



# Performance as the basis of goal-directed behavior

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## Abstract

**Objective of the study** was to evaluate the effectiveness of students entering a specialized university faculty, taking into account their motivation for future professional activities.

**Methods and structure of the study.** The study was carried out on the basis of the results of the competitive selection of 251 students in the period from 1996 to 2000. To select the best of the most motivated students for future activities, students of the 2nd and 3rd courses of specialized universities of the Russian Federation with high educational results were admitted to competitive tests.

**Results and conclusions.** The dominant learning motivation, reflecting the intellectual preparation of the student, his success in mastering the fundamental disciplines is the leading one in the effectiveness of admission to a specialized research faculty. At the same time, the student's creative abilities are an important, however, independent characteristic of the individual. Thus, emotionally colored motivation is the basis for the effectiveness of a behavioral act.

**Keywords:** *motivation, behavioral act, Fisher's exact test.*

**Introduction.** An essential moment that determines the effectiveness of a purposeful human activity is the interaction of the psychophysiological characteristics of the body, physical performance and the motivational basis of behavior. An ideal example illustrating the importance of emotionally colored motivation for the effectiveness of a purposeful behavioral act is the achievement of high results by an athlete.

The functioning of the mechanisms responsible for the effectiveness of any activity from the standpoint of systemic physiology is associated with its *physiological cost* - specific efficiency. Theory of functional systems P.K. Anokhin, based on the cybernetic principle of self-regulation, explains the vital activity of the organism from a systemic standpoint. The unification of all central and peripheral components of the functional system of a behavioral act is based on the principle of effectiveness [1–3]. The achievement of the final result ends with its evaluation, comparison of the achieved result with its predicted ideal model. Ensuring the effectiveness of a behavioral act is achieved by

the work of the acceptor of the result of the action - the physiological apparatus for predicting and evaluating the achieved result. Continuous feedback about the achieved result ensures its evaluation and the effectiveness of the functional system of the behavioral act. The acceptor of the result of the action provides the possibility of correcting errors and improving the behavioral act.

The most important components of the functional system of a behavioral act are the dominant motivation, the severity of which ensures overcoming difficulties in achieving results, as well as emotions, subjective experiences of the state of the organism and its needs. The effectiveness of a purposeful behavioral act is determined by motivation and not only by avoiding negative emotions, but also by including expected positive ones in the apparatus of foresight [1-3, 5, 8-11].

**Objective of the study** was to evaluate the effectiveness of students entering a specialized university faculty (SF), taking into account their motivation for future professional activities.



**Table 1.** *Research data*

Indicators	Results	A	B	C	D	E
		3 <sup>rd</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year	2 <sup>nd</sup> year	2 <sup>nd</sup> year
Number of students	Admitted	44	32	33	27	34
	Not admitted	14	17	5	17	28
Average mark	Admitted	4.818	4.844	4.828	4.773	4.833
	Not admitted	4.806	4.698	4.582	4.760	4.716
Test score	Admitted	21.06	20.71	18.69	20.60	21.18
	Not admitted	17.35	15.39	11.76	15.12	15.20
Interlocution score	Admitted	4.855	4.778	4.600	4.489	4.615
	Not admitted	4.386	4.529	4.542	4.024	4.290

**Methods and structure of the study.** The study was carried out on the basis of the results of the competitive selection of 251 students for a specialized faculty for the period from 1996 to 2000. To choose the best students among the most motivated to succeed in future scientific research, only students of 2<sup>nd</sup> and 3<sup>rd</sup> years of specialised Russian universities who achieved high academic results were allowed in the competition: the average marks of aforesaid examinations ranged from 5.0 to 4.5. The entrance examinations consisted of three stages: the examination test (MCQs), the foreign language examination, and interlocution.

The tests for students who graduate the 2<sup>nd</sup> and 3<sup>rd</sup> years covered the basic disciplines of the corresponding year. The number of test questions was equal to 180, which complied with standards; one minute was allowed to answer a test question, so the testing lasted for 3 hours. The correct choices in the MCQs were placed randomly with account for the known central tendency: a human strives to avoid the extreme choices. The difficulty index was 30–70%; the discrimination index was 0.25 and greater. The test was valid, reliable, and relevant [9].

At the last stage, an academic commission estimated the students' personal creative abilities by the method of expert evaluations with the use of the following criteria: creative imagination, "outside-the-box" thinking; cultural level; inquisitiveness and overall range of interests. The results were recorded in the expert evaluation cards.

**Results of the study and their discussion.** According to the results of the entrance exams, the mean scores of the examination grades of the past sessions in the record book, the results of testing fundamental subjects and interviews were calculated (Table 1).

The obtained results reveal a higher value of the average score in the record book of students who passed the competition and were enrolled in a specialized faculty compared to students who did not pass the competition.

The construction of histograms of the distribution of the examination test score among those who entered and those who did not enter revealed the absence of a normal distribution in the samples. The size of the samples themselves is small. For these reasons, the contingency analysis of features was carried out using Fisher's exact test, a nonparametric test of statistical significance used in the analysis of contingency tables for small samples with variables whose distribution is unknown [10, 11].

A significant difference in the average scores of the test exam among admitted and not admitted students was revealed. Consider the admission of students of the 2nd year in 1997: the average score of the test exam is 18.87, a total of 49 people, of which 32 passed the competition, and 17 did not enter.

The number of points scored in the examination test shows the level of knowledge of the student in fundamental disciplines, his intellectual readiness, and thus reflects the level of his learning motivation. Processing showed a significant difference in

**Table 2.** *Contingency table for test examination*

Indicator	Admitted	Not admitted
The score is smaller than the average	3	16
The score is equal or greater than the average	29	1



**Table 3.** Contingency table for interlocution

Indicators	Admitted	Not admitted
Score is smaller than the average	7	8
Score is equal or greater than the average	25	9

the average scores of the examination test between those who entered and those who did not enter the specialized faculty: the average test score of the enrolled students significantly exceeded the average test score of those who did not enter. Thus, the level of motivation, reflected by the average test score, turned out to be significantly higher in the group of admitted students.

Let's build a four-digit contingency table of features (Table 2) "the test exam score is greater than or equal to the average test exam score" and "admission".

Fisher's exact test for this table yields  $p \approx 4.5 \times 10^{-9}$ , strongly rejecting the hypothesis that these features were unrelated. In other words, a student who was most motivated to carry out scientific research and hence got a higher test score had a greater chance to join the SD.

As concerns the interlocution scores characterising the personal creative abilities, a detectable difference between those groups also manifested itself: the students who passed the competition and were admitted to the SF had a higher interlocution average score than those who did not get in. So the degree of expressiveness of personal creative abilities required for a successive researching, which was estimated by interlocution average score, appeared to be markedly higher in the group of admitted students.

The contingency table for the features "the interlocution score is equal or greater than the interlocution average score" and "admittance" is given in Table 3:

The value of Fisher's exact test  $p \approx 5.2 \times 10^{-2}$  does not allow us to reject the hypothesis of independence of these features. It is known that all incoming students belong to the category of motivated and have high grades, thus, the associative analysis of the interview results revealed the presence of personality abilities necessary for creative research work, inherent in the entire group of applicants. In other words, the sample of studied students is obviously biased in the sense that all incoming students have a close and high level of creative abilities according to the results of the interview. At the same time, the sample size for the analysis of the contingency of features allows us to apply the Pearson  $\chi^2$  criterion [4, 6], which has an asymptotic character; the resulting conclusions remain unchanged.

**Conclusions.** On the basis of the data obtained on dependence between admittance and the average MCQ test scores on fundamental courses, the significance of the learning motivation for entering the SF was stated. This dependence is supported by the fact that the 2<sup>nd</sup> year students who had not admitted tried to enter the SF again next year, which reflects the strength of emotionally-charged motivation to learn advanced knowledges and techniques.

Thus, the dominant motivation, which reflects the students' intellectual background and success in learning fundamental knowledges, holds the leading position in successfulness of entering to the specialised research department. At the same time, student's personal creative ability is an important but independent characteristic.

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