

Creativity and Need for Cognition in Students of Pedagogy

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Abstract

The aim of this research was to evaluate the relationship between the level of creative thinking in pedagogy students and their internal need to learn about the world and themselves. A quantitative research strategy was employed. The research sample numbered 250 participants. The questionnaire Need For Cognition Scale – NCS was used to measure the need for cognition (NFC). The Test for Creative Thinking, Drawing Production – TCT-DP, test sheets A and B were used to measure creativity. The results of the research revealed the existence of relationships between creativity and the need for cognition in pedagogy students. The analysis enabled an outline of the directions in which university education might develop in order to foster students' need for cognition as a precondition for creative activity. Finally, the study delineated the limitations and perspectives for future research.

Keywords: individual differences, creativity, need for cognition.

Креативность и познавательные потребности будущих педагогов

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Аннотация

Цель данного исследования заключалась в том, чтобы в среде студентов педагогических специальностей установить и проанализировать взаимосвязь между уровнем творческого мышления и уровнем их внутренней потребности познавать мир и самих себя. Выборка состояла

из 250 участников. В ходе исследования были применены количественные методы анализа данных. Для замера познавательных потребностей участников исследования был использован опросник NCS («Опросник познавательных потребностей»). Для замера креативности – разделы А и В теста ТСТ-DP («Тест на творческое мышление»). Результаты исследования показывают, что у студентов педагогических специальностей существует связь между креативностью и познавательными потребностями. Этот вывод потребовал определить пути развития у студентов познавательных потребностей с целью создания условий для творческой деятельности. Статья также указывает на ограничения данного исследования и перспективы дальнейшей работы.

Ключевые слова: индивидуальные различия, креативность, познавательные потребности.

Introduction

Living in a knowledge society, we are aware that creative activity in all its dimensions is not merely a need, but perhaps a necessity. The ever-present transformations in various spheres of life demand that we develop an attitude of thoughtfulness and focus on constant development (Wang, 2014). A creative attitude towards everyday matters becomes an important and useful value and skill demanded of schoolchildren, employees, students and teachers. Therefore, education must aim to prepare future generations to meet the challenges posed by the economy and the society of today. This demands that students must develop the ability to engage in independent activities involving creative thinking (Craft, 2006; Sternberg & Lubart, 1999a, 1999b). Assuming that we consider equipping children for living in the new millennium as one of our tasks, we must teach them original, critical and constructive thinking (Fisher & Williams, 2012). Educators should not merely equip schoolchildren with knowledge; they must also help them develop the ability to take advantage of any information available, to correctly design paths towards achieving goals, to adapt to the ever-changing world, and to embrace good values (Sternberg, 2001). What matters here is not only the ability to think and act in a creative manner but also, more importantly, the ability to think about the said process in a productive manner, to draw educational conclusions and to implement them in the future (Karwowski, Gralewski, Lebuda, & Wiśniewska, 2007; Sternberg, Reznitskaya, & Jarvin, 2007).

The skilful and conscious development of one's abilities is linked to intrinsic motivation and willingness to learn about the world and oneself. Fostering school children's cognitive curiosity about their social environment and themselves may help them approach the creative process in exactly the same way that they go about their daily activities. The need for cognition (NFC) (Cacioppo, Petty, & Morris, 1983) is a natural human tendency to engage in trying to solve problems demanding intellectual effort. Teachers play an important role in the process of strengthening this tendency. On the one hand, they can create environments which foster the development of children's creative thinking and their need to learn; on the other, they can encourage their students by setting an example, demonstrating their own attitude to life and values adopted, and their own need to know themselves.

The aim of this article is to present the results of studies into the connections between the level of creative thinking and need for cognition in students of pedagogy – future teachers and educators who, in their work, will aim to develop children's creativity.

Creativity as a personal characteristic – theoretical assumptions of the research

“Creativity” is a broad term which can be analyzed from the perspective of four paradigms. In its attributive dimension, we are dealing with “creativity” when the result of the act of creation is something new, useful and valuable in a given historical, cultural and political context (Kasof 1995; Runco & Jaeger, 2012; Sethy, 2009; Acar & Runco, 2014; Barbot, 2018, 2019; Tien, Chang & Kuo, 2019; Puryear, Kettler & Rinn, 2019;

Runco & Beghetto, 2019). The processual concept of creativity centres around the analysis of psychological, emotional and intellectual processes influencing the development of creative attitudes (Ma, 2009; Spendlove, 2007). Perceived in terms of its personological aspect, “creativity” focuses on the creative personality itself (Da Costa, Páez, Sanchez, Garaigordobil, & Gondim, 2015, Toh & Miller, 2016).

How creativity is defined in literature

As defined by Sternberg and Lubart (1991a, 1991b), acts of creativity produce outcomes which are new and valuable, and result from taking good decisions and risks. Within their concept, creativity comprises six resources: intelligence, knowledge, intellectual styles, personality, motivation, and environment (Zhang & Sternberg, 2011). Parashar and Pingle (2015) claim that creativity refers to the development of ideas about products, practices, services or procedures that are novel, original and potentially useful in different domain. It encompasses the process of generating new ideas which can further result in formulating a new solution to a problem, a new method or device. Creativity may be defined not only as a product or process, but also in terms of the characteristics of a person. In this latter sense, creativity is a feature of human personality, one that the person can develop and improve (Beghetto & Kaufman, 2007, James & Asmus, 2000; Nečka, 2012). According to Szmidt (2013) creativity, seen as a complex feature: for example ability of a human being to relatively frequently generate new and valuable creations (objects, ideas, methods of action).

The study presented in this article has its theoretical foundations in a perception, according to which, creativity is a set of features proving a person’s potential rather than serving as evidence of his/her achievement. The above definition fits in with the egalitarian approach, where everyone one can be creative, even if only to varying degrees.

The creative personality

Personality is defined as a set of individual characteristics which distinguish a person from other people (Nečka, 2012). Personality is a process, which involves the everyday ways of feeling, thinking, and acting of an individual. Nečka (2012) claims that creative personality comprises three sets of qualities: openness, independence and perseverance.

Openness to new experiences can manifest itself in the ease with which one assimilates new information and in one’s tolerance for ambiguity. Creative people can adapt to all new situations, using what they currently have (opportunities, resources and information) in a variety of ways so as to achieve their goals (Csikszentmihalyi, 1996). They are also nonconformists. Another frequently highlighted aspect of the creative personality is a sense of humour which helps creative thinking and action (Ghayas & Mailk, 2013). As indicated by research, positive emotional states can greatly influence the creative process (originality of thinking, fluidity and flexibility) (Baas, Roskes, Sligte, Nijstad, & De Dreu, 2013; Naylor, Kim & Pettijohn III, 2013; Spitzer, 2007). Creative people are also very persistent. They can defer gratification in favour of hard work, showing great commitment and ambition in pursuing their goals (Tokarz, 1985). Drawing on empirical research conducted in the field of creativity, the authors Baas et al. (2013) developed the Dual-Pathway to Creativity Model (DPCM), which identifies cognitive flexibility and cognitive persistence as two pathways to obtaining creative outcomes. The researchers claim that creative outcomes are generated thanks to the flexibility or persistence shown in the process of creation. Cognitive flexibility is defined as the “ease with which people can switch to a different approach or consider a different perspective” (Baas et al., 2013, p. 734). The process is connected to such cognitive skills as holistic processing of information and the ability to find connections between various categories, approaches and ideas. Flexibility facilitates

one's search for links between various relationships, fostering creativity and supporting the emergence of new ideas. Csikszentmihalyi (1996) writes that a creative person is able to take advantage of his/her own resources for working in a productive way, can work quietly, being highly concentrated and focused on his/her task, is able to combine a sense of humour with discipline and a sense of responsibility for the tasks undertaken, is proud of his/her own achievements and is, at the same time, humble, not guided by stereotypes, thinks independently, is passionate about his/her work, and the process of creativity in itself, provides him/her with much pleasure. Personality traits associated with creativity include self-esteem, independence, willingness to take risks, and flexibility of action. For example, behavioural flexibility and emotional variability as components of personality can be a source of creativity when they induce a person to think in new and original ways (James & Asmus 2000; Silvia, Christensen, & Cotter, 2016).

Need for cognition

The need for cognition is a tendency to engage in and enjoy situations which require cognitive effort (Cacioppo & Petty, 1982; Cacioppo et al., 1983, Cacioppo, Petty, & Kao, 1984; Lin & Wu, 2006; Sadowski & Gulgoz, 1996; Tuten & Bosnjak, 2001; Wood & Swait, 2002; Neigel, Behairy, Szalma, 2017; Aquino, Picconi, & Alparone, 2018; Grass, John, Strobel, 2018; Strobel, Behnke, Gärtner, & Strobel, 2019; Keller, Strobel, Wollschläger, Greiff, Martin, Vainikainen, & Preckel, 2019). The need for cognition is defined as a natural "tendency to process and analyze information in depth (...) A high level of need for cognition arises as a result of the development in an individual's sense of competence and satisfaction with his/her own skills resulting from repeated discoveries of effective solutions to cognitively demanding problems over an extended period of time (...) It is a desire to engage in intellectual activity and to draw pleasure from it (...) Individuals with a high level of need for cognition constantly use their intellect to strive for profound knowledge of the world" (Matusz, Traczyk, & Gąsiorowska, 2011, p. 115-116).

As claimed by Cacioppo and Petty (1982), individuals whose need for cognition is low avoid intellectual effort even though they are capable of it. Research indicates that the level of cognitive motivation shapes thinking and behaviour. The need for cognition is also linked to the development of identity. Individuals with high levels of NFC think about developing and exploring aspects of their identity more often than people with low levels of NFC (Njus & Johnson, 2008). There also exists a positive relationship between NFC and the social-cognitive style of identity. The latter is characterized by the ability to seek information in a skilful manner, elaborate, and use relevant information to make important decisions. A negative correlation has also been noted between the need for cognition and reluctance to face challenges and problems (Berzonsky & Sullivan 1992).

The role need for cognition in human development

The ability to elaborate plays an important role in academic education. The connection between elaboration and students' need for cognition and their school performance is statistically significant (students with a higher degree of cognitive need are better at learning) (Sadowski & Gulgoz, 1996). Students who have a higher NFC level are more motivated to make an intellectual effort at school, they are intrinsically motivated to learn, adopted more regulating strategies to organize learning (Al-Alwan, Ashraah, & Al-Nabrawi, 2013, p. 63). Finally, studies show that individuals with high levels of NFC are open to cognitive experience (Bye & Pushkar, 2009). Their attitude results from the tendency to acquire, organize, evaluate and synthesize information (Sadowski & Gulgoz, 1996). They tend to be curious, tolerant of diversity, willing to make a mental effort, and conscientious (Sadowski & Cogburn, 1997).

Connection between the need for cognition and creativity

Creativity can develop through cognitive persistence, consistent pursuit of specific outcomes, focusing attention on the task at hand and, finally, patient, thorough and often effort-consuming work which frequently requires significant effort and diligence (Baas et al., 2013; Bye & Pushkar, 2009). In the process of learning at school, factors determining the pupil's success are, among others, motivation, cognitive abilities, personality, a sense of self-worth and positive self-esteem. A positive relationship exists between the school achievements of pupils and their creativity (Gajda, 2016). Equally, intrinsic motivation contributes to a stronger relationship between creativity and school success among high school pupils, with fluency of thinking and elaboration having a significant effect on the results achieved. The interaction among motivation, creativity and school achievements (grades) is statistically significant (Gajda, 2016). Studies show the existence of a relationship between certain cognitive processes and creativity. Creativity is a multi-aspect category, which is why, depending on the field in which it is employed, it may require the activation of various cognitive abilities.

As we mentioned, creativity can be defined as a set of related and interdependent personal features, for example, openness, independence (Karwowski, 2010, 2015; Beghetto, 2016; Perry, Karpova, 2017; Kunat, 2018), or also as a process of generating new original and valuable ideas or solutions (Crompton, 1999). Research shows that there is statistical significance level of relationships between need for cognition and creativity in such aspects as quality, originality and elegance of problem solutions (Watts, Steele, Song, 2017, p. 26). These components are a feature of creative thinking and also creative personality.

The present study

The main objective of this study was to examine the relationship between the need for cognition and creative talents and their components in students of Pedagogy at the University of Białystok. It was hypothesized that there is a significant and positive relationship between the need for cognition and creative thinking. The research questions tackled in this study were as follows: 1) Is there a significant relationship between the need for cognition in university students and their creativity? 2) What is the level of the need for cognition and level of creativity in students – future teachers of early education? 3) Do the students in their first year of study for the degree of *magister* (second study cycle) show a higher level of creativity than students in their first year of study for the degree of *licencjat* (first study cycle)?

Participants

The participants of the present study included 250 Polish students of childhood education (235 females and 15 males). The students were in their first year of study towards the degree of *licencjat* (group A) and their first year of study for the degree of *magister* (group B) at the Faculty of Pedagogy, and had declared their choice to continue their education in preparation for the job of teachers in kindergartens and in grades I-III of elementary school¹. All first-year students took part in the study. Participation in the study was voluntary. The number of students in this two groups was similar. The average age of students participating in the study was 20.6. The average age of students in group A was 19.6, in group B it was 22.5. All the participants were adults and were over 18 years of age. The study lasted from October to December 2016.

¹ For the purpose of this research project its participants were also tested with research tools not discussed in this report. More information on the above can be obtained directly from the author.

*Instruments**Questionnaire: Need for Cognition*

In the study presented here we used the *Questionnaire of the Need for Cognition* (Matusz et al., 2011) which is an adaptation of the original *Need For Cognition Scale* (Cacioppo, Petty, 1982), measuring the tendency to derive pleasure from pursuing activities demanding various cognitive efforts. The questionnaire used was developed and verified by Matusz, Traczyk and Gašiorowska (2011) for the purpose of studying the need for cognition in a particular group of subjects – university students.

The questionnaire *Need for Cognition* is a tool which measures individual differences in the need for cognition (Hevey, Thomas, Pertl, Maher, Craig & Chuinneagain, 2012; Akpur, 2017; Georgiou & Kyza, 2017; Sağlam & Tunç 2018). The latter is seen from a statistical rather than a biological perspective (ie, as a probability or tendency). As the team attempted to generate test items they aimed to capture students' responses to a variety of situations necessitating cognitive effort. These included primarily the circumstances in which one can choose whether to collect information, analyze available arguments, generalize from past experience, and synthesize ideas into more general concepts.

The team developing the Polish version generated 36 test items which were subject to factor analysis with Varimax rotation method (KMO = 0.585), Bartlett's test for sphericity $\chi^2(1953) = 3243.9; p < 0.00$). The analysis of the scree plot suggested employing a univariate solution. The questionnaire's internal consistency measured with Cronbach's alpha was $\alpha = 0.892$, which testifies to the high homogeneity of the *Need for Cognition* scale. The hypothesised univariate solution was confirmed with confirmatory factor analysis. The research confirmed also the reliability and validity of the rating scale and high test-retest reliability (Matusz et al., 2011, pp. 113-128).

Test For Creative Thinking – Drawing Production (TCT-DP) test sheet A and B

A Polish adaptation of the test TCT-DP by Urban and Jellen (Matczak, Jaworowska, & Stańczak, 2000) was used to measure creative thinking. Urban's (1996) componential model of creativity provided the theoretical basis for the instrument. The latter considers not only divergent, quantitative aspects, but also aspects of quality, like content, "gestalt", composition, and elaboration, and other components emphasised in the relevant literature, like risk-taking, unconventionality, affection and humour. The test sheet features special figural elements designed to stimulate students to draw in a free, open and unspecified way. The students are asked to complete someone else's drawing in whatever way they wish – everything is allowed and correct. Students are given no more than 15 minutes for each drawing. Once the drawings are completed, the test sheets (A and B) are collected. The finished drawing is rated with points based on 14 evaluation criteria, which also represent the test construct. These are: continuity – any way a student uses the elements existing in the drawing; completion – each new element qualitatively added to the student's earlier continuation of the drawing; New elements – these are independent, new objects that appear in the drawing and do not involve continuation or complement; connections made with a line between the elements; connections made to produce a theme, i.e. the fact that the picture contains elements that are coherent with each other; the use of a small open box outside the frame; expanding the drawing outside the frame; perspective; humour and emotions; unconventional manipulation, i.e. non-standard use of the worksheet and abstract dimension of the drawing. The developers of the test believe that the fourteen key criteria cannot stand as single entities and a score on a single criterion says nothing about creativity. "Only as interacting factors do they together reflect a holistic concept of creative thought" (Urban, 2004, p. 390). Thus, only the total score for all criteria indicates the value of the creative product.

The reliability of the Polish adaptation is $\alpha = 0.75$ (Matczak, Jaworowska, & Stańczak, 2000) and in the current study, test reliability was even higher ($\alpha = 0.83$). There is also compelling evidence for the validity of the TCT-DP (Dollinger, Urban, & James, 2004; Urban, 2004).

Results

Need for cognition and creativity of students of pedagogy

For the purpose of studying the level of the need for cognition and the differences in the results of the above variable in pedagogy students, the descriptive statistics for the two groups compared have been presented separately (Table 1).

Table 1. Descriptive statistics of the participants' scores on need for cognition

Stage of education	N	Minimum	Maximum	Mean	SD
First cycle – Group A	162	69	176	123.42	20.24
Second cycle – Group B	88	46	180	131.11	20.18
Total (Group A and B)	250	46	180	126.13	21.22

The results of K-S test show that distribution of variance in both groups participating in the study is normal $N=250$ $z=0.050$, $p=0.200$ (first cycle students – group A – the value of the Kolmogorov–Smirnov statistic is 0.037 and $p=0.200$, while its value for group B is 0.076 and $p=0.200$ with Lilliefors test for normality). The study shows that students in their second cycle of study (for the degree of *magister*) show a much higher level of cognitive need than the students in their first year of study for the degree of *licencjat* (first study cycle).

The Student's *t*-test for unpaired samples showed that the level of cognitive need is indeed statistically higher in group B (participants studying for the degree of *magister*) than in group A (participants studying for the degree of *licencjat*): $F=0.432$; $p>.05$; $t(248)=-2.772$; $p<0.001$.

Table 2. Descriptive statistics of the participants' scores on creativity

Version of TCT-DP	Group of students	N	Min.	Max.	M	SD	Skewness	Kurtosis
Version A	First cycle	162	8	56	23.8	9.9	0.682	0.052
Version B	First cycle	162	7	54	23.7	10.7	0.533	-0.440
Total (A and B)	First cycle	162	15	104	47.4	18.3	0.647	0.164
Version A	Second cycle	88	9	57	32.3	10.4	0.198	-0.375
Version B	Second cycle	88	10	63	33.5	12.1	0.227	-0.572
Total (A and B)	Second cycle	88	20	113	65.7	20.5	0.196	-0.483
Version A	Total	250	8	57	26.8	10.9	0.473	-0.348
Version B	Total	250	7	63	27.1	12.1	0.465	-0.431
Total (A and B)	Total	250	15	113	53.8	21.0	0.497	-0.266

The data presented in Table 2 show that students in their second cycle of study exhibit a much higher level of creativity than students in their first cycle of study, both with regard to the scores obtained in the category of creativity with version A and in version B of the TCT-DP test.

The Student's *t*-test for unpaired samples indicated that the level of creativity in participants studying for the degree of *magister* (group B, students in their second cycle

of study) when tested with version A of TCT-DP is indeed statistically higher than in group A (participants studying for the degree of *licencjat*): Levene's test $F=0.155$; $p>0.05$; $t(248)=-6.313$; $p<0.001$. Similarly, the result for version B of the test was $F=1.582$; $p>0.05$; $t(248)=-6.568$, $p<0.001$ and, for the scores in both versions together, $F=1.226$, $p>0.05$; $t(248)=-7.254$, $p<0.001$. Factor analysis with Varimax rotation was performed to examine the structure of the TCT-DP test. The results of the Kaiser-Meyer-Olkin (KMO) test is 0.78, which is adequate. Bartlett's test for sphericity ($\chi^2=1374.349$; $df=91$; $p<0.001$). The amount of common variance ranges from 0.419 to 0.802. The explained variance is 57.61%.

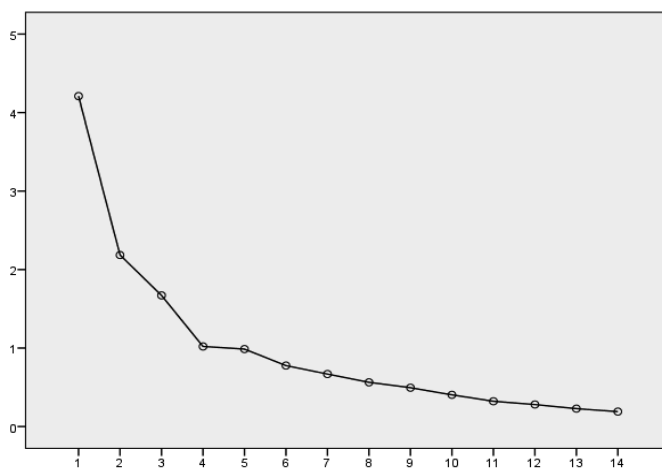


Figure 1: Scree plot for the TCT-DP test results

Factor analysis revealed three sub-scales of creativity: elaboration, fluency and non-conformity, originality

Table 3: The results of factor analysis for TCT-DP test

Criteria (Test TCT-DP)	Factors		
	1. Elaboration	2. Fluency and nonconformity	3. Originality
Connections made with a line	.862		
New elements	.840		
Connections made to produce a theme	.825		
Speed	.596		
Perspective	.557		
Humour and affectivity	.546		
Continuations		.873	
Boundary breaking (fragment – dependent)		.871	
Boundary breaking (fragment – independent)		.771	
Completions		.770	
Non-stereotypical use of a certain element			.826
Surreal or abstract drawings			.816

Note: The method of extracting factors – main components. Method of rotation – Varimax with Kaiser normalization; rotation of convergence reached in 4 iterations.

Data presenting a comparison of the scores obtained by students in their first and in their second cycle of study as regards the previously determined components of creativity are shown in Table 4.

Table 4. Descriptive statistics of the participants' scores for components of creativity

Version of TCT-DP	Group of students	N	Min.	Max.	M	SD	Skewness	Kurtosis
Elaboration	First cycle	162	0.0	57.0	20.59	14.48	0.394	-0.742
	Second cycle	88	3.0	58.0	32.44	12.42	-0.380	-0.372
	Total	250	0.0	58.0	24.77	14.88	0.053	-0.975
Fluency and nonconformity	First cycle	162	8.0	48.0	20.85	6.55	2.24	0.379
	Second cycle	88	14.0	48.0	26.10	10.52	1.257	-0.062
	Total	250	8.0	48.0	22.7	8.52	1.84	2.71
Originality	First cycle	162	0.0	12.0	4.69	3.58	0.753	-0.490
	Second cycle	88	0.0	12.0	4.18	2.64	0.549	0.034
	Total	250	0.0	12.0	4.51	3.28	0.784	-0.156

Comparisons of average results for the particular components of creativity obtained by the two groups of students in their first years of study at the Pedagogy Department in their first and their second cycle of study show that in the fields of elaboration and fluidity and nonconformism students in their second cycle of study obtained significantly higher and statistically more significant scores, while in the field of originality a higher score was obtained by students in their first cycle of study (Levene's test for elaboration $F=3.363$; $p=.000$; $t(248)=-6.484$; $p<.001$; for nonconformism $F=35.838$; $p=.000$; $t(248)=-4.855$, $p=.000$ and for originality $F=13.005$, $p=.000$; $t(248)=1.174$, $p=.242$).

Data used to evaluate the relationship between students' need for cognition and particular dimensions (components) of creativity are presented in Table 5.

Table 5. Investigating the relationship between creativity and the need for cognition among pedagogy students

Components of creativity	Need for cognition		
	Group A	Group B	Total
Elaboration	.197*	.135	.225**
Fluency and nonconformity	.127	.200	.201**
Originality	.125	.060	.089
Creativity – total	.221**	.203	-.159

Note: * $p<.05$; ** $p<.01$

The data in Table 5 indicate a positive, statistically significant relationship ($r=.221$) between the need for cognition and creativity in students in their first cycle of study. A similar relationship ($r=.203$), while statistically insignificant, was observed in participants studying for the degree of *magister*. Analysing the relationship between the need for cognition and particular components of creativity indicates only that there is a positive correlation between the need for cognition and the capacity to elaborate in the group of students in their first cycle of study. The correlation between the need for cognition and the particular dimensions of creativity is low and statistically insignificant. Data obtained from the entire study sample (students of pedagogy) show only the existence of a positive

correlation between the need for cognition and elaboration, as well as between the need for cognition and fluidity and nonconformism.

Conclusions

The results of the study indicate the existence of a positive, statistically significant relationship between the need for cognition and creativity in pedagogy students in their first cycle of study. A similar, though statistically insignificant relationship was noted in the scores obtained by students from the second group participating in the study, those studying for the degree of *magister*. For all students (both in their first and second cycle of study) we obtained a positive correlation between the need for cognition and capability for elaboration and between the need for cognition and the fluidity of creative thinking, as well as nonconformism. The correlation between other dimensions of creativity was revealed to be low and statistically insignificant. The results of the study partially overlap with the theoretical and empirical assumptions presented in this study (Watts, Steele, Song, 2017). When defined as a tendency to engage in intellectual effort, thorough processing and analysing of information, the need for cognition (Cacioppo & Petty, 1982; Cacioppo et al., 1983) is linked to elaboration, which, in turn, is a component of creative thinking. The latter consists of perfecting one's work and ideas, of carefulness and precision in executing one's work, and in thoroughly analysing problem situations, all of which is shown in the amount of work and effort involved in achieving the final result (Torrance, 1966). The study is also consistent with the theoretical assumptions of the Dual-Pathway to Creativity Model (DPCM). As claimed by the developers of DPCM (Baas et al., 2013), creative results can be obtained thanks to flexibility or perseverance in the creative process, which is in turn reflected in elaboration and the non-conformism of the creative individual. What the need for cognition and creativity have in common is the intellectual effort involved. The results of the study presented here are also relevant to the results of previous studies in the field of elaboration and need for cognition, which similarly showed a significant connection between the two (Berzonsky & Sullivan 1992; Sadowski & Gulgoz, 1996; Sadowski & Cogburn, 1997). The connection between the need for cognition and creativity among students at the Pedagogy Department demonstrated in the present study is also linked to non-conformism, a feature characterising individuals who do not rely on the opinions of other people, are thoughtful, and hold their own system of values. The study also provided evidence for the connection between the need for cognition and the fluidity of creative thinking, i.e. the capability for generating many new ideas – an especially desired feature in teachers of young children.

The need for cognition is significantly higher in the participants studying for the degree of *magister* than in those studying for their *licencjat*. Similarly, the study reveals a much higher level of creativity in the students who are on the verge of graduation. The participants studying for the degree of *magister* obtained much higher scores within the categories of such components of creativity as elaboration, fluidity of thinking and non-conformism. It is possible that the knowledge which students had gained at University, as well as their own effort to consciously develop their creative attitude, influenced the results of the study and resulted in significant differences between the two groups of students – those beginning and those ending their university education. Therefore, the research reveals that students need to prepare for the teaching profession within the framework of five-year university programmes awarding the degree of *magister* (one-cycle or two-cycle degrees). However, since kindergartens and elementary schools can employ graduates who have completed the first cycle of study alone (i.e. those awarded the degree of *licencjat*) to teach in early education, this need is not articulated within the now binding Bologna Process. James and Asmus (2000, p. 149) state that a “variety of cognitive skills have been

targeted as shaping creativity, such as problem-finding ability, information–organization tendencies, idea-generation skills, spatial ability, and communication skills”. Individual differences in divergent thinking may arise from the fact that in some areas (such as art, politics or social life) certain cognitive skills may be more relevant than in others (as in, for example, science or everyday life). The cognitive functions used vary depending on the type of the problem being solved and on the manner in which the issue is approached (James & Asmus, 2000).

The present study has some limitations that should be noted. First, the variable need for cognition was assessed with the declarative self-report methods. Need for cognition measured by questionnaire is a subjective, personality-related trait. It would be valuable to employ objective measures of need for cognition connected with cognitive functioning. Second, these studies could have been more interesting if we took into account the opinions of students. Interviews with students could show an interesting background for this research. Thirdly, this study can be considered as preliminary. Future research should consider a larger number of participants.

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