

disciplines correspondence. Also, in accordance with the Labor Code, a student who studies full-time is entitled only to part-time work and only if the employment corresponds the specialty.

To achieve the above-mentioned requirements, 50% (not less) of network education program should be implemented in collaboration with engineering enterprises. We have developed the mechanism of students' labor time management to study in terms of the network interaction. This mechanism implies spending the second half of the study day on practical and laboratory work at the enterprise. In this case, the student must be under the supervision of a professional.

The fundamental difference between students' training at the engineering enterprise under supervision and students' training at the university is in the individual training instead of mass classroom training. No company, even a large one could employ a group of graduates (28 engineers) every year. The logical solution to this problem is the application of the network form of training that allows splitting 28 students into subgroups at four basic departments. In this case, there are 7 students of one year in each enterprise. If 7 students are distributed to company's structural divisions, then

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there are 1-2 students for each division. Considering the fact that each student will be entitled to independent work at the end of the first year, and, by the graduation, will become a professional employee with a four-year experience, as well as a specialist who can understand the difficulties of junior students (succession of generations), it is possible to establish a self-monitoring reserve personnel unit in the company.

Such features of the network education as part-time employment within practical and laboratory work are a kind of students' motivation to work and study, as the evaluation of students' performance by instructor or supervisor is considered at the credits and examinations. Failure in labor responsibilities fulfillment disables the student to study in accordance with the applied Bachelor degree program. This partially solves the problem of money return spent by the company on students' training.

Thus, the presented type of networking interaction is aimed at improving the quality of education, graduates' competitiveness, and students' mobility. Network education programs are a common practice in the world education system and have good prospects in the system of national higher education.

Cross-cultural Interdisciplinary Study of Learning Motivation of Engineering Students in Russia and the USA

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The paper addresses cross-cultural analysis of the learning motivation of Russian and US students majoring in engineering. The study is carried out with the use of psychological and pedagogical methodology. Empiric analysis has not revealed significant differences between the Russian and US groups, however some peculiarities in the hierarchy and structure of motivational sphere were found and should be taken into consideration in organizing international mobility programmes.

Key words: interdisciplinary study, learning motivation, cross-cultural peculiarities, psychological-pedagogical analysis, engineering students.

Globalization, particularly in the sphere of professional communication, as well as knowledge economy, has provided researchers' and practician's unflinching interest in the issues of academic mobility and cross-cultural communication. The universities worldwide focus on the programmes of students' and teachers' mobility development, establishment of international working groups and projects. For example, Purdue University implemented a unique project of students' integration into the world community working at senior capstone project [1]. Kazan National Research Technological University has also great experience in international projects [2]. International teamwork allows future engineers to be integrated into international professional environment at the training stage.

Due to the increase in significance of cross-cultural communication in the professional engineering environment, it is of great interest for researchers as well. Cross-cultural communication is studied at the interdisciplinary level and is an object of culturology, psychology, pedagogy, linguistics, ethnology, anthropology,

sociology, and some other sciences. The given study implements interdisciplinary approach at the level of psychology-pedagogic relations to investigate cultural-related peculiarities of students' learning motivation in engineering universities of the USA and Russia.

Motivation, being one of the basic components of any activity and, to a great extent, defining its efficiency, is of interest for many humanitarian sciences. Interdisciplinary psychology-pedagogic approach to learning motivation considers a goal-oriented process of learning motivation development as a basis of learner's personal psychology. "Dynamics of personality development, – as V.G. Aseev puts it, – ...includes those steady regularities, study of which is a basic purpose of psychology. The most important among them are regularities of motivation development as a top form of psychological process regulation and moving force of human activity" [3, p. 334].

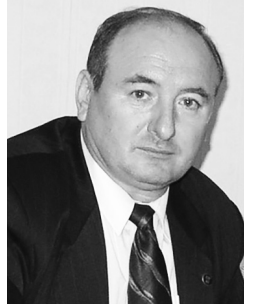
Besides, when considering learning motivation from the standpoint of mutual impact of personal, situational, and social factors, it is necessary to take



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into account the fact that social-cultural environment, where a person forms and develops, as well as actual living situation have a direct impact on the content and structure of motivation. Cross-cultural analysis is not only to answer the question what development of a person's motifs, demands, and attitudes are, but also why just these, but not other motifs, demands, and attitudes are developed in a person, to what extent they depend on cultural environment, where this person lives.

Motivation is the most significant aspect of learning. Analyzing the essence of thinking process, L.S. Vygotskiy wrote [4] that thought is not produced from other thought, but from the motivating basis of our consciousness that covers our inclinations and demands, our interests and impulses, our affects and emotions. E.P. Il'in [5], underlining the significance of motivation in learning process, said that the factor of motivation appears to be more essential for its efficiency than the factor of intellect.

Learning activity is multi-motivated, i.e., as A.N. Leontiev stated [6], may be based on several broad, generalized, and meaningful motifs. It may not be reduced to only cognitive and thinking activity and, consequently, cognitive motifs. The issue of learning motivation structure is one of the most complex questions.

The literature review shows that in the structure of learning motivation most authors distinguish motifs directly connected with learning activity or intrinsic motifs, and extrinsic motifs influencing learning process, not directly, but immediately connected with it. Such a classification is suggested in works by P.Ya. Gal'perin (1976), V.F. Morgun (1976), V.E. Milman (1986), M.G. Rogov (1998) and others. Besides, it is noted that intrinsic motivation leads to more productive activity. As E.P. Il'in [5] indicates, good students show their demand for mastering a profession at high level, whereas low-performing students have mainly extrinsic motifs in the motivation structure. Distinguishing

extrinsic and intrinsic types of motivation is typical for most foreign psychologists. American psychologists E.L. Deci, R.M. Ryan [7] developed theory of self-determination and intrinsic motivation of behaviour. These researchers also showed that intrinsic motivation contributes to proficiency development, creativity, more efficient conceptual learning as well as memory improvement. Intrinsic motivation has a positive effect on cognitive flexibility and enables to derive pleasure from activity.

Intrinsic motivation is not limited by cognitive motifs only. V.E. Milman stated that "motivation of intrinsic type characterized by social personal meaning is a real intrinsic motivation of development ... In case of dominating extrinsic motifs there is inadequate, inverted subject structure of learning activity" [8; p. 131]. In other words, it is intrinsic motivation that allows achieving the main purpose of learning – a person's development. In this connection D.B. El'konin wrote: "Learning activity ... is to be induced by adequate motifs, they may be only motifs directly connected with its content, i.e. motifs of generalized action acquisition or, simply put, motifs of self-development, self-perfection" [9; p. 46]. He calls the described motifs learning-cognitive ones (in contrast to broad cognitive interests). Y.M. Orlov's (1976) and M.G. Rogov's (1998) investigations confirm that motifs of person's development play an important role in learning motivation structure.

In our study the self-determination concept developed by E.L. Deci, R.M. Ryan [7] was used as a methodological basis as it meets the requirements of cross-cultural research to the greatest extent and is reflected in the empirical technique The Academic Motivation Scale (AMS-C 28) (College version) [10]. The given questionnaire is based on distinguishing three self-determination attitudes: intrinsic motivation, extrinsic motivation, and amotivation. The questionnaire contains 28 statements, the degree of agreement

with which is suggested to estimate using seven-point scale.

171 students took part in the empirical study:

- 86 students-future engineers (81 boys and 5 girls of 18–23 years old) of Purdue University (USA);
- 85 students of engineering profiles (39 boys and 46 girls of 17–25 years old) of Kazan National Research Technological University (Russia).

As it is seen from the sampling group, the demographic features of Russian and American groups are of particular interest: the most part of the students from the American University (94.19%) are boys, whereas more than half of the Russian respondents (54.12%) are girls. These figures correspond to the general data on the sphere of national engineering education systems: in contrast to many Western countries, in Russia a sufficient percent of girls study in engineering universities [11]. However, one should take into account the gender when analyzing the research results, as some features of motivation may be explained not only by cultural, but also gender factor.

Tab. 1 shows the results of comparative analysis of motivation specificity of Russian and American students. Using seven-point scale the students determined to what extent the given factors correspond to the reasons for their choice of studying at the university.

As Tab. 1 shows, there are some differences between the sampling groups in a number of factors, for example, American students regard such motifs as "Because higher education will permit me to better prepare for the career I have chosen", "Because it will help me to enter the job market in the profession I like", "Because I am sure that some additional years of study allow me to enhance my professional capacities", "To feel satisfied when improving my knowledge of subjects that I like" etc. more significant, whereas Russian students – such factors as "For pleasure I have when reading new authors", "Because I want to live well in future", "For the pleasure that I have when reading books by some authors" and so on. Regarding all enumerated factors the statistical differences (Student T-test) are more significant at the levels $p \geq 0.01$ and

Table 1. Cross-cultural differences of engineering students' learning motivation in the USA and Russia.

Motivation factors	the USA		Russia	
	Mean	Rank	Mean	Rank
1. Because having school certificate only will not give an opportunity to have a highly-paid job	5.7	5	5.54	4
2. Because I enjoy learning something new	5.2	9	5.13	6
3. Because higher education will permit me to better prepare for the career I have chosen	5.88	3	5.11	7
4. Due to strong emotions I have when discussing my ideas with the others	3.26	21	2.29	24
5. To be honest, I do not know. Actually, I feel I'm losing time	2.02	26	1.82	26
6. Because of the pleasure I have every time I surpass myself in learning	3.9	20	4.32	18

7. To prove myself that I am able to get higher education	4.74	14	4.38	16
8. To have prestigious job in future	6.01	2	5.87	2
9. For pleasure I have when discovering something new, unknown for me before	4.94	12	4.79	12
10. Because it will help me to enter the job market in the profession I like	6.05	1	5.2	5
11. For pleasure I have when reading new authors	2.76	23	3.21	22
12. Some time ago I had a big cause to enter university, but now I am not sure I have to go on studying	2.15	25	1.88	25
13. For the pleasure that I have when improving my achievements	4.38	17	4.84	11
14. Because I feel important and significant when I am successful at university	4.47	15	4.35	17
15. Because I want to live well in future	5.52	6	5.99	1
16. To feel satisfied when improving my knowledge of subjects that I like	5.12	11	4.58	14
17. Because it will help me to make better choice in planning career	5.17	10	5.09	8
18. For the pleasure that I have when reading books by some authors	2.69	24	3.15	23
19. I don't see any reason to study at university and, to be honest, I don't care of it	1.8	28	1.51	28
20. To be satisfied in the process of solving complex problems	4.24	19	3.94	21
21. To prove myself that I am a clever man	4.45	16	4.07	19
22. To have high salary in future	5.72	4	5.82	3
23. Because my learning allows me to continue learning much interesting	5.24	8	4.89	10
24. Because I am sure that some additional years of study allow me to enhance my professional capacities	5.5	7	4.91	9
25. Because of excellent feeling that I have studying different interesting subjects	3.0	22	4.02	20
26. I don't know; I can't understand what I am doing at university	1.84	27	1.6	27
27. Because university helps me to feel satisfied when improving in study	4.29	18	4.42	15
28. Because I want to prove myself that I can be successful in study	4.9	13	4.59	13

$p \geq 0.001$. Hence, the American sampling group is more focused on the labour market in future, whereas the Russian students are less prudent discussing more common topics.

Interesting conclusions can be also made having compared the ranks occupied by different motivating factors in learning motivation hierarchy. According to calculation of Spearman rank correlation coefficient ($r_s = 0.952$, $p \geq 0.01$), on the whole, there is a statistically significant correlation between the sampling groups, i.e. the differences in ranks are not sufficient. In other words, while there are some differences in significance at the level of comparing definite factors (Tab. 1), in general, the system of learning motivation hierarchy is not sufficiently different when comparing Russian and American engineering students, which allows forecasting success in joint education programmes. Learning motivation may be considered as a universal meta-cultural system.

A more generalized picture can be produced in comparative analysis of motifs' groups (Tab. 2).

Tab. 2 shows that all respondents, independently on their ethnic-cultural background, are motivated to study

engineering majors, which is evidenced by low amotivation values, i.e. students understand the significance of study.

Both Russian and American students are more motivated by extrinsic factors (extrinsic regulation: high salary, prestige, "good life"), i.e. social factors to a more extent than their desire to gain professional knowledge (intrinsic motivation). Interpreting this fact it should be taken into account that intrinsic motivation is traditionally considered to result in higher learning outcomes and more creative approaches to learning. But in the self-determination theory terms underlying the given technique it is stated that extrinsic motivation does not always point to underdevelopment of motivation and often is a more complex, indirect mechanism of stimulating learning activity [7]. In our case one may suggest that respondents of both groups do not regard engineering profession as an inherent value, but as a means of achieving social success in their worldview.

The intercorrelation analysis gives deeper understanding of learning motivation specificity (Pearson's coefficient). In both sampling groups a great number of significant correlations among the factors were established, which shows high integration of motivation, where most

Table 2. Cross-cultural analysis of learning motivation

Motivation	the USA		Russia	
	Mean	Rank	Mean	Rank
Intrinsic motivation – knowledge	5.7	5	5.54	4
Intrinsic motivation – achievements	5.2	9	5.13	6
Intrinsic motivation – stimulating motifs	5.88	3	5.11	7
Extrinsic motivation – identification	3.26	21	2.29	24
Extrinsic motivation – introjection (self-identification)	2.02	26	1.82	26
Extrinsic motivation – extrinsic regulation	3.9	20	4.32	18
Amotivation (absence of motivation)	4.74	14	4.38	16

factors mutually reinforce each other. On the other hand, it may also mean that there are no strong independent motifs in the learning motivation structure of both groups, which determines learning activity and may reflect the lack of "maturity" in the respondents' motivation sphere. Negative correlations with other motifs showed only factors of amotivation, which is quite understandable: the higher amotivation is, the less a person is motivated.

It should be noted that the statistical analysis has revealed any gender differences between the American and Russian sampling groups neither in the hierarchy (Spearman rank correlation coefficient), nor in specific values (Student T-test), which means that features described above are not gender-specific. In this case we consider the fact that the number of girls is too small among the surveyed American students to make some final conclusion.

Thus, the performed psychological-pedagogical study in learning motivation

of Russian and American engineering students have not revealed any cross-cultural differences, which may reflect the process of globalization in engineering professional community and is a factor inspiring the success of Russian-American academic mobility programmes.

The high value of extrinsic motifs related to future prestigious, highly-paid job and competitive position in the labour market is to be taken into account in designing curricula: to increase motivation students are to have clear idea of how knowledge and competences acquired may be used for their professional and social growth. In addition, it should be taken into account that surveyed sampling groups have differences as well in spite of many common features. For example, the Russian students more often regard successful learning as a means of boosting their self-confidence and social status. Those features should also be taken into account when implementing academic mobility programmes.

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