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**PSYCHOLOGICAL AND PSYCHOPHYSIOLOGICAL
RESEARCH OF THE ATTITUDE SYSTEM OF
STUDENTS FOR TECHNICAL AND
HUMANITARIAN SPECIALITIES**

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Psychological and Psychophysiological Research of the Attitude System of Students for Technical and Humanitarian Specialities

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Abstract

Currently the problem of students' professional development and the formation of their future work readiness with account for their psychological peculiarities is very actual. Our reference to the point is determined by several factors:

1) contemporary students have difficulties in their professional identity formation, and in curriculum learning;

2) the new specialities are appear;

3) technical progress influences the human potential demands changes and specialities learning; existing psychograms grow obsolete;

4) the attitude system of different educational profiles students' is not studied sufficiently, and there not enough computer based psychodiagnostic research methods (techniques). Relevant personality attitude's system research is still carried out introspectively, or else with the help of socio-psychological methods that significantly limit the research perspectives.

The aim of this article is to analyse the results of psychological and psychophysiological research of the contents and extent of the humanitarian and technical profiles students' attitude system. We have organized an experimental research in two stages: St-Petersburg universities students' questionnaire; and laboratory research on the base of psychophysiological testing laboratory. We have worked out and tested psychological computer methods for different profiles students' attitude system research: associative experiment version and the technology "Psychomotor differential".

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We present here the results of the different profiles students' attitude system research: their needs, instincts, psychological defence influencing profession learning. Besides, we have analysed differences in the temperament and students' common and non-verbal intelligence level. With the help of authentic versions of the instrumental-computer methods we have received objective differences of the needs system and psychophysiological parameters of the motivation and emotional component in the different profiles students' psychic attitude.

In the article we suggest a complex approach, giving the opportunity to receive important data that can be used for students' professional orientation, self-realization inner resources search.

Keywords:

Attitude system; Students for Technical and Humanitarian Specialities; Psychological defence; Non-verbal behaviour; Objective methods of research.

1. Introduction

The situation that has gradually formed in students' professional training, has demanded significant changes in the approach itself towards the most important psychological entrance qualifications for acquiring technical and humanitarian specialities. We can outline several reasons that made us create the research concept and methods. First of all, the percentage of technical (engineering) educational profile' students and graduates not going to work in the speciality is rather high. It is important to say that often students with high level of general and non-verbal intellect get into this group. Secondly, according to different research works, the students of both humanitarian and technical profiles have psychological difficulties during studies, the reason for which is not always explicit. Thirdly, the approach itself towards the specialists' training has changed. We should definitely mark education computerization, especially in technical profile higher educational institutions. Thus, the psychological entrance qualifications requirements for specialities acquiring change. And at last the methods (questionnaires, some tests, projective methods) do not always help psychologists to find out the most important natural prerequisites for specialities assimilation.

The study of a person's significant attitude system will allow to get important data necessary for students' occupational guidance. Many authors (Gordienko, 2007; Tomanov, 1990; Hall, 1996; etc.) think that

people's real attitude become evident in their expressive behaviour. The fact is explained as follows: expression is difficult to control and to be conscious of, attitude is difficult to verbalize that's why a person has to use expression for its presentation. But it is important to note that personality attitude's system research is still carried out introspectively or with the help of socio-psychological methods. That's why the fundamental problem of attitude psychology is to develop psychodiagnostical methods of research.

The aim of this article is the psychological and psychophysiological research of the contents and extent of the humanitarian and technical profiles students' attitude system.

According to the aim we have designated the following tasks:

- To design and test psychological instrumental-computer method for technical and humanitarian profiles students' need's system research
- To test the psychological instrumental-computer method for motivation-emotional components research of technical and humanitarian profiles students' psychic attitude
- To research specific peculiarities of psycho-emotional state, needs, instincts, defence mechanisms, general and non-verbal intellectual level of technical and humanitarian profiles students'
- To research psychophysiological peculiarities of technical and humanitarian profiles students' attitude system

We assume that: a) students' attitude system comprise: specific programs of attitude towards different aspects of reality (instincts), inclinations, ego-defensive mechanisms and needs influencing a profession assimilation; b) students for technical and humanitarian specialities differ as to their psychophysiological parameters of the attitude system.

2. Methods

The research objects are 120 technical (engineering) and humanitarian (pedagogical and psychological) profiles students at the age of 18-25. We have organized an experimental research in two stages: St. Petersburg universities students' questionnaire; and laboratory research on the base of psychophysiological diagnostic laboratory (the Herzen State Pedagogical University of Russia, Saint-Petersburg).

According to the aim of our research we have chosen principal methods group. For the psychophysiological and psychological research of the attitude system:

a). “Psycho-motor differential” (original method by L. V. Tomanov, V. G. Kamenskaya; software by A. G. Pyatigorsky) was used for research of motivational and emotional components of the students’ psychic attitude.

Theoretical basis for the method is I. M. Sechenov’s theory (Sechenov, 2001), who substantiated the reflectory nature of the man’s movements and showed the role of muscle controlling response movements in space and time; V. N. Myasishchev’s conception (Myasishchev, 1960); social psychology researches data (non-verbal forms of behaviour, proxemic studies of the man’s space behaviour) (Hall, 1966).

“Psycho-motor differential” method realizes instrumental testing of emotional reaction characteristic features with the help of the gesture reaction of a hand to outer stimuli.

A hand moves in progressive-reactive manner, along saggital surface of body without sight control. Immediate reaction coded in the form of electric signal is registered. To make a movement the tested person held on the handle of the lever fixed on the stand and could move his hand. The device is connected to the computer, a TV is also included into the psycho-diagnostic complex.

The researcher was in front of the computer monitor and selected stimulus material from the computer program that appeared in front of the tested person on the TV screen. The tested person was shown different stimuli on the TV screen one after another (as opposed to the standard diagnostic method) and was offered to express his attitude towards it by gesture distancing.

Thus, if the tested wanted to express his positive attitude towards the stimulus on the TV screen, he moved the lever towards himself as much as he liked it and fixed his decision by pressing a special button on the handle. If his attitude was negative, the person being tested could move the lever backward at a different position depending on the degree of neglecting the stimulus and fix his decision by pressing the button. The tested could also express his indifferent attitude towards the stimulus.

It should be noted that the designed computer program allows the images on the screen visually approximate the tested or move away depending on the degree of admittance or non-admittance of the given stimulus. The file with the test data (for each unit stimulus of the diagnostic program) contains the information on the numerical row and the scheme of motor response.

The analysis of the numeric rows and motor response scheme allows to pinpoint the following parameters concerning each particular stimulus: overall duration of the motor response to each stimulus, overall duration of the subtest (sec.); the degree of the stimulus admittance-non-admittance. The possibility of each stimulus ranging according to its significance for the tested; motor response amplitude (maximum, minimal, average); the number of transitions through the initial position of the lever (changing the sign of reaction from «+» to «-» and vice versa); time (sec.) for decision making about the movement in definite direction without changing the sign of response (it was determined by the motor response scheme); time (sec.) of the movement in a definite direction after taking a decision (it was determined by the scheme).

b). Associative experiment technique (original development by L. V. Tomanov, N. N. Gordienko; software by N. N. Gordienko) for students' needs system study.

The associative experiment contents is based on the needs hierarchy concept in a person's motivation, suggested by A. Maslow (Maslow, 1964). The technique represents 98 words-stimuli distributed inside the seven groups of needs (14 words in each group): physiological needs, safety needs, belonging and love needs, self-esteem, communication needs, needs of knowledge and self-actualization.

A computer program, fixing the latent period of the associative response to each word-stimulus simultaneously given into the earphones of the tested and on TV-screen, has been designed. In response to the stimulus the testing participant sitting in front of the TV-screen was to pronounce the first association thought of. The latent periods of the associative response (in msec.) were stored in the computer data base. The significance degree of each definite word for the tested was determined by the analysis of the time needed for thinking over the associative response. For psychological research were used:

c). V. I. Garbuzov's test series (a questionnaire and 4 projective subtests) – for students' dominating instincts studies (Garbuzov, 2006).

The test series was presented in standard variant and in the “Psycho-motor differential” program. Garbuzov suggests the instincts concept within which he considers people’s basic typology as to the dominating instinct. Instincts is a genetically fixed program of a people’s adaptation, the attitude towards themselves and others, to the nature, influencing the formation of attitude system, vocational aptitude, the way of adapting

d). Questionnaire by Plutchik-Kellerman-Konte: Life Style index in V. G. Kamenskaya’s adaptation (Pluchik, Kellerman, Conte, 1979), researching the students’ psychological defence mechanisms. It was presented in standard variant and in the “Psycho-motor differential” program

Additional methods group includes:

- G. Raven’s test “Progressive matrices”, aimed at the students’ general and non-verbal intellectual level study
- M. Lusher’s test for research the students’ psycho-emotional state at the moment of psychological examination. It was presented in standard variant at the beginning and at the end of testing, and in the “Psycho-motor differential” program (3 times)
- L. Sondy’s modified technique for students’ inclinations study. It was presented in standard variant and in the “Psycho-motor differential” program
- H. Kaler’s test. Presented only as a stimulus material to the students in the “Psycho-motor differential” program
- Mathematic-statistical data processing methods

3. Results

Basing on the materials of the research and their correlation with literature data, we have come to the following conclusions:

Technical and humanitarian students’ instincts profiles differ greatly. It demonstrates Fig. 1. Despite the fact that altruistic instinct is in the first place in the upper zone of both the groups, its orientation (focus) is different. Humanitarian profiles (pedagogical and psychological) students’ altruistic instinct ($37,1 \pm 1,76\%$) is closely connected with reproduction instinct ($28,6 \pm 1,83\%$), while the engineering profile students’ one ($32 \pm 1,65\%$) is connected with dignity ($22 \pm 1,82\%$) and research ($20 \pm 1,76\%$) aspects. Two personality types are formed, the first of which is directed mainly at interaction with people, family creation and the corresponding choice of profession; the other is

aimed at scientific research work, interaction with people on professional basis, tendency to go against only family's interests and social status for the sake of honour and dignity.

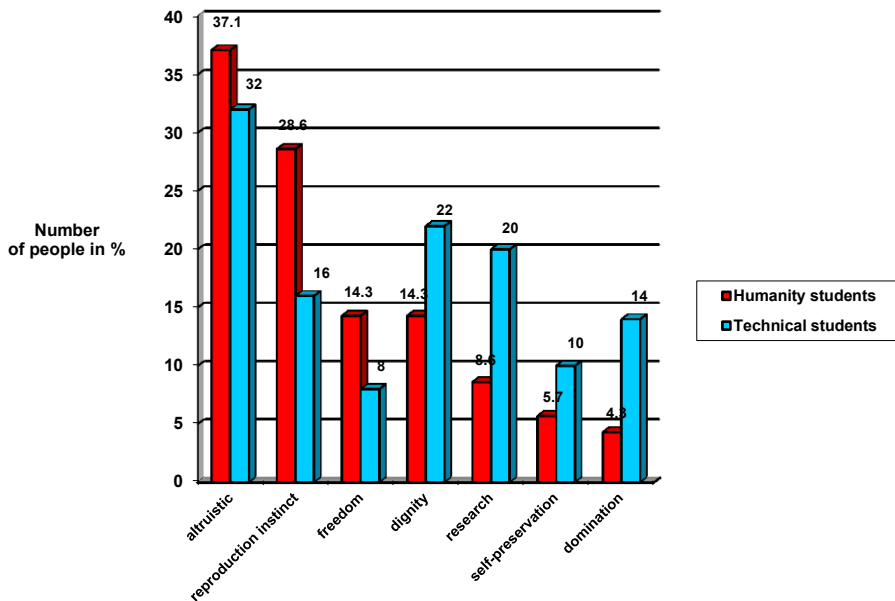


Fig. 1. Instinct-Profiles of students of humanitarian and technical studies

The results of Sondy's technique, carried out by the students in the program of the instrumental-computer method can also help to research innate backgrounds to acquiring specific specialities. The factor of vector m (of contact inclination) turned out to be the leading in both groups of the tested, and more explicit with humanitarian profile students (41,43%), than with technical (37,78%). The students percent (28,89%) with dominating "Ego - inclination" (p) is actually higher in technical universities than in humanitarian ones (20%).

In the analysed groups of students specific systems of ego-defending mechanisms have been found. Fig. 2 demonstrates differences and similarities.

The projection and intellectualization are the common ego-defending mechanism in both the groups, however they are more explicit with the technical profiles students. This group differs from the humanitarian profile students by using a denial as one of the leading defences and more explicit repression that we connect with the high degree complexity of educational programs. The system of humanitarian students' psychological defences (future specialists in work with children) is characterized by regression presence among the dominant ego-defence mechanisms.

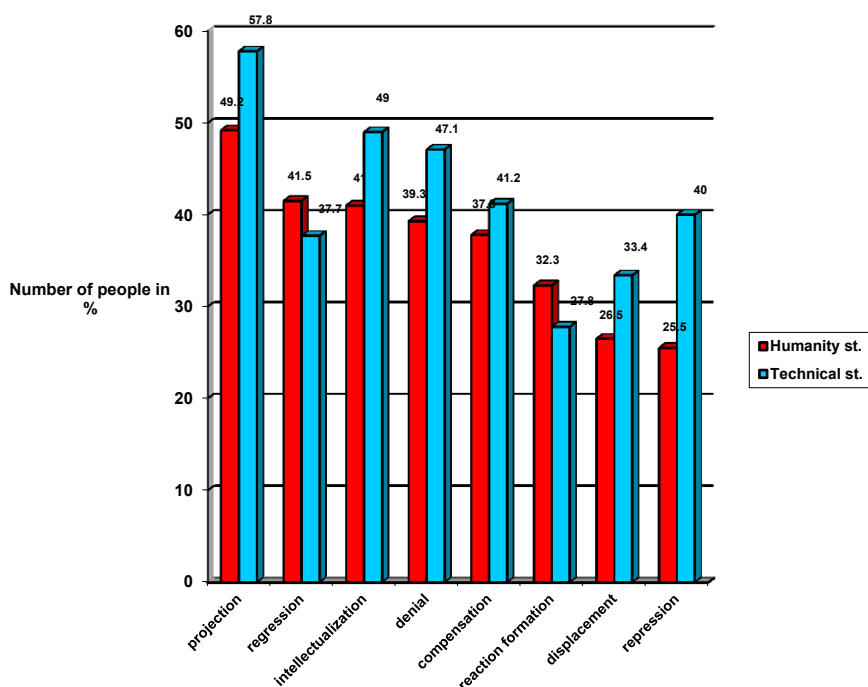


Fig. 2. Average assessment of psychological defense mechanisms (%) of students of humanitarian and technical studies

Using associative experiment technique we have received objective differences of the humanitarian and technical profiles students' needs system. We have found out that humanitarian profile students show greater need in self-esteem, safety needs, belonging and love;

technical profile students are characterized with dominating physiological needs; needs in belonging and love, need of knowledge. Valid significant increase of time indices range (msec) of latent periods for associative responses to words-stimuli was determined for humanitarian profile students as compared to technical profile ones. Fig. 3 demonstrates the system of the needs.

The level of general and non-verbal mentality (intelligence) of the technical profile students is actually higher ($127,04 \pm 17,33$), than that of humanitarian profile students ($118,38 \pm 21,99$). Also significant difference is found out in the range of personal equation, which is wider with humanitarian profile students. The technical students' percentage with low and medium indices by Raven' technique is actually lower, but the number of students with high and very high estimates grows.

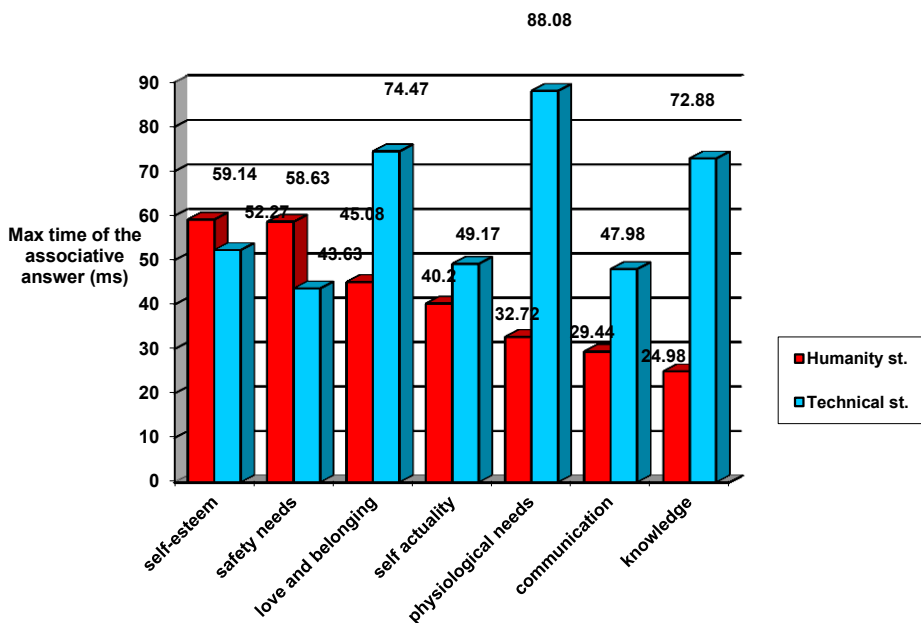


Fig. 3. The system of the needs of students of humanitarian and technical specialties

The found out humanitarian and technical profiles students' attitude objective parameters, studied with the help of "Psycho-motor differential" technique allowed us to characterize specific differences in the attitude character according to the degree of their expressiveness, differentiation and stability.

Humanitarian profile students as opposed to technical profile students are found out to be characterized by occurrence of a longer time for decision making on expressing a definite attitude and moving to a chosen attitude pole after taking a decision, attitude expression peculiarity demonstrates tables 1, 2; a wider range of a hand movement amplitude while expressing their attitude towards different stimuli, a lower percentage of high amplitudes of moving reaction, it demonstrates fig. 4; a larger amount of transitions (hesitations) from one sign of attitude towards the opposite in the process of decision making; less stability in the attitude towards different stimuli (verbal and figural). It is possible to demonstrate general tendency of reaction to stimuli on the example of carrying out the tests.

Table 1. Humanitarian profile students' attitude expression peculiarity.

Tests	Dur. (sec.)				t dec. (sec.)				t mov. (sec.)			
	min	max	av.	msd	min	max	av.	msd	min	max	av.	msd
Lusher	9,84	134,05	29,69	±10,63	3,86	108,67	15,65	±9,05	3,58	48,19	14,04	±6,22
Kaler	9,07	91,49	38,29	±14,84	3,17	53,22	19,73	±9,41	5,02	43,42	18,55	±7,96
Sondy	6,84	108,22	24,51	±10,63	1,8	71,86	13,39	±7,02	3,31	40,87	11,16	±5,12
Garbuzov	8,06	70,84	23,26	±8,35	0,83	50,03	12,52	±6,09	1,64	26,84	10,74	±4,32

Table 2. Technical profile students' attitude expression peculiarity.

Тесты	Dur. (sec.)				t dec. (sec.)				t mov.(sec.)			
	min	max	av.	msd	min	max	av.	msd.	min	max	av.	msd.
Lusher	5,91	59,3	22,7	±7,18	0,88	36,25	11,3	±5,38	3,74	29,88	11,4	±4,67
Kaler	15,07	50,81	31,87	±8,63	1,16	39,72	17,14	±7,25	5,59	32,48	14,74	±5,55
Sondy	8,13	63,33	20,28	±7,43	0,72	56,97	10,92	±5,73	2,7	21,19	9,36	±3,6
Garbuzov	6,7	51,83	20,05	±6,43	0,8	45,83	10,98	±5,57	2,89	25,39	9,07	±3,08

Notes to tables 1, 2:

Dur. – durability (sec.) of test carrying out; t dec. - the time (sec) for making a decision on movement in a definite direction without changing the sign of reaction (it was measured according to the movement reaction scheme); t mov.- the time (sec.) for movement reaction after taking a decision; av.- group-average time index (sec); msd - mean square deviation.

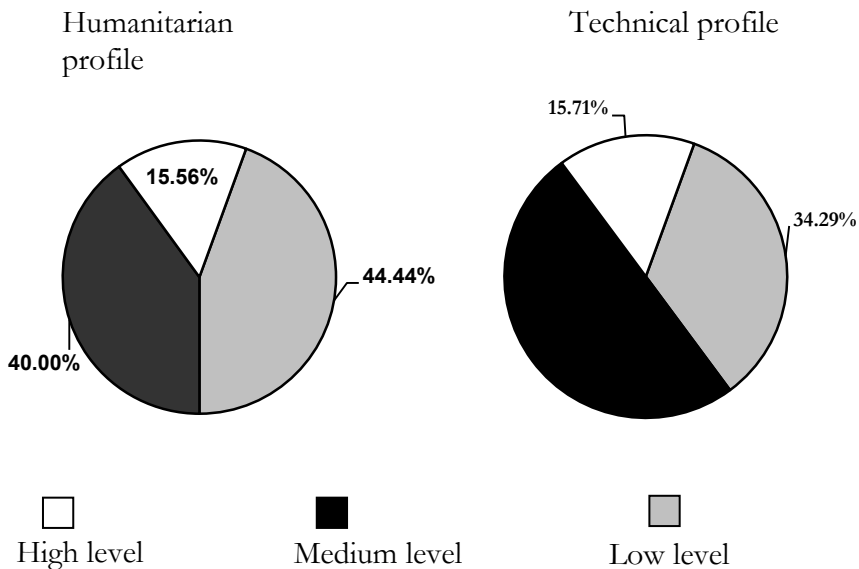


Fig. 4. The correlation (%) of humanitarian and technical profiles students with different levels of medium amplitude of the hand movement

“Psycho-motor differential” technique allows:

- to find out natural backgrounds for attitude system formation (in close connection with temperament), influencing the profession acquiring;
- to implement the individual approach to a person’s diagnostic, which allows to take into account the factors often slipping away of psychologist’s attention in the process of group research (testing) (individual development of a person, his or her psycho-emotional condition etc.);

- to decrease significantly (due to the specific character of testing) the probability of presenting of socially desirable answers by the tested

4. Conclusion

The research methods allow to forecast the success of the different educational programs learning by students, to find out arising difficulties in time, to organize psycho-correctional and consultative work.

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