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DEVELOPMENT OF INNOVATIVE TRAITS OF UNIVERSITY STUDENTS DURING AN EDUCATIONAL PROCESS

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Abstract

The article include a theoretical review of modern researches on the innovative personality and the results of an experimental study aimed at measuring and increasing the innovative potential of university students. The research object is characteristics of the innovative personality. The research subject is the impact of interactive learning on development of innovation components of university students. The authors found a discrepancy between scientific ideas about a personality "innovativeness" construct, despite the common nature of features characteristic of the innovative personality (creativity, communicative competence, reflexivity, risk appetite, activity, striving for success, etc.). The authors proposed a program aimed at developing innovative personality traits, and assessed effectiveness of the program using psychological testing and mathematical statistics methods. 80 students (40 people were included in the control group, 40 students were included in the experimental group) participated in the experiment. The students from the experimental group became more curious, began to relate the possibility of achieving success with changes, and perceive themselves as more creative people, they increased the number of proposed ideas, their originality and elaboration degree. These results allow for conclusion about the effectiveness of the proposed program aimed at developing innovative personality traits in university students.

Keywords: Innovation, innovative potential of the individual, characteristics of the innovative personality.

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1. Introduction

Improving learning technologies is crucial for development of modern education. Formation of creative thinking becomes one of the main tasks of innovative education, it forms future specialists who can generate and implement new original ideas, understand personal and social meanings. In the structure of vocational training, the ability of an individual to continuous self-improvement is important, preservation and development of creative potential is important. It can be formed in the context of innovative educational systems.

In the system of innovative training, as well as training using innovative techniques, it is possible to form a creative personality capable of self-education and self-development. The use of innovative technologies in education can solve many problems associated with training of specialists who meet the needs of modern society (Kapustina & Kozlova, 2016, Stauffer, 2016). This can be achieved by combining traditional and innovative approaches to the educational process.

2. Problem Statement

One of the important tasks of modern higher education is to unlock the potential of all participants in the educational process, to provide them with opportunities to manifest their abilities which is associated with transition to the position of student-centered pedagogy, competence-based approach, inclusion in the European educational space. The strategy of socio-economic development of Russia until 2020 (Strategy 2020) confirms the transition to an innovative way of development which is reflected in the project "Concept of Innovative Development by 2020". This implies a sharp rise in innovation activities aimed at obtaining the final result in all economic sectors. Thus, "innovations" are inherently becoming part of the life of every specialist, while being a complex phenomenon. However, there is no generally accepted scientific definition of innovation personality in psychological science, therefore, to achieve the strategic goals, it is important to disclose the content of this concept which requires additional analysis of the concept of innovation personality, factors and conditions influencing the development of the innovation potential of a person. To solve the problem of development of an innovative person, it is necessary to understand what qualities an individual should possess and what is meant by innovation and innovation activity.

T.B. Zagorulya, N.N. Murovanava, E.V. Starovoyt, (Zagorulya, 2014, Zagorulya, 2017, Murovanaya, 2018, Starovoit, 2015) consider the innovation of the individual in the context of innovative culture. N.N. Murovanaya defines the innovation culture of an individual as "a complex cultural phenomenon of modernity which must be considered as a way of activity and thinking of an individual which ensures his/her readiness for effective life in the conditions of innovative socio-economic transformations" (Murovanaya, 2018). As a part of her study, T.B. Zagorulya revealed that "personality sensitivity, openness to innovations, creativity, assertiveness, tolerance, reflexivity, self-actualization, responsibility" are characteristic of an innovative personality (Zagorulya, 2017). Unlike T.B. Zagorulya, E.V. Starovoyt believes that innovative personality has such features as openness to the new, a sense of perspective, progressive thinking, the ability to perceive and introduce innovations (Starovoyt, 2015). At the same time, D.J. Hughes, M. Rowe, M. Batey, A. Lee, Buettner (Hughes, Rowe, Batey, & Lee, 2012, Buettner, 2016) talk about the connection of openness to new and active use of social networks (e.g.,

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Facebook and Twitter) which indirectly confirms the willingness of such people to use in innovation, including technological one, in their lives. Studying the innovative potential of the personality of a teacher, EA Shmeleva describes the ability to create, the responsibility for decision-making, development orientation as main components of the personality of an innovative teacher (Shmeleva, 2013).

Researchers have been studying both the quality of an innovative person and his/her values. In particular, E.K. Veselova and V.A. Artemyev focus on the need to develop the moral sphere of innovators, in addition to improving intelligence, creativity, flexibility of thinking, etc. (Veselova & Artemyeva, 2014). V.A. Fedotova concludes about differences in values between young people and adults, in terms of willingness to accept and introduce innovations: for adults, this is expressed in the value "public safety", and for young people – in the values "Independence of thought", "Stimulation", "Achievement", "Power: Dominance" "Power: Resources" (Fedotova, 2016). Despite a pronounced interest in personality innovation among scientists, we found that there is no consensus about the components of innovation and formation of an innovation personality. Foreign researchers are developing talent management involving development of abilities, including the creative potential of young people, and improvement of competitiveness of graduates in the labor market (Collings & Mellahi, 2009, Chan, Chan & Zhao, 2009, Farao & Gianecchini, 2017), while Russian researchers influence individual personalities in order to increase innovative potential of students (Shmeleva, 2013, Zagorulya, 2017). The present research aimed at identifying the effectiveness of an individual's innovative development program that can be integrated into the existing educational system as a part of the competence-based approach and project training is relevant.

3. Research Questions

The research object is characteristics of an innovative personality. The research subject is the impact of interactive learning on development of student innovation in the educational process of higher education

4. Purpose of the Study

The purpose of the study is to identify psychological and pedagogical conditions for development of innovative personality traits of students in the educational process.

The study aims to

1. Involve students in professional and creative activities.
2. Develop creative thinking (fluency, flexibility, originality, etc.).
3. Increase the level of innovation of the individual.
4. Develop self-presentation and teamwork skills

5. Research Methods

The authors used the following methods: psychological testing; an experiment aimed at developing innovative characteristics of young people; statistical data processing (Rs-Spearman's rank correlation coefficient, U-criterion of Mann-Whitney differences, T-criterion of Wilcoxon change reliability).

Experimental work was carried out under the continuous educational process. Nine lessons were given. Six lessons were given in the training form. Training is an option of interactive learning, which,

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according to authors and other scientists involved in innovative forms of education, contributes to formation of innovative personality traits (creativity, perfectionism, communicative competence, etc.). Trainings increase motivation to learning (Chan, Chan & Zhao, 2009, Kapustina & Kozlova, 2016, Rodina & Lapaeva, 2018).

The structure of the experiment program is presented in Table 1.

The program uses tasks that simulate professional and life situations, business games aimed at learning how to design life and professional strategies; brainstorming, solving prognostic tasks.

The program was tested in Novosibirsk State Technical University. 80 students of the third course of the Faculty of Business were participated in the experiment, 40 of them were in the experimental group and 40 - in the control group.

The diagnostic unit of the program (psychological testing) included the following techniques:

- "Evaluation of creative personality characteristics" and "Evaluation of divergent thinking"
- "The scale of self-esteem of innovative personality traits"
- "Methods for determining tolerance for uncertainty"

The hypothesis of the study: the program "Development of innovative qualities" improves performance of such innovative personality characteristics as creativity, flexibility of thinking, originality, tolerance for uncertainty, self-esteem of innovation.

Table 01. Brief description of the experimental program

No	Purpose	Description
1	Collection of primary data, formation of control and experimental groups	Psychological testing using the methods "Evaluation of creative personality characteristics" and "Evaluation of divergent thinking" suggested by F. Williams, "Self-assessment scale of innovative personality traits" (Lebedeva & Tatarko, 2009)
2	Development of creative thinking skills (flexibility and originality)	Main part: exercises "Original use" and "Improvement of the subject"
3	Deeper understanding of professional activities	Main part: exercises "What can happen?", "Professional qualities of an economist"
4	Formation of stress tolerance under uncertainty	Main part: exercises "Incredible situations", "Economic change"
5	Development of self-presentation and public speaking skills	Main part: the exercise "Logo", presentation of biographies
6	Development of creative thinking skills (fluency, elaboration, creativity)	Main part: the exercise "Methods of Action", "Six Hats of Thinking" (Hughes, 2012), "Thoughts about the economy"
7	Development of critical thinking, forecasting ability, increasing the value of the future, team interaction skills	Main part: the exercise "Prognostic Project", the use of the focal object method in teamwork
8	Practicing self-presentation and public speaking skills	Main part: protection of works performed by the method of focal objects. The focal object was chosen by the students themselves. The prerequisites were as follows: writing of the functional features and description of an invention, design of the written part of the work, presentation and protection.
9	Collection of secondary data, comparison of control and experimental groups to assess the effectiveness of the experimental program	Repeated psychological testing using the methods "Evaluation of creative personality characteristics" and "Evaluation of divergent thinking" suggested by F. Williams, "Self-assessment scale of innovative personality traits" (Lebedeva & Tatarko, 2009)

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The training work took place every semester every two weeks. The duration of each class was 1 hour 25 min. Each lesson included the introductory part (greeting and warming-up), the main part (in compliance with the program) and the final part (summing up, reflection, review of the program for the next lesson):

• *Introduction*. At the beginning of the lesson, various exercises (non-standard use of the subject, etc.) were used to involve students in the "here and now" situation.

• *Main part* of the lesson is described in the program (Table 1). Exercises and tasks were performed by groups.

• *Final part.* Group and individual activities were analyzed. According to the authors, reflection as a way of self-knowledge, self-esteem, self-analysis and a technology ensures active perception of training material and personal development.

Control and experimental groups were compared using the Mann-Whitney test on the basis of the primary diagnosis (prior to the forming experiment). The analysis showed no significant differences between the groups by all studied characteristics. The use of the statistical procedure creates conditions for correct experimental studies on effectiveness of the proposed methods for development of innovative thinking in students.

6. Findings

Let us describe the research results obtained in this study.

According to the method "Evaluation of creative personality characteristics" by F. Williams, the level of "curiosity" changed in the experimental group ($T = 236$, $p \leq 0.03$). Having participated in the program, curiosity of the participants increased due to various tasks and interest in the proposed activities (a motivational component of innovation).

In the experimental group, there were significant changes according to the method "Divergent thinking" suggested by F. Williams (an increase in the level of "flexibility" ($T = 42$; $p \leq 0.001$), "originality" ($T = 75.5$; $p \leq 0.001$) and "development" ($T = 143.5$; $p \leq 0.001$). Having participated in the program, the subjects increased the number of proposed ideas, their originality and elaboration level.

In the experimental group, there were significant changes according to the method "The scale of self-assessment of innovative personality traits" suggested by N.M. Lebedeva, A.N. Tatarko (an increase in the level of "orientation to the future" ($T = 167.5$, $p \leq 0.03$) and the total score of self-assessment of innovation ($T = 254$, $p \leq 0.03$).

The experimental program changed development of innovative personality traits: the participants in the experimental group began to relate potential success with changes, and perceive themselves as more creative people.

These results coincide with the data obtained by of V.A. Fedotova who discovered a positive relationship between creativity and a general innovation index for the values "Hedonism" and "Independence of actions" (Fedotova, 2016).

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Comparison of the results of the control and experimental groups showed significant differences in the following creative characteristics (by the method "Divergent thinking"): fluency ($U = 682$; $p \leq 0.02$), flexibility ($U = 203$; $p \leq 0.001$), originality ($U = 390$; $p \leq 0.001$), naming ($U = 439.5$; $p \leq 0.001$) and creative thinking ($U = 337$; $p \leq 0.001$) are higher in participants of the experimental group.

Statistically significant differences by the method “Evaluation of creative personality characteristics” suggested by F. Williams were obtained only for “risk appetite” ($U = 573.5$; $p \leq 0.02$). According to N.M. Lebedeva, A.N. Tatarko (Lebedeva & Tatarko, 2009) and others, an innovative person should take a risk.

According to the method “Self-assessment scale of innovative personality traits” (N.M. Lebedeva, A.N. Tatarko), significantly significant differences were obtained for the “innovation index” scale ($U = 615$; $p \leq 0.01$). Thus, in the experimental group, the subjects became more innovative. The innovation index consists of creativity, risk appetite and orientation to the future (Lebedeva & Tatarko, 2009).

Since the program aims to assess creative abilities, and modern scientists tend to separate creativity (generation of new ideas) and innovation (implementation of new ideas into practice, improvement of the process or product of creativity) (Kumar & Bharadwaj, 2016), additional methods for evaluating effectiveness of the program were “Real World Problems” adapted to the specifics of the Russian sample. The comparative analysis (φ - Fisher criterion) showed statistically significant differences in the experimental and control groups interacting with the environment: the control group chose the environment, while the experimental group formed it ($\varphi = 2.465$; $p \leq 0.01$). Due to the fact that formation of the environment is an indicator of readiness for innovation, we can conclude that the students of the experimental group are more willing to interact with the environment, form the environment.

These data allow us to conclude that the hypothesis is partially confirmed: the program “Development of innovative features” improves performance of such innovative personality characteristics as flexibility of thinking and self-esteem of innovation.

The result suggests that the experimental program is an effective tool for developing both creativity and personality of the student.

7. Conclusion

The theoretical analysis identified a discrepancy between scientific ideas about an innovative personality (analysis of the innovative potential of individuals, innovative culture of a person, innovation as a personal component). The researchers revealed a set of features characteristic of the innovative personality (creativity, communicative competence, reflexivity, risk appetite, activity, striving for success, etc.). The lack of a unified approach to personality innovation in Russia made the authors develop an educational program aimed at improving innovative features in university students. Program efficiency assessment using psychological testing and mathematical statistics methods showed that participants became more curious, began to relate possible success with changes, and perceive themselves as more creative people. They began to suggest more original well-developed ideas. These results allow for conclusion about the effectiveness of the proposed program aimed at developing innovative personality traits in university students.

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