

## Creativity Particularities of Students Specializing in Humanities, Science, Technology in Kazakhstani Universities

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### Abstract

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Future specialist's creativity development is an important professional education task. On the one hand, a new generation of specialists will be capable of creating new technologies, products. On the other hand, creativity is an opportunity for a person self-expression. Are there any differences in the levels of students' creativity specializing in science and humanities?

Purpose of the Study: diagnostics of students' creativity specializing in humanities and natural sciences, their comparison to develop further innovative techniques for enhancing creativity components of a person. Creation of maps as trajectories of students' creativity diagnostics by step-by-step application tests.

Research Methods: Synthesizing of diagnostic techniques into maps of trajectory of student creativity diagnostics using Tunnik's test of student creativity levels, Mayers and Briggs test (MBTI). 60 students specializing in humanities and science took part in the research.

The method of creating maps is offered as trajectories of diagnostic techniques for creativity assessment. According to Tunnik's test high creativity level is diagnosed in 42,8% of students specializing in humanities and in 13% of respondents specializing in science and technology; average creativity level in 46,4% and 74% of respondents and low one in 11% and 13% of respondents respectively. The study has shown that according to MBTI test, psychological types characterized by organizational skills, communication skills, enthusiasm, inspiration, creative activities are widespread among representatives of humanities field. Psychological types characterized by administrative activity, logic, inspiration and delivery of information by means of language and examples are widespread among representatives of science and technology sphere

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**Keywords:** University students, diagnostics of creativity

### 1. Introduction

Creativity is a great professional quality of the individual specialist of the XXI century. According to N. Vishnyakova's definition "creativity is a set of intellectual and personal skills of the individual, contributing to self-nomination issues, generating a large number of original ideas and unconventional

solutions" (Vishnjakova, 1998). We have already conducted a study on experimental study of students' creativity (Mynbayeva & others, 2016). This article presents new research results under the grant from the Ministry of Education and Science of the Republic of Kazakhstan # 1763 / GF4 "Development of students' creativity as a factor of enhancing intellectual potential of Kazakhstan".

**Problem statement:** According to H.Gardner there are different types of intelligence: verbal, musical, logical-mathematical, spatial, bodily-kinesthetic, intrapersonal and interpersonal intelligences (Gardner, 2011). By analogy, we asked the question, whether there is a difference between the creativity of the humanities and natural sciences? The article presents theoretical data about the kinds of creativity in research and we'll make an empirical research.

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## 2. Types of creativity and art theory

A.V. Morozova believes that "creativity can be divided into *intellectual* and social (Morozova, 2000). Intellectual creativity involves cognition, which, in turn, consists of *analysis (abstraction) and synthesis (generalization)*. Ability to analyze and synthesize are the components of general intelligence. *Social creativity*, in turn, includes *professional* creativity, a variation of which is *pedagogical creativity*. According to E.E. Sherbakova, "pedagogical creativity consists of *communicative* and *didactic* creativity. Communicative creativity is based on *dialogue and improvisation*. Didactic creativity involves susceptibility to intellectual values, as well as the ability to *innovate* (Sherbakova, 2000). Lauri Hietajärvi, Kirsti Lonka and others examined the relationship of the teacher creativity and the learning process, knowledge of modern concepts of creative training of teachers. Management of student's creativity at school has been studied in Kazakhstan (V. Shahgulari, 2010), the formation of the future specialists' creativity (B. Ospanova, 2006), the pedagogical conditions of development creative potential of students (Shvaykovsky A. 2009).

P. Ilyin systematized the following theory of creativity:

- *Psychoanalytic theory* of creativity (Z. Freud, K. Yung), where the motivation and unconscious components of creativity were examined;
- insight in *Gestalt psychology* (V. Keller, M. Vertmeyer);
- *Cognitive theory* of J. Kelly's creativity. Human life is meant as a research creative process; A person constantly constructs reality for himself putting forward a hypothesis;
- *Compensation theory* of A. Adler's creativity. Creativity in science, art, culture becomes a way of weaknesses compensation for a man;

- *Theory of creative personality development* of G.S. Altshuller. Creativity is the nature of a man, and not only the talent of gifted people. Creativity is present in every person, but internal and external demand for their discovery is necessary. Intellectual and spiritual human activity is important for creativity development;

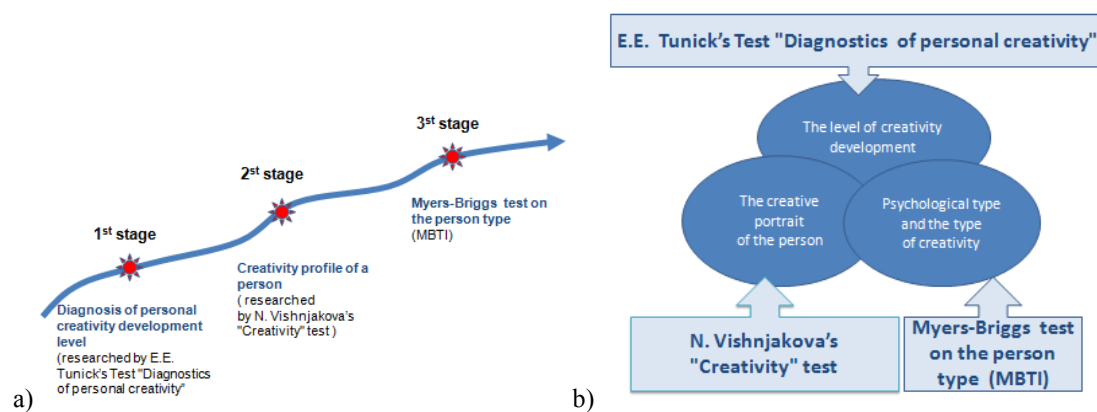
- The nature creativity from the perspective of *humanistic psychology* and others (Ilyin, 2009).

C. Rogers defined the internal and external conditions of creative activity in humanistic psychology. The internal conditions are: 1) extensionality (openness to new experience); 2) internal locus of evaluation; 3) the ability to unusual combinations (Ilyin, 2009). External conditions for creativity are: 1) the psychological safety and security (the recognition of the absolute value of the individual, creating an environment in which there is no external evaluation); 2) the psychological freedom of self expression (Ilyin, 2009). Related components of creative act by C.Rogers is emotion (aesthetic, heuristic, communicative, "disunion"). A. Maslow introduces the concept of primary and secondary creativity. The primary creativity is understood as inspiration, an act of insight, the idea struck. Secondary creativity is a hard work on the idea implementation, creation of a real artistic product (Maslow, 2011).

### 3. Designing maps and diagnosis of university students' creativity

As far as in different studies, we have tried about 20 diagnostic techniques of creativity, we had the idea to articulate some of them in the diagnostic map. Visually one of the maps, called "Advanced diagnostics of students' creativity" is shown in Figure 1 (a). It consists of three test methods, and includes 3 stages:

- 1) E.E. Tunick Test "Diagnostics of personal creativity";
- 2) "Creativity" test (author: N. Vishnjakova);
- 3) Myers-Briggs test on the person type (MBTI).



**Fig. 1.** (a)Stepwise representation techniques of advanced diagnostics of students' creativity. (b)Expected results

The reason for combining these techniques - the ability to get a complete picture of human creativity and its relation to the psychological portrait. For the diagnosis maps the expected results are applied (Figure 1b):

- 1) The level of creativity development;
- 2) The creative portrait of the person;
- 3) Psychological type and the type of creativity.

E.E. Tunick's test is used in the first stage "Diagnosis of personal creativity." Using these techniques we study the level of development of personal creativity and creative portrait of the individual is drawn. E.E. Tunick's test "Diagnostics of personal creativity" consists of 50 questions and the time allowed to complete the test is 15 minutes (Tunick, 2002).

In the second stage the creative personality portrait is researched. Diagnosis is carried out using the "Creativity" test, it allows to identify the level of creative inclinations of the individual and build a psychological creative profile, reflecting creative component of the image of "I am real" and the idea of the image of "I am perfect." Comparison of the two images of creativity "I am real" and "I am perfect" allows you to define the creative reserve and creativity of the individual.

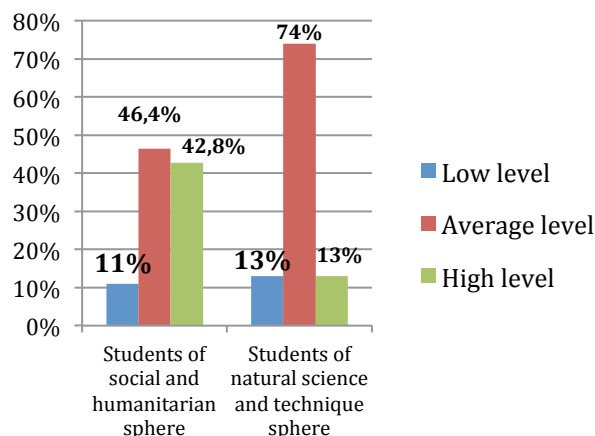
In the third stage the psychological type of the person and the type of creativity are studied. Diagnosis is carried out using Myers-Brigg's (MBTI) test of personality type. The test consists of 60 questions. The time allowed to complete the test is 20 minutes.

#### 4. Results

All stages of creativity diagnostics were tested among the students of 60 respondents in the period from April 2015 till November 2015 from 5 universities in Kazakhstan. The average age of respondents was 22.5 years. The gender structure of respondents is represented by the following percentages: 72% female respondents, 28% - male.

##### 4.1 The results of the test to diagnose the level of development of personal creativity and creative personality portrait (The 1<sup>st</sup> stage of research)

E.E. Tunick's test allows to determine four characteristics of creative personality: curiosity (L); imagination (B); complexity (C), risk inclination (P), and summing up the data on the presented indicators, to identify the level of development of creativity of the individual (Tunick, 2002). The results are shown in Figure 2.



**Fig. 2.** The level of respondents creativity development according to E.E. Tunick's test

Analysis of the test results of students of 5 universities in Kazakhstan showed that out of 100% of respondents among students of social and humanitarian areas high level of creativity was diagnosed in 42.8%. At the same time, a high level of creativity was detected in 13% of respondents specializing in science and technology. Highly developed curiosity and imagination is characteristic for people with a high level of creativity, knowledge of complex phenomena in this category is presented in a high degree, and there is a high risk tolerance (Fetiskin N.P. & Kozlov V.V., 2002).

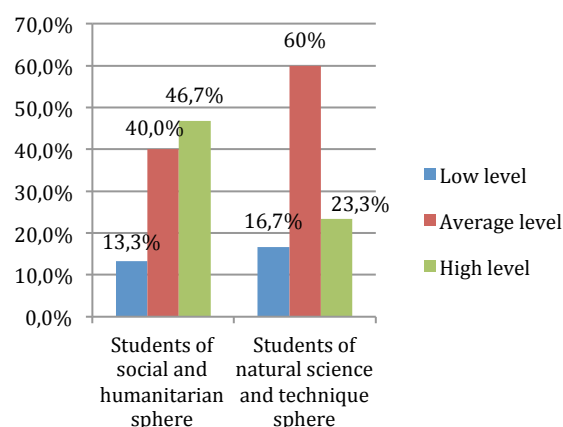
Qualities such as confidence in their abilities, self-esteem, high initiative, personal independence of judgment and action, success and high social adaptability are characteristic to respondents with a high level of creativity. An average (which is in the normal range) level of creativity is diagnosed in 46.4% of the respondents from social and humanitarian areas and 74% of natural-science and technical direction.

This suggests that respondents of this category have developed sufficiently creative personality features, but low willingness to take risks, fear of making a mistake or get disapproval from others prevent them to express themselves fully in their way. Timely provided psychological and educational support to respondents with an average level of creativity within the walls of the university and extra classes, the actual level of creativity can increase creativity to a high level.

11% of social and humanitarian areas and 13% of science and technology spheres respondents showed a low level of creativity. These results suggest that psychological and special education is needed, first of all, for such indicators as curiosity and risk appetite. Namely these indicators often low developed in the study participants of this category (Tunick, 2002).

#### 4.1 The results of the test for the diagnosis of creative portrait of personality (2<sup>nd</sup> stage of research).

“Creativity” test allows us to identify the level of creative inclinations of the individual and build a psychological creative profile by reflecting creative component of the image of “I am real” and the idea of the image “I am perfect.” The results are shown in Figure 3.



**Fig. 3.** The level of respondents' creativity development test "Creativity" by N. Vishnyakova

Analysis of the students' test results from 5 universities in Kazakhstan showed that a high level of creativity was diagnosed in 46.7% of the respondents from social and humanitarian areas. At the same

time, a high level of creativity was detected in 23.3% of the respondents from science and technology direction. This leads to the conclusion that the interviewed students have a high level of creativity, open to new ideas, tend to solve their tasks in an original way.

The following qualities are characteristic to respondents with a high level of creativity:

- A high degree of thought fluency (number of ideas arising per unit of time);
- Highly developed abilities to develop hypotheses, irrelevance (the logical independence of the reaction from stimulus);
- Predisposition to divergent thinking (alternative, multivariate thinking, assuming a lot of answers to one question);
- High level of imagination, curiosity and originality of thought.

40% of respondents from social and humanitarian areas and 60% respondents from science and technology directions showed an average (which is in the normal range) level of creativity. This suggests that respondents in this category have developed enough qualities necessary for effective display of their creative potential, but barriers (mental and behavioral stereotypes) prevent them to express themselves fully.

Having overcome the identified barriers, above mentioned respondents can develop a high level of creativity and demonstrate effectively the quality of their creative personality in various activities (teaching, research, public, etc.).

13.3% students of social and humanitarian areas and 16.7% respondents of science and technology directions showed low level of creativity.

A mismatch between the images "I am real" and "I am perfect" was revealed in 100% of the respondents on all eight indicators of creativity

The largest gap is observed in four indicators: "Creative attitude to the profession", "Creative thinking", "Originality" and "Imagination". This leads to the conclusion, that the above-mentioned indicators of creativity respondents believe ideally underdeveloped and would like to improve them significantly. At the same time, the majority participant students note that they see real opportunities to develop their creative qualities in high schools, for example, in the framework of relevant disciplines, creative workshops, master classes, psychological and pedagogical activities aimed at the development of individual creative qualities and self-confidence.

#### *4.2 The results of the test for the diagnosis of psychological type and personal creativity type (3<sup>rd</sup> stage of research)*

The essence of MBTI psychological testing system is that thanks to measuring unique combination of personal human factors, it is possible to predict his inclination to a certain type of activity, the style of his action, the nature of solutions and other features that allow him to feel comfortable and confident (Goldstein D. & Kroeger O., 2014).

MBTI personality test examines on 4 scales (descriptors):

- 1) Orientation of consciousness (introversion-extraversion);
- 2) Orientation in the situation (common sense - intuition);
- 3) The basis for decision-making (the Logos - the pathos);

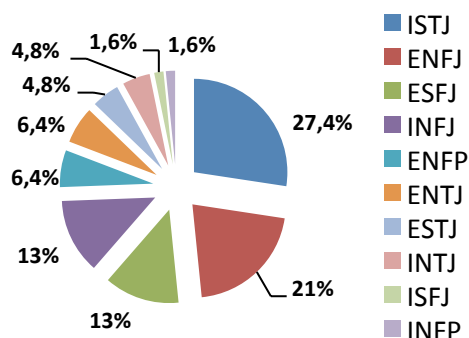
4) A method of preparing decisions (rationality - irrationality).

Researchers David Goldstein, Otto Kroeger also emphasize 16 creative types (Figure 4). The results of testing humanitarian specialties students are presented in Figure 5, the natural sciences faculty - in Figure 6. For comparison, the data are summarized in Table 1.

ISTJ Organizer	ISFJ facilitator	INFJ Inspirer	INTJ Visionary
ISTP Crafter	ISFP Dreamer	INFP Muser	INTP Idea Mill
ESTP Adventurer	ESFP Entertainer	ENFP Socializer	ENTP Brainstormer
ESTJ Realist	ESFJ Teacher	ENFJ Persuader	ENTJ Commander

**Fig. 4.** Sixteen creative types

Analysis of test results showed that out of 16 possible creative types, respondents of humanitarian and social direction diagnosed 10. ISTJ type is predominant type of creativity among the respondents in the humanities, in psychological and pedagogical literature, often referred to as "Organizer". This psychological and creative type was detected in 27.4% of participants. 21% of the respondents relate to the ENFJ type or "Persuader". 13% are of ESFJ ("Teacher") type. In 13% we also see the creative type INFJ ("inspirer"). At 6.4% of the respondents are of ENFP ("Socializer") type, 4.8% are of ESTJ ("realist") type. 6.4% relate to ENTJ type ("Commander"). 4.8% of the respondents are of INTJ type ("Visionary"). Types ISFJ ("facilitator") and INFP ("Muser") were revealed at 1.6% of each respondents.

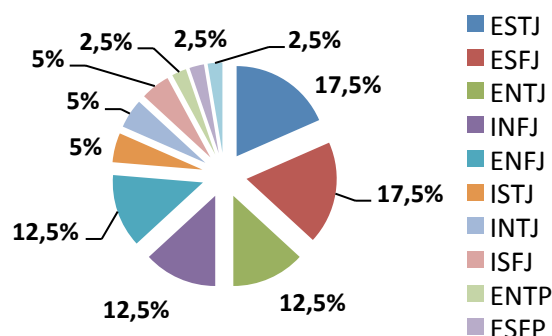


**Fig. 5.** Allocation of respondents enrolled in humanitarian and social specialties, according to psychological types (MBTI)

After having analyzed respondents data enrolled in the specialties of science and technology spheres, we can conclude that the most common psychological types are ESTJ ("Realist") and ESFJ ("Teacher"). Two given types were met at 17.5% each. The second highest prevalence ENTJ ("Commander") types, the type INFJ ("Inspirer") and ENFJ type ("Persuader"). These three types were detected in 12.5% of each respondents.

Types ISTJ ("Organizer"), INTJ ("Visionary"), ISFJ ("facilitator"), INFP ("Muser") were diagnosed in 5% of each respondents.

Types ENTP ("Brainstormer"), ESFP ("Animator"), ISFP ("Dreamer") were revealed in 2.5% of each respondents.



**Fig. 6.** Allocation of respondents enrolled in the specialties of science and technology directions, according to psychological types (MBTI)

**Table 1.** Allocation of respondents according to psychological types (MBTI) type of respondents humanitarian and social direction on psychological types (in percent) of respondents science and technology direction for the direction of psychological types (in percent)

Title of psychological (creative) type	Allocation of respondents enrolled in the specialties of science and technology direction, according to psychological types (in percentage)	Allocation of respondents enrolled in the specialties of humanitarian and social direction, according to psychological types (in percentage)
ISTJ "Organizer"	27,4 %	5 %
ENFJ "Persuader"	21 %	12,5 %
ESFJ "Teacher"	13 %	17,5 %
INFJ "Inspirer"	13 %	12,5 %
ENFP "Socializer"	6,4 %	Not revealed
ESTJ "Realist"	4,8 %	17,5 %
ENTJ "Commander "	6,4 %	12,5 %
INTJ "Visionary"	4,8 %	5 %
ISFJ "facilitator"	1,6 %	5 %
ISFP "Dreamer"	1,6 %	2,5 %
INFP "Muser"	Not revealed	5 %
ENTP "Brainstormer"	Not revealed	2,5 %
ESFP "Entertainer"	Not revealed	2,5 %



Thus, we can conclude that the representatives of the humanities and social professions are of more common psychological types associated with organizational qualities, communication skills and abilities, training and education of other people, enthusiasm, inspiration and creative activity.

The representatives of the science and technology areas are of more common psychological types associated with the administrative activities, logic, education and training others, inspiration and deliver information through language, examples (Goldstein D. & Kroeger O., 2014).

Let us turn to a brief description of psychological types according to the MBTI system. Start with the most common types. ISTJ type ("Organizer"). This is introvert, sensing, logic, rational.

ENFJ type or "Persuader." ENFJ: extrovert, intuit, ethics, rational. A very emotional person, prone to empathy and expression of a wide range of emotions.

ESFJ type ("Teacher"). ESFJ: extrovert, sensing, ethics, rational and is able to influence people with the help of emotional pressure, thus gets along well with them, can elevate mood, inclined to sacrifice their own interests for the sake of another person and to love and care for loved ones (Goldstein D. & Kroeger O., 2014).

INFJ type ("Inspirer"). INFJ: introvert, intuit, ethics, rational. Subtle sense of the nature relations between people, attaches great importance to the trust, does not forgive betrayal. This person can identify the hidden talents of others, endowed with educator talent.

ENFP type ("Socializer"). ENFP: extrovert, intuit, ethical, irrational and is able to be sensitive to other people, possesses developed imagination. Loves creative work, can not stand the monotony and routine, sociable, loves to give good advice interacting with people.

ESTJ type ("Realist"). ESTJ: extrovert, sensing, logical, rational, very hard-working, socially-adapted type, always feels the need to bring the undertaking to complete. Plans activities, almost treat others things (Goldstein D. & Kroeger O., 2014).

ENTJ type ("Commander"). ENTJ: extrovert, intuit, logic, rational and is able to clearly highlight his own capabilities and the ability, easily inspired and start new businesses, interested in dynamic sports, which give extreme sensations.

INTJ type ("Visionary"). INTJ: introvert, intuit, logical, rational and is able to distinguish the important from the secondary, doesn't not like idle talk, he is prone to clear practical thinking.

ISFJ Type ("facilitator"). ISFJ: introvert, sensing, ethical, rational). Recognizes artificiality and hypocrisy in relationships, divides people into his own people and strangers, directing psychological distance. ISFP: introvert, sensing, ethical, irrational). He is able to enjoy a normal life, quietly enduring the monotony and routine. ENTP type ("Brainstormer"). ENTP: extrovert, intuit, logical, irrational). He is distinguished from other people with a wide range of interests, is able to adapt to new conditions and easily transfers to new working methods. ESFP ("Entertainer"). ESFP: extrovert, sensing, ethical, irrational) and is able to see others possibilities, using this knowledge to manipulate (Goldstein D. & Kroeger O., 2014).

## **5. Findings**

1) While comparing creative portraits of humanities and social, technical and natural-science specialty students it has been revealed, that the first often find themselves over emotional person, as

far as they have actual level of emotion and empathy should ideally ("I am ideal") to be much less, i.e. unlike other creative qualities, not to grow in training and development, but rather decrease. Also humanities students believe that emotions, especially negative, hinder the development of a creative attitude to the profession. Indicator "emotionality, empathy" increases for students specialized in techniques during training and personal development in higher education establishments (from course to course), reaching the peak in the 4th year of study. For the representatives of the humanities and social professions psychological types are more common associated with organizational qualities, communication skills and abilities, training and education of other people, enthusiasm, inspiration and creative activity. The representatives of the science and technology areas are more related to psychological types associated with the administrative activities, logic, education and training others, inspiration and deliver information through language, examples.

2) The obtained data allow us to conclude that the respondents of social and humanitarian specialties compared to respondents of technical and natural science professions are dominated by creative thinking and emotional components that are responsible for creative thinking and imagination, emotional experience of research tasks, the production of new original ideas. Respondents of technical and natural science professions in comparison with respondents of social and humanitarian specialties are dominated by logical thinking and operational components that are responsible for the operation and logical techniques. The development of one component of thinking compared to other explains the differences between respondents of social and humanities and the respondents of technical and natural science professions in manifestation of their creative abilities and views on the solution of research problems, the approach to their solution, and provide the results.

3) Significant differences between respondents of social and humanitarian specialties and respondents of technical and natural science disciplines have also been identified in relation to the nature of the dominant type of imagination. The person with a predominance of visual, auditory or motor imagery imagination most often can be met among the respondents of social and humanitarian specialties. Less commonly, the person with a mixed type of imagination (i.e., those who have high development of several types of imagination). The type of spatial imagination and technical mindset prevailed in respondents of technical and natural science disciplines. Spatial imagination is necessary for students and graduates in the study of solid geometry, it develops a careful viewing of drawings and natural volume bodies in different ways. Spatial imagination and thinking, as a component in the solution of practical problems associated with the place orientation and the things of nature is more necessary for respondents of technical and natural science disciplines than creative thinking which prevail among respondents of social and humanitarian fields.

4) In the process of psycho-pedagogical study of personality of the respondents it was revealed that belonging to one or another type of imagination, significantly affects the individual psychological characteristics of respondents. Accordingly, conditions for development of creative potential, creativity and imagination should be created corresponding to their individual psychological characteristics of the respondents of social humanities and technical and natural science disciplines

5) Correlation between the level of creativity and the willingness to risk level was revealed, which in turn explains why a high level of creativity among respondents humanitarian and social direction is

diagnosed more often than representatives of the technical and natural science disciplines. Respondents of technical and natural science disciplines are less prone to risky behavior, preferring to act according to earlier worked out algorithm or not to risk at all, if you are not sure.

## 6. Conclusion

Maps as a diagnostic path except for use in the general study of the definition pattern of students' creativity in higher educational institutions of Kazakhstan, can be used to diagnose students' creativity in the group for the design of future development and use of innovative techniques, as well as individual research of student creativity. In the course of the study psychological and pedagogical counseling was carried out with students to create a portrait of the individual student, including their creative and psychological portrait, creative abilities of students. The next task is to design developing training, based on the obtained results for students of humanities and natural science disciplines. The purpose of training is the development of professional creativity and the overall creativity of students.

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