THE IMPACT OF COGNITIVE AND NON-COGNITIVE PERSONALITY TRAITS ON COMPUTER LITERACY LEVEL

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INTRODUCTION

Computer literacy in the current information age is no less significant as reading, writing and calculus were in the 19th-20th century. Like reading, computer literacy is increasingly widely addressed in research around the world as well as in Lithuania. However, despite some significant research contributions in the area, so far little attention has been given to the impact of personality traits on the computer literacy and its level. The lack of both empirical studies and theoretical works, which analyze computer literacy and psychological factors affecting its level at the higher institution, is evident. Mainly this article deals with the scientific problem related to the hypothetical presumption on the impact of cognitive and non-cognitive personality traits on the peculiarities of computer literacy in the system of higher education. The article deals with the study of students' computer literacy one of the objective being demonstration the impact of the personality traits (attention, verbal and non-verbal intelligence, emotional-motivational relationship with computer, learning strategies, computer stress, etc.) on the quality of computer literacy. The study was built on the following theoretical foundation - theoretical notions of the contemporary psychology on individual's cognitive and non-cognitive qualities as a prerequisite and a factor of education .rightly called by socialisation scholars the socialisation of socialisation or secondary socialisation, computer literacy becomes an essential precondition of successful socialisation and professional career. For this reason, education, being an important factor in society development, plays an essential role in addressing the issue of literacy and in particular the computer literacy.

Human's work becomes more and more associated with various technologies; professional practice and work's character are changing. A new type of interaction "*human – machine"* is being formed. Human acting in modern society is dependant upon behaviour of many technological systems (industry, traffic, communication, health, finance, etc.). Sociotechnical environment naturally becomes a part of human's entity. In the scientific world human's approach towards technology, the interaction "human-machine" becomes the object of *interdisciplinary research*. Psychology, investigating human's psychic work under different conditions, is one of cognition forms which can take the investigator of the interaction "human-machine" towards new discoveries. Cognitive, personality, social psychology together with education, sociology, technical sciences investigate ups and downs, attitudes, stereotypes, employees' computer motivation, etc. of computers' usage in various human's actions.

COMPUTER LITERACY AND PERSONALITY'S COGNITIVE TRAITS

The knowledge of personality's cognitive traits is necessary for effective process of education and diagnostics. Though interrelation of computer literacy and personality's cognitive traits is an essential issue, we must admit, that it has not been sufficiently investigated so far.

Often one of the cognitive factors – *the intelligence* – is associated with mathematical-computer abilities. Scientists have always been interested *if intelligence affects learning achievements*. Positive medium correlations between the results of learning evaluations and intelligence tests do not allow the investigators to state unambiguously that intelligence determines learning achievements. The relationship existing between intelligence and achievements is not linear. For instance, the research carried out in 1978 (the authors Л.Ф.Бурлачук and В.М.Блейхер) showed that among pupils with low learning achievements there were pupils of both high and low intelligence levels. The main reason of poor achievements of high intelligence pupils – the absence of learning motivation. However, pedagogical psychology has saved a number of empiric researches, indicating the relationships between intelligence and achievements. We must admit that verbal intelligence affects learning achievements more than non-verbal (according to Veksler). The analysis of the researches shows that: 1) *the level of verbal intelligence determines results of all the subjects, first of all – the humanities*; 2) *the level of dimensional intelligence determines the results of natural sciences and mathematics* (Дружинин, 2000).

General knowledge is considered to be an inseparable part of intelligence. *General knowledge* occupies an important part in the system of personality's cognitive traits. The basis of general knowledge – systemically ordered, generalized, semantically sensed information preserved in permanent memory and effectively renewed when necessary (Blinstrubas, 2002). Attempts to find any researches that could answer the question "*Does general knowledge affect person's computer literacy?*" were unsuccessful.

Attention occupies a special place among all cognitive processes. It can be described as a psychophysiological process characterizing the traits of dynamic cognitive activities. It is a conscious or non-conscious (half-conscious) process of selecting-ignoring information received through the sense organs (Дормашев, Романов, 1999; Немов, 1997). Therefore it is obvious that *attention is one of the most important cognitive processes of activities related to the work with computer*. Work cannot be

efficient and purposeful if a person does not concentrate his/her attention on it. Attention traits are partly inborn since a lot depends upon the rate of nervous processes. Attention can hardly be influenced by education process.

Although the success of human activities is determined by a number of variables an important position in the hierarchy of learning success is taken by a person's *learning strategies*. D.M.Smith and D.A.Colb (1996) state that a person's learning strategy defines how he/she behaves in various everyday situations; he/she learns more effectively, easily, and comfortably when his/her learning needs are generated by his/her learning experience. In other words, learning strategy outlines the way a person learns. For example, R. Dunn (1986) defines learning strategy as a way of perceiving and preserving information and abilities. Many authors (Gregorc 1979, Davidson et.al. 1992) emphasize that learning strategy is an obvious observed behaviour, which reveals how a person gets, processes and collects information.

Researches on computer usage confirm that *learning strategies* partially are a part of success. For example, R.P.Bostrom and others (1990) ascertain that while learning to work with a computer students of convergent learning style (Colb's taxonomy) achieve better results than students of other learning styles. G.V.Davidson and others (1992) also maintain that students who have certain *learning strategies* perform better than others.

The review of scientific literature (foreign and Lithuanian) obviously demonstrated *the lack of researches that reveal the relationships of computer literacy and personality's cognitive traits*. One of the reasons could be the issues of narrowness of the investigated theories.

COMPUTER LITERACY AND PERSONALITY'S NON-COGNITIVE TRAITS

It is universally known that achievements of the academic work depend upon many sociopsychological and socioeducational factors. Besides the analyzed cognitive factors, which are traditionally associated with academic achievements, in this perspective it is essential to analyze non-cognitive personality's traits and their place in the context of computer literacy.

Computer literacy investigations are mainly oriented towards consumers' attitudes regarding a computer (Thomas, James, 1996; Igbaria, Chakrabarti, 1990; Reece, Gable, 1982). Their content holds the analysis of *motivation, emotions, satisfaction, and interest*.

Attitude is an inner psychic state influencing behaviour. Therefore, we can understand an inner state from actions and words. For instance, we may presume that a person actively avoiding a computer has a negative attitude towards it. Attitude is not an inborn, instinct phenomenon; it mainly depends upon person's experience and its impact in a new situation. Consequently, attitudes are formed in the process of experience and their change is possible due to the internal and external factors.

Obviously the quality of computer literacy is closely related to one of the major attitude's components – *motivation*. If a student is absolutely motiveless to work with computer, the learning result will not be optimal. A motivated computer user, even under unfavourable conditions, willingly works with computer. In everyday conception the level of motivation usually is measured by such notions as "*time devoted to the work with computer*" or "*the degree of efforts*". Motivation approaches the pupil towards the object and increases his/her efforts in relation to the object (Keller, 1983). It is an inner process, the explanation of which demanded a lot of efforts from the scientists for many years (Schunk, 1991). Today the researchers are interested in how inner motivation affects achievements and behaviour of work with computer. Inner motivation is related to personality's dispositions: demands, interests, wishes, etc. In this way it helps to reveal pupil's inner interests (Astleitner, Keller, 1995; Keller, 1999). Inner motivation involves repetition of action which stimulates positive emotions. All mentioned types of inner motivation suit to define personality's satisfaction, enjoyment obtained by a successful computer usage.

It is a difficult task to determine what factors inspired motivation and demotivation, whether the circumstances were internal or external, steady or changeable, controlled or uncontrolled. Trying to avoid computer demotivation the researchers (Pancer, George, Gebotys, 1992; Hancock, 1995) suggest, that work with computer must be related with present or further pupil's demands. These demands can be fulfilled considering pupil's aims, clearly stating the use, adjusting degree of difficulty, etc.. Work with computer has to stimulate self-confidence, confidence in success what promote efforts and further successful, motivated work. Also the work with computer must give self satisfaction and preserve constant motivation. Students, meeting their expectations, have to realize the received use as fair, neutral, and permanent.

There exists an obvious relationship between *emotions* and *motivation*. For instance, students that have personal problems in their life may not have a motive to study computer subjects well, or performing various tasks they may have attention problems. Otherwise, students' positive feelings (enthusiasm, pleasure, satisfaction, etc.) help to do difficult tasks and achieve good academic results.

RESEARCH METHODOLOGY AND CHARACTERISTICS OF EMPIRICAL BASIS

The article deals with the study of students' computer literacy one of the **aims** being demonstration the impact of the psychological factors (attention, verbal and non-verbal intelligence, emotional-motivational relationship with computer, learning strategies, computer stress, etc.) on the quality of computer literacy.

Empirical basis of the research. The empirical-experimental part of the present study is based on the series of diagnostic studies with the total number of 1004 surveyed students. They represented 4 Lithuanian universities (Kaunas University of Technology, Siauliai University, Klaipeda University, and Vilnius Gediminas Technical University) and 5 high schools and

colleges. 84.7% of the sample were university students, 15.3% - students from high schools and colleges. The major portion of the sample – 73.1% (N=733) consisted of students from management and economics study programmes. The rest of the respondents (22.9%, N=271) included students from other areas: education, philology, informatics, physics, mathematics, technical, agricultural and health sciences. The study was based on voluntary participation and anonymity.

Study instruments. A test (theoretical and practical) on computer literacy (CL) and 2 anonymous closed type questionnaires "Student and computer" and "Student and studies", which comprised of a series of questions on computer literacy and studies, were designed. Study instruments (tests) designed by other researchers and practiced in research studies to study the respondents' attention, to rate their general intelligence (BIKT) and their knowledge of terminology (BITT) and to measure their verbal and non-verbal intelligence were used (Saparniene, 2002; Saparniene, Merkys, 2004; Saparniene et al., 2005).

The psychometric characteristics of the study variables designed and discussed in the article.

1) ***Computer literacy test***. Using the method of expert analysis a two-part computer literacy test was designed. 19 theoretical questions with the aim to assess the respondents' general knowledge of computers were included into the first part of the test. The second part of the test was composed of 24 practical tasks to assess the respondents' competence to use practically the applied software. For every step in the test percentage frequency was calculated and the parameters for central tendencies were selected: average, standard error and standard deviation (Table 2). Standard reliability rates to measure computer literacy are presented in Table 1. The rates presented in the table evidence that the scale constructed to measure computer literacy is fairly reliable (Bortz, 1993; Anastasi, Urbina, 2001; Merkys, 1999).

Table 1

Reliability Indices of the Computer Literacy Test Scale

	Cronbach coefficient	*Gutman Split - half* coefficient	*Spearman Brown* coefficient
Theoretical part of the test	0.73	0.72	0.72
Practical part of the test	0.90	0.84	0.85

Table 2

Parameters of the Computer Literacy Test Scale

	Scale average	Standard error	Standard deviation
Theoretical part of the test	9.7 (maximum 19)	0.26	3.4
Practical part of the test	25.4 (maximum 48)	0.69	9.4

2) ***Scale of emotional-motivational relationship with a computer***. The statements of the scale indicating emotional-motivational relationship with a computer were selected intuitively, by means of qualitative analysis and later were verified empirically. Factor analysis was used to validate the psychometric applicability of the stimulus material on the initial emotional-motivational scale and to construct sub-scales. By this method 5 factors (sub-scales) were singled out and named: "*Computer as a hobby and an object of admiration"*, "*Computer as a source of fatigue, stress and dissatisfaction",* "*Indifference to a computer", "Dissociation from computer enthusiasts and fanatics"* and *"Computer as a factor of improvement and education"*.

Rather high correlations of the ratings of the statements and the extracted factors were obtained. The fluctuation limits of the correlation coefficient meaning $0.41 \leq r \leq 0.79$ were obtained. Factor descriptive variation ranges from 16% to 8% (the total explained variation is 53.1%). *Kaiser-Meyer-Olkin* (KMO) coefficient, which is comparatively high in this scale (0.92), explains the extent the matrix is applicable for factor analysis. Inner consistency of single factors, expressed by *Cronbach alpha* coefficient, ranges from 0.59 to 0.83, furthermore, all 5 factors are quite homogeneous. Inner consistency of the combined scale is rather high (0.69). Thus, the scale parameters presented on the whole meet the methodological norm of construct reliability and factor validity.

Attention should be paid to meaningful classification of categories within a factor. It is evident that factor 1 and factor 5 reflect positive attitudes toward computer, factor 2 and factor 4 – negative attitudes toward computer and factor 3 – indifference to the computer dimension. Thus, the factors contain variables representing fairly homogeneous dimensions.

The subscale "*Computer as a hobby and an object of admiration"* (15.9% variation) comprises sentences reflecting attitudes of computer fanatics. This factor includes such statements as "My most important hobby is computer", "Living without a computer for me is the same as living without air", "If anybody deprived me of the possibility to use a computer, my life would become humdrum" etc., which clearly show that factor 1 represents great emotional-motivational satisfaction from the work with a computer. Thus the work with a computer, computer competence are compared to success in life, life experience.

The subscales "*Computer as a source of fatigue, stress and dissatisfaction"* (11.5% variation) and *"Dissociation from computer enthusiasts and fanatics"* (8.1% variation) involve statements reflecting negative attitudes toward computer. Here emotional dissatisfaction is revealed by such statements as "If I were able, I would "run away" from the computer, but the situation is such that I must start studying this subject", "While working with a computer I constantly feel trouble, get irritated", "Computer and me are two opposites", "Computer causes me continual stresses" etc. Meanwhile the statements "I feel bored in

the company of the delighted by computers" and "I find computer fanatics strange" illustrate dissociation from the delighted by computers.

"Indifference to the computer" factor (10% variation) consists of the statements representing absolute indifference towards computers by the respondents. The statements falling into this subscale are as follows: "I am indifferent enough to the computer", "I can do without a computer in my life", " A computer for me is just a tool to perform my work".

All the statements of subscale 5 "*Computer as a factor of improvement and education"* (8 % variation) display a positive attitude toward computer technologies and deep perception of its influence on the success in life.

3) ***Test on learning strategies (or learning ways and habits).*** The test consists of 81 statements, which reveal various learning aspects and learning factors starting from special logic and psychological learning techniques and tactics concluding with the management of learning time, learning ergonomics, etc. The psychometric validity of the scale was evaluated by factorial analysis using the method of Principal Components and VARIMAX rotation. 19 factors were extracted during primary factorial analysis; secondary factorial analysis multiplexed the statements to the model of 6 factors (which explains 55,7% of dispersion of the variables). Factorial analysis (especially secondary factorial analysis) presented a rather significant link of the majority of statements with the factors; their inside grouping is theoretically significant. It should be noted that a rather high correlation of the statements estimation with extracted factors was obtained. It is evidenced by the limits of the meaning variation of the correlation coefficient ($0{,}52 \le r \le 0{,}88$). The descriptive power (dispersion) of the factors ranges from 15,8% to 10,7%. Kaiser-Meyer-Olkin (KMO) coefficient, which in this case is 0,80, shows to what extent the matrix is valid for the factorial analysis. Inner consistence of the factors, evaluated by Cronbach alpha coefficient, remains above the limit of 0,5, therefore, all five factors are homogeneous enough.

The first factor, explaining 15,8% of the dispersion of all the variables, combined the statements on structured, methodological activities: intended planning of learning time, learning the exactly marked amount of material, planning the succession of the learning material, usage of schemes, marks, summaries, etc.

The second factor, explaining 15% of the dispersion, combined the statements on reflectivity: attempt to relate new material, conceptions and theories with the old ones and experience, comparison of various theories and conceptions, search for alternatives, critical evaluation of the studied material, etc.

The third factor combined the statements on interactive learning in a group (dispersion – 13,4%), the fourth factor – learning ergonomics (dispersion – 10,7%).

In the secondary factorial analysis the factors shortage of advertence and orientation to learn by heart (mnemonic learning) formed individual cases.

4) ***Attention test***. Respondents were given a reliable, economic, rather effective, standardized test "Sulte's tables", which helped quickly and reliably to measure respondents' attention traits. The investigated person cannot imitate better attention that it really is (as it could be done in tests – questionnaires). Attention is estimated according to the pace of performance. The psychometric test's characteristics are presented in table 3. The shortest pace of performance – 17 seconds, the longest – 69 seconds. The average pace of performing one test's task (table) – 28,4 seconds.

Table 3

Psychometric characteristics of attention test

Coefficient Cronbach α	*KMO*	*Total explained variation*
0,85	0,88	63,5%

5) ***General knowledge's tests (curricular and terminological)***. These tests are created by PhD of Social Sciences A.Blinstrubas (2002). The validation scope of both tests consists of 3287 respondents from 16 to 40 years. The curricular test consists of 115 tasks (test's steps), measuring respondents' knowledge in various spheres (mathematics, physics and astronomy, chemistry, biology, geography, literature, history, music, art and architecture, antique mythology and Christianity). Inner compatibility indexes of the general knowledge curricular test are impressively high, considering a great variety of the questions' content.

Inner compatibility indexes of the terminological test (105 tests' steps) the basis of which – international terms of science and culture not included in the comprehensive school's syllabus – are very high as well: *Cronbach* $\alpha = 0{,}98$, *Gutman Split – half* coefficient 0,93.

Despite different content of the tests and different formation principles of the tasks' base a very strong and statistically significant relationship ($r=0{,}84$, $p<0{,}001$) has been set between these two general knowledge tests. This fact indicates that on the whole both tests measure one and the same construct – general knowledge – revealing its diverse aspects. That means – general knowledge, received at school during assimilation of curriculum and cultural "luggage" that a young person takes from the family or other social surroundings by courtesy of the natural, non-institutional acquisition. For example, through the fiction, popular literature, art, mass media, and active relationship with social and cultural surroundings.

6) ***Verbal and nonverbal intelligence tests***. Shortened operating versions[1] of two intelligence tests regarded as classical in the sphere of psychopedagogical researches were used in the research. Here we have in mind the components of "psychometric intelligence" – verbal intelligence (source: "*Kognitiver Fähigkeists – Test KFT (4-13+) von K.Heller, A.-K.Gaedike und H.Weinläder*") and nonverbal intelligence (source: "*RAVEN-Matrizen-Test/ Advanced Progressive Matrices von J.C.Raven, J.Court and J.Raven Jr.*").

In the psychological diagnostics J. Raven's test *Progressive Matrices* is assigned to measure the level of general intelligence development. This is so called *Culture Fair Test* – culture-free test. The basis of the test is formed by *gestalt* theory and Spearman's intelligence theory. Psychometry sometimes postulates that the mentioned "*culture-free*" tests and Raven's test measure the so called nature rather than cultural intelligence. The authors point that test's validity varies in the range of 0,70-0,89 (Дружинин, 2000). In the scope of our research the analogous coefficient reached a rather high point *Cronbach* $\alpha = 0{,}86$.

Another used test – *KFT* – is a typical cognitive abilities' test, the background of which goes to the intelligence tests created by the scholar of psychological and educational researches – L.L. Thurstone. Specifically we used the German version of the test, which was adapted in the population of Germany's pupils, involving the forms from the 4th to the last gymnasium form i.e. 13th form. As a result the test's title is *KFT 4-13*. Only one subscale – *verbal intelligence* subscale – has been taken from this test. Using experimental experience, 29 tasks, that seemed the most acceptable to the Lithuanian cultural conditions, have been selected from the tasks assigned to the 12th -13th forms. In the psychological diagnostics the verbal intelligence scales are used to measure the component of person's intelligence acquired in the course of lifetime interacting with cultural surroundings. This psychometric postulate is grounded by the fact that people's language, text material, communication first of all are the subjects of culture.

In the scope of this research the inner consistence of verbal intelligence test was not as high as it was in the case of nonverbal intelligence, though conditionally it was high and acceptable: *Cronbach* $\alpha = 0{,}68$.

RESEARCH RESULTS

Interrelation of diagnostic variables. In order to determine interrelation of diagnostic variables correlation analysis was used i.e. Pearson's correlation coefficient calculated. The value of correlation coefficients defining the highest and statistically the most significant interrelations of diagnostic variables is presented in table 4.

From the psychological constructs analysed in this research students' computer literacy is conditionally the most strongly related to the respondents' *emotional – motivational relationship* with computer. The valuation of all five subscales of emotional-motivational relationship statistically reliably ($p<0{,}001$) correlate with both subscales of computer literacy, reach an average valuation $r=|0{,}30|$, and range from $r_{min} = |0{,}24|$ to $r_{max} = |0{,}37|$. Conditionally the strongest emotional-motivational subject of computer literacy ($r = -0{,}37$, $p<0{,}001$) is the attitude towards the computer as "*a source of fatigue, stress and dissatisfaction*". The stronger is this attitude expressed the lower computer literacy is. And vice versa – *distressed and giving satisfaction work with computer provides better level of computer literacy*.

Table 4

Correlation between Computer Literacy (CL) and Psychological Variables

Sig. *** <= 0,01		CL test	Theoretical part of the CL test	Practical part of the CL test	Emotional – motivational relationship with computer: Computer as a hobby, an object of admiration	Emotional – motivational relationship with computer: Computer as a source of fatigue, stress and dissatisfaction	Emotional – motivational relationship with computer: Indifference to computer	Attention test	General knowledge (curricular) test	Verbal intelligence test	Nonverbal intelligence test	General knowledge (terminological) test
Computer literacy (CL)	CL test	1	0,81 ***	0,98 ***	0,26 ***	0,28 ***	0,24 ***	-0,32 ***	-0,08	0,28 ***	0,23 ***	0,15
	Theoretical part of the CL test		1	0,67 ***	0,36 ***	-0,37 ***	-0,32 ***	-0,24 ***	0,04	0,28 ***	0,20 ***	0,26 ***
	Practical part of the CL test			1	0,29 ***	-0,32 ***	-0,27 ***	-0,32 ***	-0,11	0,25 ***	0,23 ***	0,10

[1] More about the shortened test versions' usage, essence and validity in academic researches refer to G. Merkys (1999).

The hypothesis that computer literacy is related to personality's cognitive traits – *verbal and nonverbal intelligence, attention, general knowledge* (*curricular and terminological*) – has been checked. The accomplished data analysis only partially verified this hypothesis. It has been set that there exists a statistically significant and of average intensity relationship between computer literacy and attention ($r = -0,32$, $p<0,01$)[2]. The hypothesis about statistically significant interrelation between computer literacy and general knowledge was not verified. The research revealed that computer literacy is not basically related to respondents' general knowledge (terminological test – $r = 0,15$; curricular test – $r = -0,08$).

It should be noted that students make a specific population. From the practice of researches it is known that 1)students' intelligence is usually higher than average; 2) a positive emotional-motivational relationship with computer dominates among students and 3) students' computer literacy is higher than the one of mass residents' population. Students, in regard to correlating psychological educational constructs in such a way, form an "extreme" population in which the decreased coefficients are likely to appear (more details about this phenomenon can be found in the book "*Маркетинговые исследования*" by Г.А.Черчилль). It is possible to pose a hypothesis that correlating analogous constructs in the scope of mass residents' population we would get substantially higher coefficients of correlation. It follows that the role of affective and cognitive (intellectual, attention) factors in the ontogenesis of computer literacy and education should not be diluted, despite in principle not very high correlation's coefficients set by our research.

Theoretically meaningful statistical relationships have been recorded in the analyzed correlation matrixes among the studied diagnostic variables in this research. In addition, it was purposeful to analyze statistical relationships between *the components of computer literacy* and *psychological variables* using *Multiple Regression Analysis*. The best clarity parameters of *Model Fit* were achieved when computer literacy was defined as a dependent variable and 5 cognitive traits (table 5) as well as 8 non-cognitive ones (table 6) were defined as independent variables.

Table 5

The influence of personality's cognitive traits on computer literacy
(The model of multidimensional linear regression, a typical SPSS program's tile)

Dependent variable: Computer literacy Set correlation coefficient R = 0,55, determination coefficient r^2 =0,30				
	DF	Squares' sum		
Regression's residual value	5 43	14,00 32,80		
F=3,66	Importance F = 0,008			
Cognitive variables		Standardized coefficients β	t	Significance
Nonverbal intelligence		0,175	1,230	0,225
Verbal intelligence		0,324	2,051	0,046
General knowledge (curricular)		-0,571	-2,395	0,021
General knowledge (terminological)		0,342	1,493	0,143
Attention		-0,390	-2,966	0,005

Table 6

The influence of personality's non-cognitive traits on computer literacy
(The model of multidimensional linear regression, a typical SPSS program's tile)

Dependent variable: computer literacy Set correlation coefficient R = 0,56, determination coefficient r^2 =0,32				
	DF	Squares' sum		
Regression's residual value	8 133	47,77 100,75		
F=7,88	Importance F = 0,000			
Non-cognitive variables		Standardized coefficients β	t	Significance
Computer as a hobby, an object of admiration		-0,008	-0,076	0,939
Computer as a source of fatigue, stress and dissatisfaction		-0,249	-2,470	0,015
Indifference to computer		-0,162	-1,527	0,129

[2] In this case a negative correlation coefficient received due to evaluation of attention test according to the time pace, i.e. the longer the test was done the lower attention was.

Dissociation from computer enthusiasts and fanatics	-0,006	-0,073	0,942
Computer – as a subject of development and education	-0,150	-1,604	0,111
The importance of knowledge about computer literacy elements	-0,163	-2,102	0,037
Auto-conception in the sphere of computer literacy	0,427	4,757	0,000
Development interests in computer literacy	0,076	0,877	0,382

The results of regression analysis between the *dependent* variable – *computer literacy* and *independent* variables – *personality's cognitive traits* proved that on the whole personality's cognitive traits are the subject that clarifies computer literacy. As the meanings of standardized β coefficients show in our case computer literacy is influenced by respondents' *attention* (β=-0,39, p=0,005) and *verbal intelligence* (β=0,32, p=0,05). This results is a significant conclusion for education practice. Appealing to common sense, usually work with computer (especially for those who are not good at it) seems as a very intellectual activity demanding much psychological tension and abilities. The data of this research denies this myth rather than approves it. We can reasonably make an assumption that *personality's cognitive traits in some measure really influence computer literacy although they are not a fatal (everything determining) factor*. Consequently, a normal, ordinary student, without any extraordinary abilities can successfully become a qualified user of computer and information technologies. It is worth paying attention to the values of determination's coefficient (tables 5, table 6). The cognitive factors explain this parameter of literacy by 30%. It is symptomatic that non-cognitive personality's traits influence computer literacy by a very similar scope, the values of determination's coefficient practically do not differ r^2_{cogn} = 0,30 and respectively $r^2_{non\text{-}cogn}$= 0,32.

CONCLUSIONS

The research on the students' computer literacy showed that ***personality's cognitive and non-cognitive traits in some measure really influence computer literacy although they are not a fatal (everything determining) factor.*** Consequently, a normal, ordinary student, without any extraordinary abilities can successfully become a qualified user of computer and information technologies.

Out of psychological constructs analysed in this study, students' computer literacy is relatively most strongly affected by the *emotional-motivational relationship with computer*. The relatively strongest emotional-motivational predictor of the computer literacy is attitude towards computer as a 'source of fatigue, stress and dissatisfaction'. The stronger this attitude the more probable is lower computer literacy, and vice versa, the higher level of computer literacy is caused by stress-free computer work that leads to satisfaction.

It has been determined that there exists close to medium strong and statistically significant relationship between the computer literacy and *attention*, while *intelligence* has a somewhat weaker relationship with computer literacy. The present stage of the study has not provided sufficient information for evaluating the impact of the *comprehension knowledge* on computer literacy. In this respect, the research data are contradictory and call for more in-depth research. However, already at this stage, a hypothesis can be formulated that high level of comprehension knowledge does not necessarily imply high computer literacy. More likely is a slightly different model of the relationship between these variables: very high computer literacy can be related to medium or even slightly lower than medium level of comprehension knowledge, and vice versa, very high level of comprehension knowledge can be related to only medium level of computer literacy. Obviously, further more in-depth research is necessary to confirm this hypothesis.

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