

Creativity Development: Theoretical and Practical Aspects

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Abstract

The rapidity of information and communication technologies and economic development raise a whole new set of challenges. Creativity is becoming the basis for successful professional activities; it improves career perspectives and ensures that problems are solved efficiently; therefore the creative personality development is of great significance. The development of personal abilities to respond creatively to contemporary global challenges when training professional future specialists is one of the major development tasks in organizing the study process. After evaluating the impact of creativity on professional activities the research objective was defined - to identify characteristic features of students' creative thinking and provide experimental evaluation of its changes in the context of its development/self-development. In the course of the educational experiment performance, when using the initial (before experiment) and final (after experiment) measurements in experimental (educational impact applied) and control groups (educational impact not applied), characteristic features of creative thinking and changes in it obtained from the research participants were defined when applying E. Torrance methodology (Test of Creative Thinking, TTCT, 1974) task 5 - visual part 3 (A - Form) and verbal part 2 (B - Form). Pre-test research results showed that the average score of the experimental group indicators did not differ significantly from the control group indicators on the grids of abundance, originality, particularity and flexibility. The control group indicators of creative thinking tasks of visual part obtained during the first research on the grids of abundance, originality, particularity and flexibility as well as indicators on the grids of abundance, originality and flexibility of verbal part did not differ significantly when compared to the second research results. However, positive changes in creative thinking were identified in the experimental group: the average score of indicators obtained after the educational experiment performance were significantly higher when compared to the data obtained during the first research on the grids of originality, particularity and flexibility of visual part and on the grids of abundance and originality of verbal part. In addition, after analysis of the tasks carried out for the second time significantly higher average scores of indicators were identified in the experimental group when compared to the control group indicators on the grids of originality and flexibility.

Keywords: creativity, creative thinking, professional training, educational experiment.

Introduction

The rapidity of information and communication technologies as well as economic development raise a whole new set of challenges. The increasing demand for creativity that is inseparable from knowledge is on the rise in every area of life. The ability to find creative solutions and to adjust to ever - changing conditions of life are bedrock requirements in a rapidly changing world. Creativity is considered

the basis for successful professional activities; it provides career opportunities and helps solve problems more effectively; therefore the creative personality development is of utmost importance. More than half a century ago C. R. Rogers (1961) (quote by Grakauskaitė – Karkockienė, 2010) paid sufficient heed to the increasing demand for creative personalities and emphasized the need to search for the origins of creativity as well as conditions and methods fostering the creative personality development. As stated by D. Grakauskaitė-Karkockienė (2010), the need for creative, innovative, ingenious, enterprising and inquisitive individuals who are willing to provide unconventional solutions foster the education process and encourage authorities to regularly renew and select appropriate teaching materials, to search for effective teaching methods and techniques and to provide favourable conditions for creativity development/self-development. The researcher admits that fostering and maintaining creativity as well as stimulating self-expression, inventiveness and vitality can stimulate educational and economic achievements and personal growth. Furthermore, creativity is important not merely to the society but also to an individual and is considered crucial to human survival and social adaptation in a dynamic society. Therefore, the development of creative abilities and skills that help creatively respond to global challenges when considering them as opportunities is one of the main tasks in the study process organizing.

Over the past few decades a large number of Lithuanian and foreign researchers wrote articles on creativity: R.A. Beghetto (2009), G. Beresnevičius (2010), C. Cortello (2005), D.H. Cropley, A.J. Cropley (2000), D. Grakauskaitė – Karkockienė (2006; 2010), K. Jaskyte, H. Taylor, R. Smariga (2009), A. Petruilytė (2001), J.E. Pretz, J.A. Link (2008), R.J. Sternberg (2006) analysed the problems regarding creativity development/self-development, emphasized its importance, specified the methods fostering creative thinking and analysed the impact of creativity development/self-development programmes on learners. The following researchers indicated the creative personality traits (Beresnevičienė, 1996; Grakauskaitė – Karkockienė, 2006), analysed the importance of motivation to the creative process (Akande, 1997), mentioned other factors and the environmental impact that influence creative activities of people (Beresnevičius, 2010; Grakauskaitė – Karkockienė, 2006; Hemlin, Allwood, Martin, 2008). However, it should be noted that creativity development/self-development in the study process has been insufficiently explored.

Considering the opportunities for creative thinking development/self-development in higher professional education institutions, the research on creative thinking development/self-development is of a great theoretical and applied significance. It helps better understand cognitive development and functioning, reveal the human nature's creative potential, design advanced and appropriate creative thinking development/self-development techniques and discover more effective individualized and differentiated teaching strategies. Considering the importance of creativity in professional activities the article seeks to disclose characteristic features of students' creative thinking and changes in

them as well as forecast the opportunities for creative thinking development/self-development in the study process.

Research subject - characteristic features of students' creative thinking and its development/self-development, educational dimensions of creative thinking.

Evaluating the relevance of the theme, the following *problematic issues* occurred: What is the definition of "creative thinking and opportunities for its development/self-development" in contemporary scientific literature? What are the opportunities for creative thinking development/self-development in the professional training process? What kind of changes might occur in creative thinking when applying educational impact?

Research objective - to identify characteristic features of students' creative thinking and provide experimental evaluation of its changes in the context of its development/self-development

Research tasks:

1. Considering the analysis of scientific literature and researches related to the theme discussed, to identify relevant dimensions of creative thinking and its development/self-development explored by other contemporary researches and to provide theoretical substantiation of its educational significance.
2. To identify characteristic features of students' creative thinking.
3. To identify and evaluate changes in creative thinking indicators in experimental and control groups of students in the course of educational experiment.
4. To forecast the opportunities for creative thinking development/self-development in the professional training process.

Theoretical substantiation of creativity and its development/self-development

The concept of creativity.

The concept of creativity in scientific literature is rather ambiguous due to its complexity and changing attitudes toward it. When defining creativity different authors provide diverse aspects of the concept and stick to different criteria. Most common definition of creativity in scientific literature is the ability to create innovative, original, unexpected, quality and appropriate, that is, useful pieces of work that meet the provided objectives (Grakauskaitė – Karkockienė, 2006; Petrulytė, 1995; Sternberg, Lubart, 1999). According to the holistic approach, creativity includes a variety of factors influencing the creative process: abilities, skills, personality traits, motivation, creative experiences, etc. E.P. Torrance (1986), Я.А. Пономарев (1999), Е.Е. Туник (2002) defines creativity as a process, which is characterized by sensitivity to the problem, the ability to discern knowledge gaps and missing items; searching and finding solutions, guessing and raising questions, formulating hypothesis, evaluating, correcting, generalizing and presenting. Some authors (Isaksen, Treffinger, 1994) (quote by Ильин, 2009) define creativity as discovering innovative, significant and appropriate relations between original, unrelated or even distant elements, the ability to discern numerous opportunities, to invent and apply diverse methods for solutions, to

propose unexpected and new opportunities and create and select alternative ideas. The majority of authors believe that creativity is determined by these personality traits: imagination, ingenuity, inquisitiveness (Gage, Berliner, 1994), emotionality, self-confidence, diligence, critical thinking, boldness, independence and flexible thinking (Petrulytė, 2001), receptivity, dominance and initiative (Jacikevičius, 1999). A number of researchers mention these personality traits: sensitivity to problems, a broad range of interests, originality, eccentricity and usefulness (Beresnevičienė, 1996; Torrance, 1986) and the following abilities: discerning and defining problems, foreseeing techniques for their solutions and tolerating ambiguity (Sternberg, 1990). L. Jovaiša (2007) admits that creativity is considered a set of personality traits that enable to achieve original, socially important and innovative quality results of one's activity. G. Beresnevičius (2010), after generalizing L. Jovaiša (2001, 2007), A. Maslow (2006) and C.R. Rogers (2005) personality theories, defines creativity via educological dimensions. According to the researcher, creativity is a set of personality traits, which include creative thinking skills (Set of Skills), interest in science or art, personal values (Determined Personality Set), psychological well-being at work and during studies, the need for creativity and self-education, the will to work independently (Activity Set), self-esteem and the perception of creativity (Character Set) that allow to achieve effective original performance results through productive activity and to discover what is new and unexpected. J. Guilford (1968) equated creativity with divergent thinking, which is related to the ability to discern problems and create diverse solution techniques. E. Torrance (1974) discerned divergent thinking parameters: fluency, originality, flexibility and particularity, whereas flexibility refers to the ability to easily convert the existing expertise, change one's attitude, expectations and principals and to move from one area to another, etc.; originality - the ability to link distant associations elements and images and generate new ideas; particularity - the completion and realization of provided ideas or solutions.

The majority of researchers link creativity to creative thinking, which is defined as the highest form of productive thinking (Jovaiša, 2007). In the course of this process new ideas, concepts, distant associations, unexpected relations between the existing ideas, effective problem solving techniques and other original and useful items are created (Guilford, 1968; Runco, 1995, 2004).

Creative thinking development/self-development subject and its opportunities.

On the basis of scientific literature and analysis of research works related to the theme analysed that were carried out in Lithuania and abroad it should be noted that creativity skills development in personality is of key importance. Researchers consider creativity as a result of innate personal characteristics and their development. The development of creativity to a great extent influences the direction of personal activity and actualization of the obtained knowledge and skills. Therefore, analysis of the creativity development/self-development process was in the limelight of researchers' attention in scientific literature as well as educational practice. The effectiveness of creativity development/self-

development was approved by numerous researches; however, consideration on this issue makes researchers repeatedly investigate the opportunities for creativity development/self-development (Бурно, 1999; Халифаева, 2006). Е.П. Ильин (2009) admits that creativity development/self-development is crucial for personal development, since it can stimulate artistic, academic and personal growth. D. Grakauskaitė-Karkockienė (2006) also supports this opinion and stresses that creative problem solving does not emerge unexpectedly; this should be developed and trained, whereas original thinking should be appreciated and encouraged. As stated by the researcher, creativity development is maximum development and improvement of potential skills when providing appropriate conditions and applying special creativity development/self-development techniques.

According to C.R. Rogers (2005), each individual possesses potential creative skills which can flourish in the environment favourable for creativity. The creative process takes place in a particular environment, therefore the creative process might be fostered or hampered by various environmental factors: people with whom a creator communicates, physical environment, certain life events, the development of the society as well as technical and other types of systems. Therefore, creativity can emerge only in an appropriate environment (Grakauskaitė-Karkockienė, 2006; Sternberg, 1990). Scientific literature highlights the following characteristics of a favourable environment: a positive attitude toward changes, interpersonal relations based on trust and respect, risk-taking and test support, leeway, encouraging independent activities, perceiving things from different angles, providing multifaceted solutions, presenting ideas and using different techniques, interpreting, providing arguments, attitudes and opinions. However, creativity development can be fostered by suitably selected creative tasks (Torrance, 1974) and effective methods and techniques aimed at encouraging learners to raise problems and analyse them. Researchers believe that there are numerous methods for creative thinking fostering. According to J. Hockey (2004), the application of unconventional teaching methods in the development/self-development process is of major importance. In his work the author demonstrates how unconventional teaching methods stimulate creativity and innovation. Researches of creative thinking development (Clapman, 1997; Grakauskaitė-Karkockienė, 2006; 2010; Petruilytė, 2001; Scott, Leritz, Mumford, 2004) described creative thinking techniques, which could be applied when training a large number of people and generating more creative ideas, providing various creativity development/self-development methods, tasks, exercises and programmes for creativity development that might encourage students to generate new and original ideas. These are a few methods that encourage creative thinking and the search for various possible solutions. *Method of focal objects*, where person selects an object, which later will be changed, improved and modified. Another object is selected randomly, while its properties are assigned to the previously chosen object. Ideas are developed until a new quality result is achieved: a valuable idea, an interesting phenomenon or a brand new

object. *Assumptions conversion strategy*, where all assumptions regarding the problem being solved are listed on paper and all of them are turned "upside down". Simple techniques are used for manipulating the selected object: Conversion, Increase-Decrease, Separate-Connect, Speed up- Slow down, Swap Properties, Transfer, etc. The *Six Thinking Hats Method* was created by E. de Bono (2008) and was applied in this paper. Six metaphorical hats of different colours represent the main types of thinking. The group moderator decides which hat to wear at one time or another, while all participants create ideas related to the meaning of hat of a particular colour. The white hat is related to the information search. The red hat - to feelings, intuition and emotions. The black hat warns about risks and explains why somebody might fail. The green hat suggests new ideas, provides proposals, analyses alternatives and creates solutions. The blue hat manages the thinking process. The yellow hat encourages to heed on the advantages of suggestions and envision positive consequences. These individualized and complex techniques are aimed at developing skills and creative behaviour as well as increasing creative potential of a person.

Therefore, in the course of creativity development/self-development process it is important to create a favourable environment, to encourage learners to express their opinion, to take "risks" by forecasting, foreseeing and analysing the situation that requires unconventional and original solutions, to provide learners with opportunities to establish interpersonal relations based on trust, tolerance and respect, to choose and apply the methods and programmes that stimulate imagination, to awaken the desire to explore and discuss ideas as well as inspire a person to search for various possible solutions and develop creative thinking.

Research methodology

The research was aimed at revealing characteristic features of students' creative thinking and its changes in the course of educational experiment performance. The research participants: two groups of students (N=80): an experimental group (N=40) and control group (comparative) (N=40). *Research methods*: theoretical, diagnostic and educational experimental. *Theoretical* - analysis of scientific literature. *Diagnostic* - in the course of educational experiment the creative thinking methodology by E. Torrance was applied (Torrance Test of Creative Thinking, TTCT, 1974) (hereinafter - TTCT). Test consists of 2 parts: visual (A - Form) and verbal (B - Form). Visual part includes three tasks:

1. The drawing creation, including the provided object. This task perfectly diagnoses the originality of visual associations and the inclination to specify one's initial ideas.
2. The uncompleted object task. It was shaped on the basis of K. Franck principles regarding the completion of drawings. Representatives of Geštal psychology admit that there is a tendency to supplement uncompleted "badly drawn" objects by simple and easy techniques. A creative personality rejects this solution, since he wants to create something original.

3. The drawing creation by using parallel lines. The performance of this task reveals the ability of an individual to place one and the same object in different situations and perceive the different aspects of it.

Results were assessed when using a four indicator grid: abundance, flexibility, originality and particularity. *Abundance* parameter was calculated by adding all proper answers. This indicator marks soft, free, nimble thinking and the number of ideas. *Flexibility* - a diverse number of categories in answers of the experimental group students, the ability to jump from one idea to another, from one category of ideas to another. This factor demonstrates how many different aspects of the problem the experimental participant can encompass and how many new solutions he can provide. *Particularity* is assessed after calculating details that supplement and expand the main idea of the experimental participant. Particularity is related to the abundance of associations and thinking speed, when the emerging thought generates numerous additional images, which supplement and enrich the main idea. When analysing the results, scores are obtained for each detail existing in the drawing: the colour, which supplements the idea, drawing lines, shades and decorations in case they supplement the idea of the answer; "overstepping" the drawing boundaries. In case the drawing is divided into two significant parts by a line, scores are obtained in each separate part by adding them. *Originality* indicator is estimated according to the frequency rate of responses on a defined population.

Verbal TTCT part includes 7 tasks. Task 1-3 - questions about the action depicted on the drawing; guessing the reasons of the action and determining the action consequences. The author believes that the first three tasks should reveal the experimental participant's sensitivity to unknown things and knowledge gaps. The above mentioned tasks disclose the experimental participant's creative thinking. Task 4 - the toy improvement (the elephant image on A- Form and the monkey image on B - Form). It is considered that this activity is a reliable indicator of creativity. Experimental participants of different ages willingly performed the tasks and provided ideas and thoughts, which they probably did not dare express when doing serious tasks. Task 5 - unusual usage (A - Form - carton boxes; B - Form - can boxes). This task demonstrates the ability to keep apart from a conventional and generally acceptable use of items. Task 6 - unusual questions - adapted from R.C. Barkhart methodology and aimed at testing divergent thinking skills. Task 7 - let's imagine - the application of the Consequences Test by J.P. Guilford (1950). It helps disclose the experimental participant's imagination, which is one of the components of creative thinking.

Educational experiment is used to define and investigate preconditions for the students' creative thinking development/self-development. In the course of the experiment performance the research scheme of two groups was applied by using the initial (before the experiment) and final (after the experiment) measurements in experimental and control groups.

Statistics. Statistical quantitative data analysis was carried out. Descriptive statistics was used to process the data obtained during the research performance:

averages, standard deviations, Student's *t* criterion (to compare the average of two independent indicators), twin *t* - criterion (to compare the average of two dependent indicators). Statistical data analysis SPSS (eng. Statistic Package for Social Sciences) software version 14.0.

Research procedures. In order to reveal characteristic features of students' creative thinking and assess the opportunities for its development/self-development the creative thinking methodology by E. Torrance (TTCT, 1974) was applied. During the educational experiment characteristic features of students' creative thinking and changes in it was carried out. Procedures of the experiment research performance were based on the scheme of experiment structure (see Table 1) by V. Žydžiūnaitė (2001).

Experimental group	Control group
<ol style="list-style-type: none"> 1. Subjects collected. 2. Pre-test (initial research before experimental effect). 3. Experimental stimulus was introduced (experimental effect was applied). 4. Post-test (research after experimental effect). 	<ol style="list-style-type: none"> 1. Subjects collected. 2. Pre-test (initial research). 3. 3. Post-test (final research without experimental effect).

Table 1: The scheme of educational experiment structure (by Žydžiūnaitė, 2001).

Research on the creative thinking changes was carried out in two stages: creative thinking tasks were provided to the experimental group, while eight weeks later they were repeatedly provided to the same experimental group when applying the above mentioned task performance conditions. In the course of eight weeks the experimental group students were taught by providing tasks aimed at developing and fostering creative thinking and stimulating the need for creative activities. The contents of the forecasted activities was shaped when formulating objectives, forecasting methods and arranging favourable conditions and measures for the task performance as well as providing practical tasks and situations. In order to assess characteristic features of creative thinking changes of the experimental group students with regard to other students, the same tasks were provided to the control group students while eight weeks later they were repeatedly provided to the same group students when applying the same task performance conditions. Activities for students of the control group were not carried out for eight weeks. The research objective was to identify changes in creative thinking of the experimental group students and compare them with the results of changes in creative thinking of the control group students.

In the course of the educational experiment performance the scheme of two research groups was applied, which included initial (pre-test) and final (post-test) measurements in experimental and control groups. At the beginning and the end of the research characteristic features of creative thinking of all participants of the

research (experimental and control groups) were identified by applying the same research methodology (creative thinking methodology by E. Torrance (TTCT, 1974). Statistical significance of all possible differences (between the first and the second research results obtained in experimental and control groups as well as between the results of the first and the second research obtained in experimental and control groups) was checked by applying Student *t* criterion (to compare the average of two independent indicators) and twin *t* criterion (to compare the average of two dependent indicators).

Experimental and control group students were provided with 5 tasks from the creative thinking methodology by E. P. Torrance (1974) - 3 tasks from visual part (A - Form) and 2 from verbal part (B - Form). Before the task performance the research participants were provided with the task performance instruction and directions. Students were encouraged to openly express their ideas in order to stimulate ingenuity and imagination of the task performers (experimental students) as well as to create a favourable atmosphere and maintain a high level of motivation. During the research performance focus was laid on the principles of independence, anonymity, confidence and good will when ensuring anonymity of each participant; considering the research participants' request, the names of towns and high schools were not indicated.

Research on characteristic features of students' creative thinking and its changes in experimental and control groups

In order to discover the impact of activities provided to the experimental group students on changes in their creative thinking, the average score of TTCT results obtained from experimental and control group students were compared after the completion of the first research (see Figure 1).

After t-test was estimated, the data of pre-experiment research demonstrated that the average results of the experimental group did not differ significantly from the control group results in the following grids: abundance ($t=-0,408$, $p=0,685$), originality ($t=0,788$, $p=0,436$), particularity ($t=1,289$, $p=0,205$) and flexibility ($t=-0,746$, $p=0,46$). Therefore, it should be stated that before the experiment both groups were of a similar creative thinking level considering the above mentioned indicators.

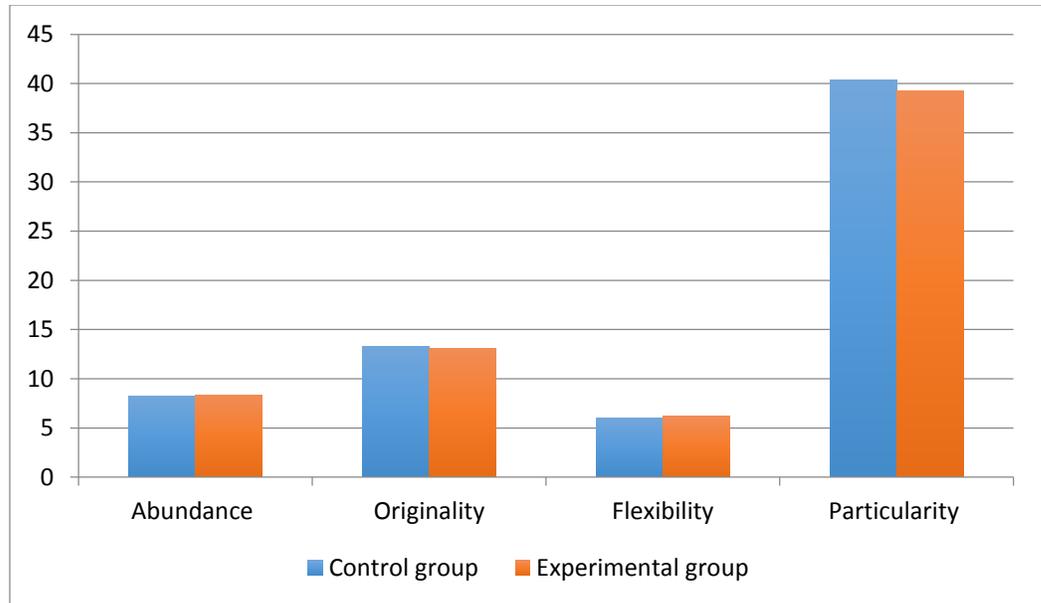


Figure 1.: The average score of indicators of creative thinking (Torrance, TTCT, 1974) obtained during the first research (before educational experiment) in experimental and control groups

Significant differences of results of control and experimental groups were revealed during the analysis of visual and verbal part tasks carried out for the second time.

The average score of indicators of visual part results of the second research on creative thinking in the control group when compared to the initial results did not differ significantly in the four indicator grid: abundance - ($t=1,504$, $p=0,141$), originality ($t=-1,02$, $p=0,314$), particularity ($t=1,224$, $p=0,228$) and flexibility ($t=0,747$, $p=0,459$) (see Table 2).

Indicators	First research		Second research		t	p
	V	SN	V	SN		
Abundance	10.88	1.48	10.55	1.15	1.504	0.141
Originality	17.71	2.02	18.04	2.09	-1.02	0.314
Particularity	40.35	3.97	39.72	4.02	1.224	0.228
Flexibility	9.53	1.7	9.3	1.37	0.747	0.459

Expanded meaning: V- the average; SN - standard deviation; t - t criterion; p - credibility

Table 2. The average score of indicators of the first and the second research results of visual part on creative thinking of the control group (Torrance, TTCT, 1974).

As revealed by the research results, the average score of indicators of the verbal part tasks of the second research TTCT of the control group when compared to the first research data did not differ significantly in terms of statistics: originality ($t=0,348$, $p=0,729$), abundance ($t=-0,913$, $p=0,367$) and flexibility ($t=-0,836$, $p=0,408$) (see Table 3).

Indicators	First research		Second research		t	p
	V	SN	V	SN		
Abundance	4.32	1.11	4.5	0.99	-0.913	0.367
Originality	6.76	1.63	6.66	1.52	0.348	0.729
Flexibility	2.53	0.81	2.65	0.78	-0.836	0.408

Table 3. The average score of indicators of the first and the second research of visual part tasks of creative thinking of the control group (Torrance, TTCT, 1974).

Seeking to reveal changes in creative thinking indicators of the experimental group after the educational impact the data obtained before and after the experiment was compared. The average score of indicators of creative thinking of this group before and after the experiment is provided in Table 4 and 5.

When visual tasks were carried out after the educational experiment significantly higher results of the experimental group were identified in the grids of originality ($t=-4,501$, $p=0,001$), particularity ($t=-2,824$, $p=0,007$) and flexibility ($t=-2,242$, $p=0,031$) compared to pre-experimental data. As it is evident from empirical twin t criterion values (to compare the average score of two dependent indicators), the following indicators of the experimental group obtained after eight weeks activities have significantly increased in the grids of originality ($V=20,23$, $SN=2,19$), particularity ($V=40,65$, $SN=2,85$) and flexibility ($V=10,1$, $SN=1,41$) when compared to the first research results (before the provided activities) (respectively: originality ($V=17,75$, $SN=1,97$), particularity ($V=39,29$, $SN=3,53$) and flexibility ($V=9,7$, $SN=1,47$)). On the basis of these results it should be considered that fostering and developing the creative thinking of the experimental group during academic activities had an impact on changes in their originality, flexibility and particularity indicators.

As it is evident from the research results, the average score of the experimental group results after the educational experiment when compared to the initial indicators, have not differ significantly: abundance ($t=-0,823$, $p=0,415$) (see Table 4).

Indicators	Before experiment		After experiment		t	p
	V	SN	V	SN		
Abundance	11.02	1.19	10.52	1.13	-0.823	0.415
Originality	17.75	1.97	20.23	2.19	-4.501	0.001
Particularity	39.29	3.53	40.65	2.85	-2.824	0.007
Flexibility	9.7	1.47	10.1	1.41	-2.242	0.031

Table 4. The average scores of changes of visual part indicators of creative thinking in the experimental group (Torrance, TTCT, 1974).

Analogous results were obtained after estimating t - test values in verbal part. After the educational experiment was completed, significantly higher average indicators were obtained when compared to the initial research data: abundance (t=2,739, p=0,009) and originality (t=-8,596, p=0,001).

No statistically significant differences were detected (t=-1,728, p=0,092) when comparing the average score of indicators of the experimental group before experiment (V=2,65, SN=0,92) and after it (V=2,93, SN=0,83).

Indicators	Before experiment		After experiment		t	p
	V	SN	V	SN		
Abundance	4.32	1.17	4.46	1.13	2.739	0.009
Originality	6.17	1.5	7.17	1.73	-8.596	0.001
Flexibility	2.65	0.92	2.93	0.83	-1.728	0.092

Table 5. The average score of changes of visual part indicators of creative thinking in the experimental group (Torrance, TTCT, 1974).

The research results demonstrate that the average score of creative thinking results of the experimental group during the second research were significantly higher than the average score of results of the control group in two grids out of four (see Table 6).

After performing the analysis of tasks carried out for the second time significantly higher results of the experimental group were obtained in the grids of originality (t=-5,533, p<0,001) and flexibility (t=-2,719, p<0,01), compared to the average score of results of the control group. It is evident that creative thinking results of the experimental group in the grids of originality (V=15,01, SN=1,62) and flexibility (V=6,51, SN=0,89) obtained during the second research are significantly higher when compared to the control group creative thinking

results in the grids of originality (V=13,49, SN=1,38) and flexibility (V=5,97, SN=0,75) obtained during the second research.

As can be seen from the research results, the average score of results of the experimental group obtained during the second research did not differ significantly from the average score of results of the control group: abundance (t=0,163, p<0,872) and particularity (t=-1,269, p<0,212).

Indicators	Control group		Experimental group		t	p
	V	SN	V	SN		
Abundance	8.13	0.78	8.1	0.92	0.163	0.872
Originality	13.49	1.38	15.01	1.62	-5.533	0.001
Particularity	5.97	0.75	6.51	0.89	-2.719	0.01
Flexibility	39.72	4.02	40.65	2.85	-1.269	0.212

Table 6. The average score of indicators of creative thinking (Torrance, TTCT, 1974) of the second research (after educational experiment) in experimental and control groups.

The generalized results of the research demonstrate that the average score of indicators of the experimental group obtained during the initial research did not differ significantly from the average score of indicators of the control group in all the four grids: abundance, originality, flexibility and particularity. This proves that before the educational experiment the experimental and control groups when carrying out TTCT tasks were nearly of the same creative thinking. Statistical data analysis revealed that the average score of results of visual and verbal parts of the control group obtained during the second research when compared to the initial data did not differ significantly. However, positive changes in creative thinking were identified in the experimental group: the average score of indicators obtained after the educational experiment were significantly higher when compared to the initial results obtained during the first research (before educational experiment) in the grids of originality, particularity and flexibility in visual part, whereas abundance and originality in verbal part. It was found out that the average score of results of the experimental group during the educational experiment did not change significantly with regard to abundance in visual part and flexibility in verbal part. After performing the comparative analysis of the data obtained during the second research of the experimental and control groups the average score of results were significantly higher in the experimental group (educational impact was applied) when compared to the control group (educational impact was not applied) in the grids of originality and flexibility, whereas the average score of indicators in the grids of abundance and particularity obtained during the second research did not differ significantly in both groups.

Considering the research results, it should be noted that the educational experiment during which creative skills of the experimental group were developed and improved through providing tasks prepared under a special programme when considering the contents, applying various (innovative, active) teaching/learning methods and techniques and establishing a favourable environment had an impact on positive changes in creative thinking. However, it is possible only hypothetically to forecast the development of creativity of students who were provided with those activities. Therefore, in order to identify the durability of educational impact, it would be appropriate to carry out a longitudinal research and investigate for how long the students will be applying creative skills and abilities obtained during the educational tasks, problem solving activities and dealing with problem situations. Furthermore, it should be considered that the development of students' creative thinking must be in tune with a regular and purposeful development of creativity when integrating creative tasks into the study process and applying active teaching/learning methods. Therefore, the development of creative powers requires a purposeful and regular training rather than episodic one.

Conclusions

1. On the basis of analysis of scientific literature it should be stated that creativity development is a maximum development and improvement of potential skills of a person when creating favourable conditions for creative processes, establishing interpersonal relations based on trust, tolerance and respect and applying teaching methods and techniques that stimulate and maintain interests and inquisitiveness and encourage students to carry out researches as well as inspire them to search for various possible solutions.
2. It was found out that during the first research the creative thinking indicators of the experimental and control groups in the grids of abundance, originality, flexibility and particularity were insignificant.
3. As it is evident from the research results, the grids of abundance, originality, particularity and flexibility of visual part of the control group and the grids of abundance, originality, particularity and flexibility of verbal part did not differ significantly when compared to the second research results.
4. After the educational experiment performance the average score of results in the grids of originality, particularity and flexibility of visual part and the grids of abundance and originality of verbal part of the experimental group students were significantly higher compared to the initial research results.
5. The results in the grids of originality and flexibility of creative thinking of the experiment group students obtained during the second research were significantly higher when compared to the second research results of the control group students, whereas the average score in the grids of abundance and particularity of the second research did not differ significantly in both groups.

Recommendations

When training specialists for professional work and seeking to develop creative powers of students it is recommended:

- In the course of the study process it is recommended to foster the students' creative thinking development/self-development when involving students into various activities, project work, problem solving tasks, etc., that are aimed at developing the students' creative imagination as well as their divergent, analytical and critical thinking.
- Developers of the study process (andragogues) should be provided with professional development courses, which would deepen their knowledge in the areas of creative thinking development and also introduced to active teaching/learning methods and their application in the study process.
- It is highly recommended to integrate creative thinking into the programmes of separate study subjects, to provide intuition and imagination nurturing tasks and exercises, to involve students into the projects that develop creativity and encourage them to apply unconventional problem solving techniques and methods.
- In order to develop a creative personality it is recommended to establish a favourable environment and conditions for creative processes, to develop students' intrinsic motivation, to consider creativity as a value, to encourage independent creation and discovering new and unconventional solutions to problems, to provide students with creativity tasks, to develop students' self-expression and involve students into interesting and appealing creative activities.

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