THE PICULIARITIES OF ENGINEERING STUDENTS' TEMPERAMENT AS THE PREREQUISITE FOR THEIR CREATIVE ABILITIES

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Abstract. The structure of temperament and the peculiarities of creative abilities of the students of technical specialties are analyzed in the article. It is revealed that the most expressed formal and dynamic properties are communicative arginate, psychomotor plasticity and speed, and also communicative speed, in general temperament is "mixed highly active, sanguine-choleric". Among creative abilities the figurative creativity is the most expressed, verbal creativity is little developed. To check a hypothesis of interrelation of temperament and creative abilities the correlation analysis is carried out and correlation galaxies are constructed. According to the results all characteristics of creative abilities (flexibility, fluency, a readiness, originality and abstractness) are determined by such manifestations of temperament as emotionality, activity, an arginate, speed and plasticity in generally communicative and intellectual spheres. All correlation relationships have positive character, except abstractness which negatively correlates with a psychomotor arginate, plasticity and activity.

Keywords: future engineer, peculiarities of temperament, creative abilities, professionalism of the personality.

1. Introduction

Temperament analysis, its features and structure isn't a new research, and it has been actively developed for many centuries within psychology, psychophysiology and of course differential psychology which in V.D. Nebylitsyn's understanding [3] means a complex of the researches devoted to studying of natural bases of individual and psychological distinctions. At a stage of the development of differential psychophysiology which is named after Teplovsko-Nebylitsynsky the important feature of temperament, that is existence of interrelation of properties of nervous system and specific features of a personal mentality, was explored. It was proved that exactly properties of nervous system define, become determinants of memory, professional suitability, individual style of activity, etc. The temperament according to V. S. Merlin [4] as the formal and dynamic formation of mentality is a necessary component for intelligence and character. According to V. M. Rusalov [2] such indicators of temperament as plasticity or speed are intelligence indicators.

Considering like V. N. Rusalov [2] temperament as the most fundamental characteristic of individual and psychological distinctions, which have biological determination and characterize the person from the formal and dynamic point of view (endurance, intensity, speed, plasticity, emotional sensitivity, etc.) we find it necessary thoroughly to investigate its influence on professional activity of the expert. As the type of higher nervous activity like a biological determinant causes not efficiency of activity, but the distinction of its execution, that is described in B.M.Teplov's words: "... the force of nervous activity is shown not in what productivity of activity of the specific person is, but in what means and under what conditions he/she will reach the maximum productivity" [1], so the analysis of formal dynamic characteristics of the expert of engineering and the accounting of properties of his/her nervous system will allow to define "style" of activity performance and to predict its speed and efficiency.

One of the most professionally important qualities of the engineer are creative abilities which are caused, according to different authors (Yermolaeva-Tomina, Matyushkin), by both biological and social factors. In our research we started from V. M. Rusalov's idea of interrelation of temperament and creative abilities. So, he considers that "formal and dynamic properties, i.e. temperament, act already as inclinations of the second level and have impact on all "higher" formations of identity, in particular on formation of abilities, including creative ones" [2]. By the results of V. M. Rusalov the properties of temperament interact not with all characteristics of creativity, but with certain parameters, such as fluency and flexibility. Due to the presented results of research, and considering the fact of "sharp debatability" of the set problem, we formulated a hypothesis of interrelation between creative abilities and formal and dynamic properties of identity which checking results are given below.

2. Materials and Methods

According to the purpose of the article it is carried out the research in which 92 respondents aged from 20 till 23 years took part (M = 21,6 SD=2,6). 37 girls, 55 boys are among them. The students of the I-V courses of the National technical university "Kharkiv Polytechnic Institute" and the Kharkiv national university of radio electronics from such faculties, as: informatics and management, computer and information technologies, machine-building, mechanics and technology, automation and instrument making, electronic equipment.

For diagnostics of the creativity we used a complex of psychodiagnostic techniques: technique of "Circles" (Varteg); test of verbal creativity (S. Mednik); Repeating Lines test (P. Torrens); the test of creativity (P. Torrens), for features determination of temperament a questionnaire of formal and dynamic properties of identity by V. M. Rusalov.

For statistical processing of the results the qualitative and quantitative analysis was used (version 20.0 of the SPSS program: descriptive statistics, correlation analysis).

3. Results

At the beginning of the research the level of creative abilities of future engineers was revealed. So, in general the future engineers have such developed indicators of figurative creativity as fluency and a readiness which testify to ability in short terms to reproduce and realize ideas within a short time, but the abstractness is not expressed and low. The verbal originality is at a low level, and uniqueness is at a medium level that testifies to not expressed ability of future engineers creatively to solve the problems connected with the use of the verbal potential. They are also characterized by unavailability in the situation of uncertainty quickly to make their idea with a limit in time.

Then the indexes of different types of activity are defined by a questionnaire of formal and dynamic personal properties of V. M. Rusalov. So, the index of psychomotor activity makes (M±SD) 101,22±13,95 that corresponds to high level, that is students of engineering specialties have a high need for the movement, can perform monotonous work for a long time, maintain high rate of psychomotor behavior.

The index of communicative activity is close to the high level (M±SD) 98,89±14,87, therefore, the respondents have a wide range of contacts, feel need for communication, have a wide set of communicative programs.

The students have the lowest indicator on an index of intellectual activity (M±SD) 94,32±9,94 which gets to area of average values that testifies to average expressiveness in aspiration to intellectual activity, its variety, and also the use of creative approach in the solution of complex tasks. Thus, the psychomotor activity is the most expressed activity of future engineers**,** then communicative and intellectual ones.

In general, it is quite a good result, considering the fact that the engineer's work is really connected with active use of psychomotor skills, however the fact that intellectual activity seemed to be on the last place is a disturbing indicator. The results on separate formal and dynamic properties of personality were also counted; they are given in figure 1.

According to the results presented in figure 1 the most expressed formal and dynamic properties of the future engineers are an arginate communicative, psychomotor plasticity and speed, and also communicative speed. All these indicators are beyond the average level of development, and are expressed rather strongly. Thus, the respondents have a high need for communication, seek for leadership, show high flexibility just changing one activity into another, strive for a variety in the carried-out activity, expedite any activity, i.e. they have high rate of psychomotor behavior, and also the high speed of speech activity. In general, the students of engineering specialties are capable to performance of the activity demanding the high level of psychomotor abilities, and also communicative skills. However such results do not completely conform to requirements of engineering activity that testifies to need of psychological maintenance of the higher technical education with the purpose to increase the level of necessary professionally important qualities that will cause the development of basic professionalism of the future engineer's identity.

Based on the received results, the prevailing temperament type of the future engineers according to V. M. Rusalov was revealed out of the other nine types, it is "mixed highly active, sanguine-choleric " which has the following characteristics: high activity at the normal level of emotionality expressiveness.

The correlation analysis which results are presented in figure 2 was used to check a hypothesis of existence of interrelation between creative abilities and formal and dynamic properties of identity, i.e. features of temperament.

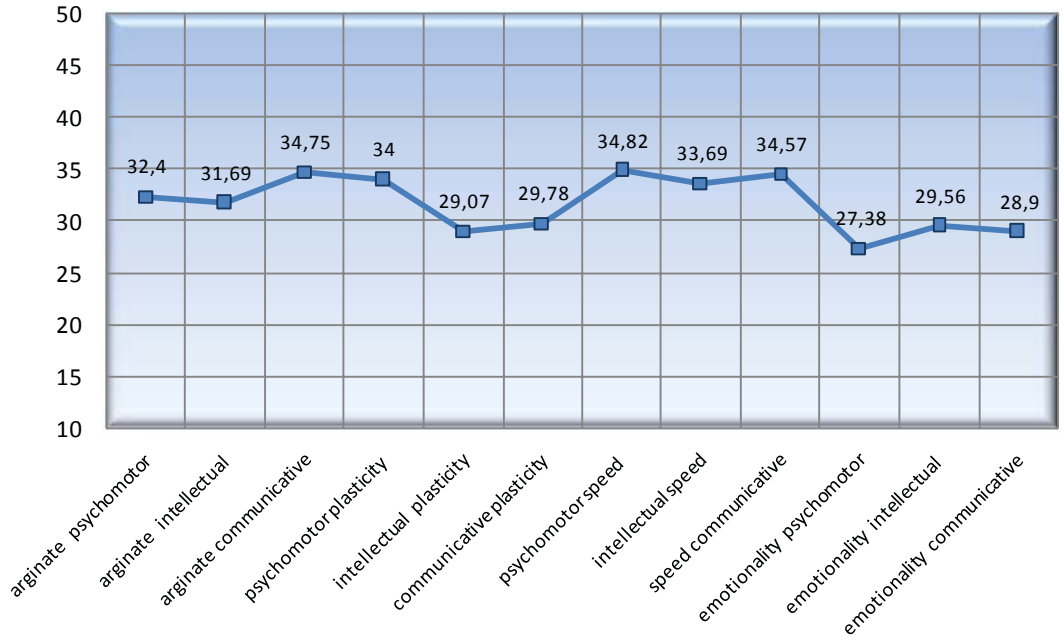

Figure 1. The Features of formal and dynamic properties of the students of technical specialties

Based on the fact that formal and dynamic features of identity largely define the various properties of the personality, they were defined as the independent variables, and thereafter, creative abilities as dependent, the following data were obtained. So, the fluency defined as the possibility of the person quickly to produce a large number of ideas and associations, depends on an arginate

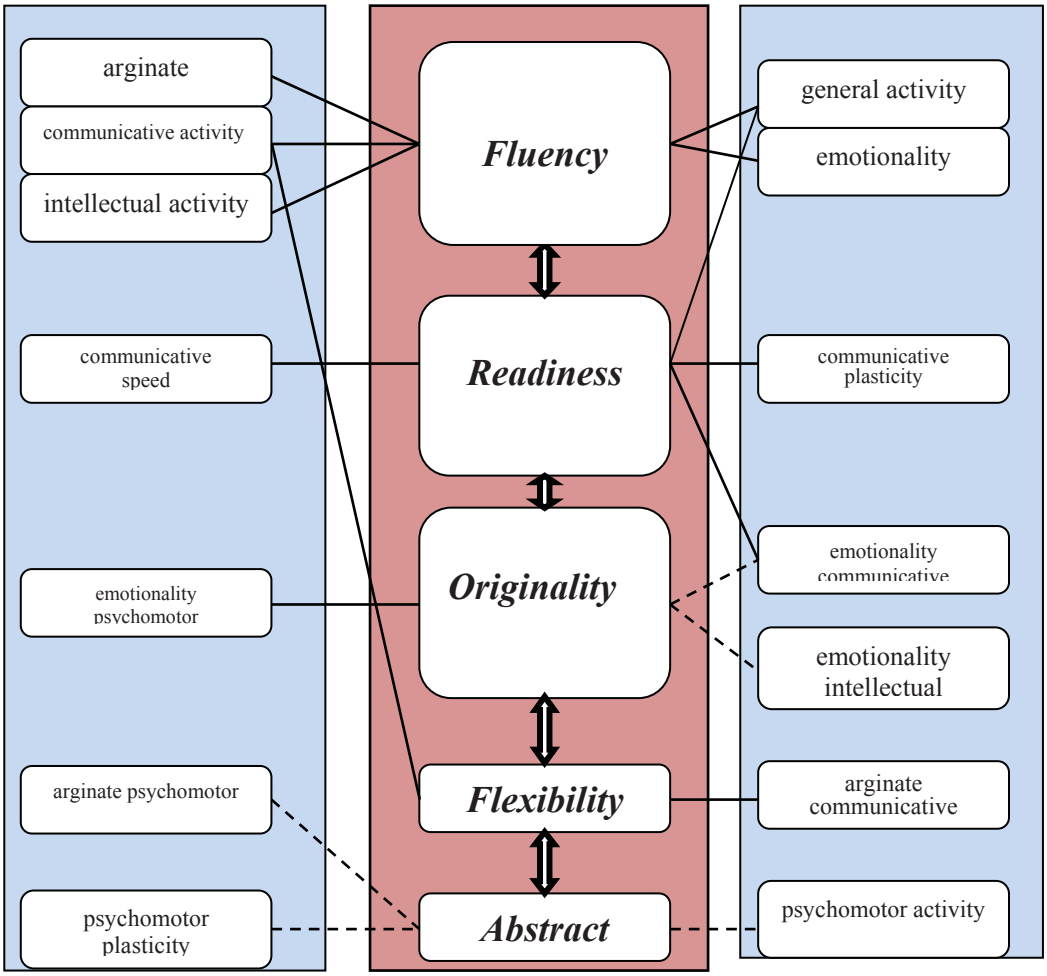

Figure 1. The interrelation of creative abilities and features of temperament of the future engineers

(r=0,277; p=0,018), communicative and intellectual activity (r=0,245; p=0,038 and r=0,241; p=0,041), emotionality and general activity (r=0,253; p=0,032 and r=0,240; p=0,042). The easier the future engineer carries out the difficult intellectual activity, is active in the personal and professional plan, the more he is capable to give a bigger amount of ideas in the solution of creative tasks.

Readiness as the ability to substantially complement the existing images and ideas depends on the communicative speed, plasticity and emotionality (r=0,232; p=0,050, r=0,282; p=0,017 and r=0,269; p=0,022), and also general activity (r=0,311; p=0,008). I.e. respondents who feel need for communication, who have the high speed of speech activity, but feel concern about quality of social contacts are capable to complete, supplement already produced ideas.

Originality as the ability to generate new original ideas positively correlates with psychomotor emotionality (r=0,237; p=0,045) and is negative with communicative and intellectual emotionality ((r =-0,359; p=0,002 and r=0,-411; p=0,045). The students who are sensitive to divergences between the real and expected result of intellectual work, and also uncertain in efficiency of their own communication, give a few original ideas. Thus, respondents who are anxious concerning a divergence between the real and expected result of manual skills, on the contrary, give more original ideas.

Flexibility as the ability quickly to pass from one idea to another, from one way of the decision to another depends on communicative activity and an arginate (r=0,252; p=0,032 and r=0,261; p=0,027). The larger the circle of contacts a student has and the larger the level of his/her subject activity is, the more he/she is capable to fast changing in activity.

Abstract names negatively correlate with a psychomotor arginate, plasticity and activity (r = 0, -297; p = 0,011, r = 0, -320; p = 0,006 and r = 0,316; p = 0,007), i.e. The more developed psychomotor ability the future engineers have, the less he/she is inclined to give abstract names.

4. Conclusions

Thus, according to the developed hypothesis that formal and dynamic properties of identity, i.e. manifestations of the future engineers'temperament influence the manifestation of creative abilities, figurative, verbal creativity research of creativity, temperament and the correlation analysis was carried out.

First, the future engineers have such well developed indicators of figurative creativity as fluency and a readiness that testify to ability to reproduce and realize ideas in short terms, but the abstractness is not well expressed, it is low. Verbal originality is at a low level, and the uniqueness is at the average level.

Second, the predominant type of temperament of engineering students is a "mixed highly active, sanguine-choleric", which has the following characteristics: high activity at the normal level of emotionality expressiveness.

Third, by means of the correlation analysis it is revealed that flexibility, fluency, readiness, originality and abstractness of figurative and verbal creativity depend on such features of formal and dynamic properties of identity as emotionality, activity, an arginate, speed and plasticity of generally communicative and intellectual sphere. All correlations are positive, except abstractness which negatively correlates with a psychomotor arginate, plasticity and activity.

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