspirations in the present, have a rather low self-esteem, perceive the situation of professional training as requiring efforts from them. Students with low levels of academic productivity have positive self-esteem, have a positive attitude towards the present, show passivity, and do not feel anxious about the future.

This is the most significant contradiction in the detected installations. We assume that academically unproductive students do not directly associate the situation of professional training with future professional and career success; they believe (perhaps illusory) in their ability to control future events regardless of the past. Therefore, they are not inclined to associate future professional success with current academic performance.

A group of students with a negative perception of the past may have faced failures in the past, but at the same time their level of aspirations has not been reduced, which cannot yet be realized in direct professional activity. Therefore, academic achievements are viewed by them as the potential for future professional success, which contributes to increasing motivation to achieve them. Such an explanation, of course, requires a separate empirical test.

The fourth factor in the first group of subjects and the third factor in the second group of subjects include variables that may relate to the mismatch between the motivational-need sphere and the perception of time. Thus, among students with a high level of academic productivity, the conviction that a person is given control over his life against the background of a carefree attitude towards the present leads to a mismatch in the perception of time and the motivational-personal sphere. In students with a low level of academic productivity, the mismatch of the motivational-need sphere may be the result of a poorly structured future.

Thus, the assumption that the general attitudes of self-realization in life are behind the

interconnections of substructures of direction, temporal orientations and personality structures has been confirmed. Also, the factor structure of students with different levels of academic productivity differs; accordingly, the attitudes, despite similar components, are meaningfully combined into different structural patterns.

4 CONCLUSIONS

Of course, the interconnection of time perspective with personal parameters and even individual characteristics takes place (Zimbardo, 1999; Harber, 2003). A balance between multidirectional attitudes is necessary for a person to function adequately in the present, which allows her to avoid fatalism, not to fall into the trap of hedonism or unrealistic daydreaming (Zimbardo, 2004). It should be remembered that behavior in the present is essentially determined not only by the past (for example, psychological trauma according to Z. Freud), but also by the future - goals, tasks, plans, etc. (Zimbardo, 2005). The subjective experience of the experience of time (Gorman, 1977), possibly, leads to the emergence of a new personal construct – the temporal trans-perspective (Lewin, 1951), which qualitatively changes the process of self-realization. It can be assumed that attitudes towards self-realization are a complex of interrelationships between personal characteristics and temporal perspective, and are manifested in different variants of activity and effectiveness. The presented study partly confirms this point of view and correlates with the results of other studies at the stage of professional training (Zavodchikov, 2018; Zeer, 2017). Statistically significant differences in groups of students with different levels of academic productivity were found in the level of self-esteem and experience of the effectiveness of life, but not in time perspectives. At the same time, factor analysis shows the similarity of the structures of interrelationships in time perspective, life-meaning orientations, personality characteristics and satisfaction of needs. They are similar, but not the same. A meaningful interpretation of the factors allows us to describe the difference in the behavior of students with low and high levels of academic productivity. On the one hand, this contributes to the development of the concept of time perspective and socio-psychological attitudes, their role in the regulation of actual activity. On the other hand, in practical terms, the research results can become the basis for developing a program to improve the academic productivity of students based on the semantic structuring of the future.

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