

9th ICEEPSY 2018
**International Conference on Education and Educational
Psychology**

**TYOLOGY OF CZECH AND POLISH GRAMMAR SCHOOL
STUDENTS BY COMPUTER GAME ADDICTION**

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Abstract

The paper describes the results of an international comparative research on the degree of computer game addiction among 18-year-old Czech grammar school students and Polish lycée students. For the purposes of the research a quantitative research strategy was used. The author developed a questionnaire to identify the degree of addictive behaviour in students in relation to computer games. The research sample comprised 525 Czech and 122 Polish students from 13 randomly selected grammar schools/lycées. The research was carried out in 2016 in the Czech Republic and followed by a comparative study in Poland in 2017. The aim of the subsequent statistical analysis was to identify groups of 18-year-old students by their addictive behaviour and perform an international comparison. The following methods were used: globalized cluster analysis, U-test, ANOVA analysis of variance. For the purposes of nominal data analysis the chi-squared test of independence was used. The degree of addictive behaviour was expressed as addiction score (0-60). A comparison of the degree of addiction revealed statistically significant differences between students from the two countries (score of 11.52 in CZ and 14.05 in PL). Polish students, unlike Czech students, were classified into two groups by addictive behaviour. The first group (approximately 30%) showed a higher degree of addictive behaviour, played PC games for a longer time per day, preferred online games, comprised mostly boys, played more often in classes and stayed up late more often. The group of Czech students was classified into three groups with different characteristics.

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Keywords: Grammar school students, computer game addiction, typology, globalized cluster analysis.



1. Introduction

A large proportion of especially young people cannot imagine their life without information and communication technologies (Van Dijk, 2005; Zounek et al., 2016). Information and communication technologies also frequently represent a source of entertainment. From an early age, children play on the computer, tablet or mobile phone (Entertainment Software Association, 2015), and this innocent play (parents often believe this is a development supporting activity) may gradually change into a form of addiction.

According to the APA (2013), clinical computer game addiction means that an individual meets five or more of the following symptoms in the course of a single year:

- Pre-occupation (thinking about previous or next playing computer games becomes a dominant activity in life).
- Withdrawal symptoms when gaming is inaccessible (typical symptoms include irritation, anxiety, stress or sadness, but there are no physical addiction symptoms).
- Tolerance; an individual requires an increased amount of time for playing.
- Repeated unsuccessful effort to control or stop playing computer games.
- Loss of previous interests and hobbies, free time is devoted to computer games.
- Continued playing computer games despite knowing the related psychosocial problems.
- Deceiving the surroundings (family, friends) about the extent of playing computer games.
- Playing computer games is a means of escaping from problems or relieving negative moods (feelings of helplessness, guilt, anxiety or depression).
- Risk or loss of close relationships, job, education or career opportunities as a result of playing computer games.

The development of the addictive behaviour questionnaire was based on these typical risk symptoms

2. Problem Statement

However, existing research activities aimed at pathological adolescents' addiction to gaming (including on-line games) and social networks (Kopecký, 2013) do not deal with the negative impact of these on-line activities on the course of the educational process. Teachers do not often notice these activities of their students in classes or think that they are unimportant. In the teaching process, teachers seldom use computer-based didactic games (Stoffová, 2016a, 2016b; Czakóová, 2016) which can motivate and increase learner engagement in their studies. Hence, the so called 'addiction' can be transformed into educational outcomes if properly planned and integrated into the curriculum.

3. Research Questions

The basic research question formulated in the framework of the present comparative research study asks about the degree of addictive behaviour in grammar school students in relation to computer games in Czech Republic and Poland. The next question focuses on whether there are typical groups of 18-year-old grammar school students by their attitude to computer games and by their degree of addictive behaviour.

Does playing computer games differ between Czech and Polish students? Do grammar school students play didactic computer games? The author of the present study also examined whether addictive behaviour in terms of playing games was dependent on gender and whether these expected differences were identical in both countries.

4. Purpose of the Study

The objective of the research study was to determine the degree of addictive behaviour in relation to playing computer games in Czech and Polish 18-year-old grammar school students.

Another objective of the research was based on an analysis of responses of grammar school students, to hypothetically divide these students into characteristic groups according to the degree of their addictive behaviour in relation to playing computer games. On the basis of previous research studies (Chráska jr, 2016a, 2016b), the authors investigated whether Polish grammar school students had identical opinions about playing computer games with Czech students.

On the basis of theoretical knowledge, however, it was impossible to determine how many groups of students should be identified. Therefore, it was decided to determine the number of typical groups of students according to the Generalized Cluster Analysis, which can positively quantify the number of groups in the research sample.

5. Research Methods

5.1. Research instrument

For the purposes of the research the authors used a yet semi-standardized questionnaire (Chráska sr, 2016), which was based on a questionnaire used in 2015 (Basler, 2016; Chráska jr. & Basler, 2016). For the purposes of an IGA project aimed at the issue of student addiction to computer games in a wider context, in 2016 new items were added to the questionnaire. The purpose of the questions was to determine detailed characteristics of the types of students according to their addition to computer games. Apart from these characteristics, the questionnaire focused on the degree of addictive behaviour in relation to playing computer games by means of 12 statements. The degree of agreement with each statement was indicated by the students on a six point scale with coded answers: totally agree (value 5), agree (4), rather agree (3), rather disagree (2) disagree (1) completely disagree (0). Regarding the extent of the paper, Table 3 shows only selected questionnaire items (the questionnaire included a total of 34 items), which were further analysed by means of the Generalized Cluster Analysis. This analysis was performed using the STATISTICA 12 statistical package (StatSoft, 2013).

5.2. Description of the research sample

The research study was carried out in 10 randomly selected grammar schools in the Czech Republic in the Olomouc Region, Pardubice Region, Moravian-Silesian Region and Zlín Region in May 2016 (Chráska jr., 2016a, 2016b; Chráska jr. & Basler, 2016). A comparative research study was carried out in Poland in three lycées in the Rzeszow region in spring 2018. The overall research sample consisted of 647

students in grade three of four-year grammar schools (or an equivalent grade of multi-year grammar schools in Czech Republic) and lycées in Poland. The structure of the respondents is specified in Table 1.

Table 01. Structure of the research sample

Do you play computer games?	Polish grammar school (lycées) students			Czech grammar school students			Total
	Gender (Female)	Gender (Male)	Row (Totals)	Gender (Female)	Gender (Male)	Row (Totals)	
Yes	47 (59%)	38 (90%)	85 (70%)	244 (76%)	194 (96%)	438 (83%)	523 (81%)
No	33 (41%)	4 (10%)	37 (30%)	78 (24%)	9 (4%)	87 (17%)	124 (19%)
All Grps	80 (100%)	42 (100%)	122 (100%)	322 (100%)	203 (100%)	525 (100%)	647 (100%)

5.3. Reliability of the addictive behaviour questionnaire

The reliability of the questionnaire was tested for questions relating to addictive behaviour. The reliability of the questionnaire was determined by means of Cronbach's alpha. Its value was 0.95 (total), 0.90 (Czech), 0.89 (Polish), which means that the research was reliable. The reliability of the questionnaire was also determined separately for the group of male students ($r=0.91$) and the group of female students ($r=0.97$). It is evident that the reliability of the research was higher for the group of female students as it generally reached the required value of 0.80 (Chráska sr., 2016).

6. Findings

In compliance with the research questions, the results of the comparative research are provided in detail and arranged in 7 sub-chapters.

6.1. Identification of addictive behaviour in grammar school students in relation to playing computer games – Czech Republic

Based on the students' responses to twelve questionnaire items (Q5, Q10, Q11, Q12, Q15, Q16, Q17, Q18, Q19, Q20, Q21 and Q13 – see Tab. 2), which represent the criteria for addictive behaviour defined particularly according to the APA (2013), the score of addictive behaviour in relation to playing computer games was calculated for each student. The maximum achievable point score was 60. Achievement of more than 30 points by a student suggested signs of addictive behaviour. The total number of students who achieved more than 30 points was 24 – see Fig. 1; this represents 5.48% of the total number ($n=438$) of grammar school students who play computer games. At the same time, computer games were played by 83.43% of all students (438) in Czech Republic.

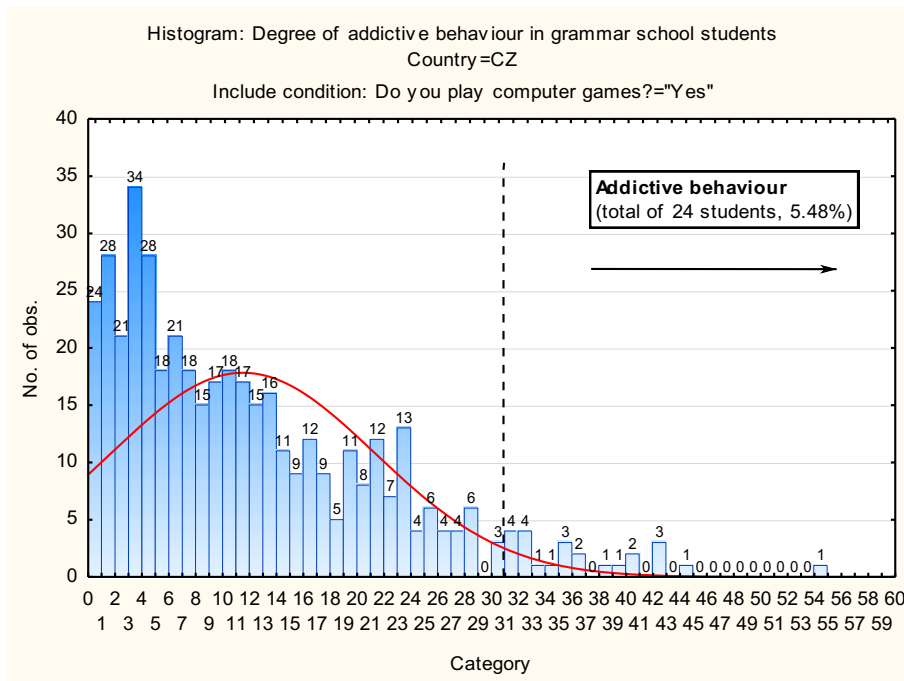


Figure 01. Degree of addictive behaviour in Czech grammar school students

6.2. Identification of addictive behaviour in grammar school (lycées) students in relation to playing computer games – Poland

Similarly to Czech students, addictive behaviour among Polish lycée students was determined. The overall addictive behaviour score is shown in Figure 2.

The total number of students who achieved more than 30 points was 5 – see Fig. 2; this represents 5.88% of the total number (n=85) of grammar school (lycées) students who play computer games. At the same time, computer games were played by 69.67% of all students (122) in Poland.

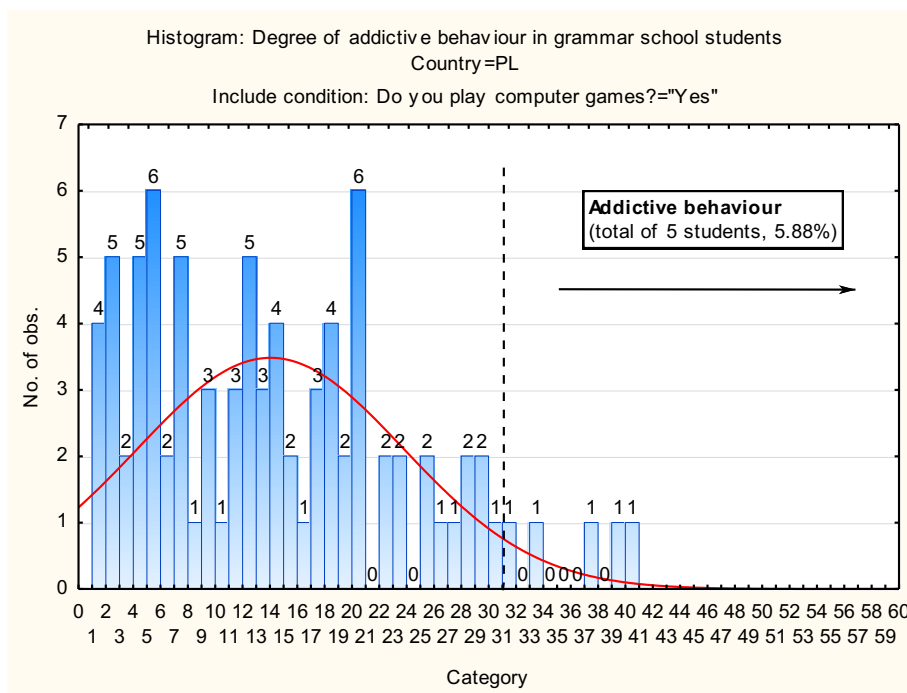


Figure 02. Degree of addictive behaviour in Polish grammar school students

6.3. Identification of typical groups of students according to their attitude to computer games - Czech Republic

An analysis of typical groups of Czech students had been performed in a previous research study (Chráska jr., 2016a) using the Generalized Cluster Analysis. Therefore, this paper will only specify the main results. The results of the research study suggested three groups (clusters) of Czech 18-year-old grammar school students according to their attitudes to computer games. These groups also showed a completely different degree of computer game addiction.

Cluster 1 includes students who often play PC games including on-line games, their parents often set limits for playing computer games, and as a result of playing they stay up late (but only once a month). They often play computer games at school in classes (e.g. using a mobile phone), and sometimes on Facebook. The group is slightly dominated by female students. The students play PC games for 81 minutes on average, in their free time they do sports. The students in this group show a lower addictive behaviour score (average score 23) and comprise about 25% of all students.

Cluster 2 includes students with the lowest addictive behaviour score (average score 15), they play PC games for only 26 minutes a day on average, they do not play on-line games, in their free time they go out with friends. More often they play educational computer games; they started playing at about 9.5 years of age. This group is significantly dominated by female students and comprises about 39% of all students.

Cluster 3 includes students with the highest addictive behaviour score (average score 32), they play PC games for approximately 2.5 hours a day, mostly on-line, in their free time they again play computer games. As a result of playing games, the students also stay up late (typically once a week and once a month). When they do not play, they are more stressed than the students in groups 1 and 2. For them, PC games are the most powerful tool for relaxation, they often play PC games even if they have school assignments (e.g. preparation for a test), and frequently they cannot imagine their life without PC games. This group is significantly dominated by male students; they have played computer games since about 8 years of age; the group comprises about 36% of all students.

6.4. Identification of typical groups of students according to their attitude to computer games -Poland

Similarly, to the group of Czech grammar school students, Polish students were divided into typical groups using the Generalized Cluster Analysis. Unlike Czech students however, Polish grammar school students can be divided only into two typical groups by the degree of addictive behaviour and other characteristics. The results of the analysis are shown in Figure 3 and Table 2.

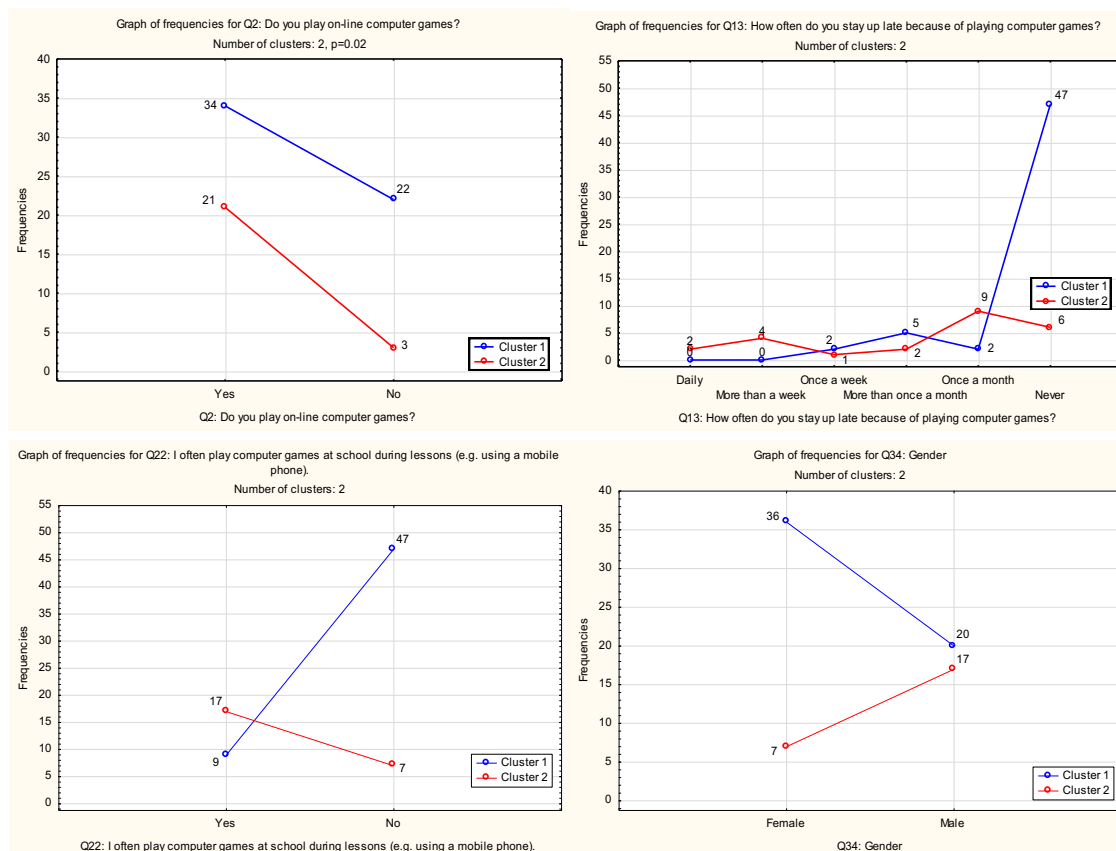


Figure 03. Students' responses to the question (nominal) in both identified groups (only those that are statistically significant)

The first group of Polish students (cluster 2) comprises students with a higher degree of addictive behaviour (average score 24.29), who play computer games on average for 200 minutes per day, play online games more often; this group consists predominantly of male students. The proportion of Polish students in this group is approximately 30%.

Table 02. Results of the Generalized Cluster Analysis of students' responses to selected questions for the monitored nominal and continuous variables – Polish grammar school students

Questionnaire item	Cluster 1	Cluster 2	p
Prevailing number of answers to the following questions:			
Q2: Do you play on-line computer games?	Yes	Yes	0.01
Q3: Do you play computer games on Facebook?	No	No	0.27
Q6: What do you usually do in your free time when you do not study?	I go out with my friends	I go out with my friends	0.77
Q7: Do you take part in any leisure time activities?	Yes	Yes	0.85
Q9: Did or do your parents limit the time for playing computer games?	No	No	0.18
Q13: How often do you stay up late because of playing computer games?	0 (never)	1 (once per month)	<0.01
Q14: If I am not playing, I am stressed (nervous, tense).	No	No	0.63
Q22: I often play computer games at school during lessons (e.g. using a mobile phone).	No	Yes	<0.01

Q27: Do you play educative computer games (e.g. Lingua.Ly, Duolingo, Lightbot, etc.)?	No	No	0.25
Prevailing number of answers concerning gender	Female	Male	<0.01
Q8: For how long a day you play games? (specify average value in minutes per day)	101.16	200.00	<0.01
Average degree of agreement with the statement:			
Q5: Playing computer games is relaxing for me, I forget about problems or stress, I relax and feel fine.	3.63	4.04	0.20
Q10: I used to have other hobbies than playing computer games, but now I spend most of my time playing.	2.04	3.00	<0.01
Q11: Even if I know there will be a test at school I prefer playing computer games.	2.27	3.42	<0.01
Q12: When I am not playing, I often think about my previous success, what I want to achieve or how I will progress when I get to play again.	2.30	3.29	0.01
Q15: I cannot imagine my life without computer games.	1.96	2.88	<0.01
Q16: I feel that computer games are becoming increasingly important for me. I need to spend more and more time playing computer games to feel happy.	1.71	3.08	<0.01
Q17: I feel that I cannot control the amount of time I spend playing computer games. I tried to reduce the amount of time spent playing, but I could not.	1.36	3.00	<0.01
Q18: Due to my frequent playing I sometimes have problems at school, at work or at home.	1.66	3.25	<0.01
Q19: I spend more time playing computer games than I am able to admit to others. I do not tell others the truth in order to conceal how much time I spend playing computer games.	1.41	2.71	<0.01
Q20: I have lost or put at risk an important relationship or friendship because of playing computer games. Because of playing computer games I have put at risk or lost opportunities at school or at work.	1.29	2.29	<0.01
Q21: My parents often prohibit or restrict me in playing computer games, which makes me upset or I play in secret.	1.41	2.58	<0.01
Q28: How old were you when you started playing computer games?	8.04	8.38	0.64
Degree of addictive behaviour in students (Addiction score)	10.36	24.29	<0.01
Number of cases	56	24	
Percentage (%)	70.00	30.00	

Similarly, the students in this group also mostly play computer games in classes and sometimes stay up late because of playing (but most of them just once a month).

The second group of Polish students (cluster 1) comprises students with a lower degree of addictive behaviour (average score 10.36), who play computer games on average for 101 minutes per day; this group consists predominantly of female students. The proportion of Polish students in this group is approximately 70%. Similarly, the students in this group mostly do not play computer games in classes and do not stay up late because of playing.

Unlike Czech students, the two groups do not differ in the beginning age of playing PC games (both groups start after 8 years of age). If they have free time, the students in both identified groups go out with friends.

6.5. Addictive behaviour in the context of playing games among Czech and Polish grammar school students

The authors also investigated whether there were any differences in students' addictive behaviour in relation to playing games between the two countries. A comparison of average addiction score was performed by means of the t-test. The results are graphically shown in Figure 4 a). The figure shows that addictive behaviour among Polish grammar school students who play PC games is statistically significantly higher (14.05) compared with the addictive behaviour score of Czech students (11.52) at a level of significance of $p=0.03$.

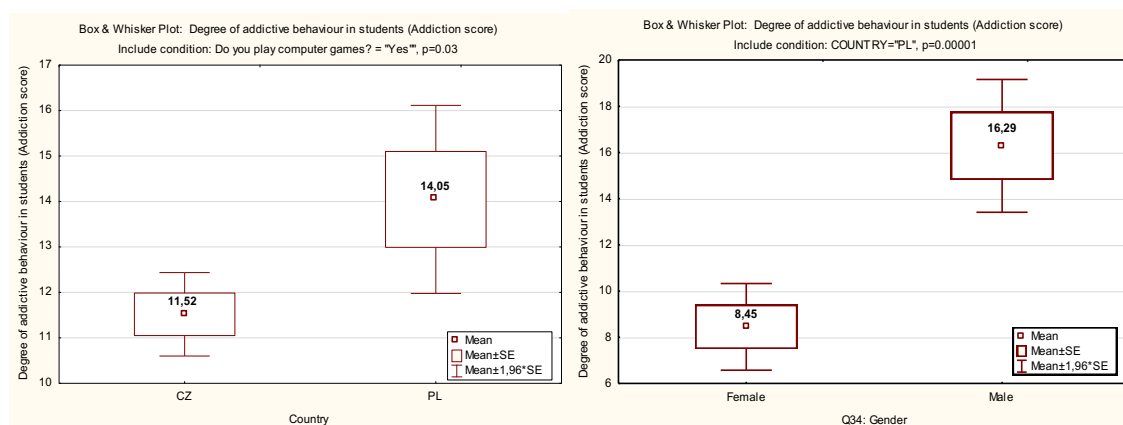


Figure 04. a) Degree of addictive behaviour (addiction score) in the group of Czech and Polish grammar school students ($p_{U\text{-test}}=0.01$) and b) Degree of addictive behaviour (addiction score) in the group of male and female students – Polish grammar school students

6.6. Addictive behaviour in relation to playing games in Polish grammar school students by gender

The authors also focused on whether addictive behaviour of Polish students in relation to playing games was dependent on gender. A comparison of average addiction score was performed by means of the t-test. The results are graphically shown in Figure 4 b). The figure shows that the addiction score at a level of significance $p=0.00001$ in Polish male grammar school students who play PC games is statistically significantly higher (16.29) than addictive behaviour among female students (8.45).

6.7. Playing computer games and didactic computer games among Czech and Polish grammar school students

A comparison of the frequency of playing computer games among grammar school students in both countries was performed by means of the chi-squared test of independence. The results are shown in Table 1. The analysis confirmed statistically significant differences in the frequency of playing PC games between Czech and Polish grammar school students (Pearson Chi-square=12.092, $df=1$, $p=0.0005$).

The authors also investigated whether the frequency of playing didactic computer games was identical between Polish and Czech grammar school students. The comparison was performed using the chi-squared test of independence; the results are presented in Table 3.

Table 03. Differences in the frequency of playing didactic computer games between Czech and Polish grammar school students (Summary Frequency Table, Pearson Chi-square: 0.007, df=1, p=0.932)

Q27: Do you play educative computer games (e.g. Lingua.Ly, Duolingo, Lightbot, etc.)?	Country (CZ)	Country (PL)	Row (Totals)
No	396 (75.9%)	93 (76.2%)	489 (75.9%)
Yes	126 (24.1%)	29 (23.8%)	155 (24.1%)
All Grps	522 (100%)	122 (100%)	644 (100%)

The values in Table 3 show that the frequency of playing didactic computer games by Czech and Polish grammar school students is identical. On average, these games are played by 24% of students in both countries, which is not a very good result. Regarding the potential of didactic computer games in the process of education, this particular finding may be an argument for strengthening this didactic instrument in teaching.

7. Conclusion

A comparison of the degree of addiction revealed statistically significant differences between students from the two countries (score of 11.52 in CZ and 14.05 in PL). It needs to be stated however that Polish grammar school students (70%) played computer games significantly less frequently than Czech students (83%). Polish students, unlike Czech students, were classified into two groups by addictive behaviour. The first group (approximately 30%) showed a higher degree of addictive behaviour, played PC games for a longer time per day, preferred online games, comprised mostly boys, played more often in classes and stayed up late more often. The group of Czech students was classified into three groups with different characteristics.

At the same time, it should be noted that high-risk online activities of students affect their personality characteristics and family relationships.

High neuroticism is frequent in avid players who use games to avoid difficult life situations and to cope with (or realize by themselves) unsuccessful impulses (Blinka et al., 2015, 2016). Other research studies on this topic identified a correlation between the onset of addictive behaviour and other personality characteristics, for example higher extraversion and openness to experience cause more frequent use of social networks. Complicated relationships with parents, parental conflicts, difficult interpersonal relationships and an increased level of social anxiety are also factors that have an effect on the development and maintenance of Internet addiction (Bernardi & Pallanti, 2009; Cerniglia et al., 2016).

Acknowledgments

The paper was supported by the following project of Palacký University in Olomouc: IGA_PdF_2018_030 'An analysis of the use of educational computer games and online educational courses in secondary schools in relation to potential addictive behaviour in students in relation to gaming'. The author would like to thank Dr. Waldemar Lib from the University of Rzeszow for assistance in the implementation of the research in Polish grammar schools.

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