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Adolescents and Information and Communication Technologies: Use and a Risk of Addiction

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Abstract

The diffusion of information and communication technologies among children, youth and adults has become an evolving phenomenon. The end of the last century was characterized by rapid technological development and by deep changes in several aspects of human activities, often described as orientation of the world to the “knowledge age“. Such changes have led to many discussions about the roles of upbringing and education as well as ICT in lessons and learning in a new era and, of course, also about the negative effects of ICT mainly on children and the youth. We focused our attention on the effect of ICT on contemporary adolescents, both in terms of its use and possible misuse, particularly in the field of possible ICT addiction. We gave the questionnaire of our own construction to a group of adolescents: there were 1542 student respondents at the age from 15 up to 23, with an average age $M=16.99$, $SD=4.28$, 647 boys and 895 girls. The independent variables were: gender, respondents' age, the type of attended school, i.e., secondary vocational school=106 respondents, college=697 respondents, grammar school=739 respondents, evaluation marks from the last school certificate of the Czech language and Math. The obtained data were subjected to factor analysis. Programme Varimax orthogonal (NCSS) was used and according to Cronbach's alpha (0.86), a critical value |0.30| was selected. 3 factors were generated: F1 Tendency to ICT addiction, F2 ICT- a study aid and F3 Current daily use and misuse.

More than a half of the respondents use daily this combination of ICT equipment: a PC, a laptop, a tablet and a mobile phone. We found out that the level of addiction to the internet is average; the internet as a study aid is used exceptionally frequently, daily use and misuse is slightly below average.

We chose the internet as a representative of all possibilities of ICT, as an easily accessible medium of contemporaneity. Based on a factor analysis, it can be stated that the more the internet is used for studying, the more possible the addiction to it is and also the tendency to its daily use and misuse.

Keywords: *adolescent, internet addiction, ICT*

Introduction

Contemporary society is often referred to as a learning society, information, knowledge or media society. Scientific disciplines increasingly work with the concepts of knowledge management, computerization of society, digitalization of society, information literacy, competences for the 21st century, digital generation, etc. As indicated by Law and Pelgrum (2008, p. 1), the end of the last century was affected by rapid technological development and deep changes in many aspects of human activity, often marked as orientation of the world to the “knowledge age“. Such changes have led to many discussions about the roles of upbringing and education as well as ICT in lessons and learning in a new era and, of course, also about the negative effects of ICT mainly on children and the youth.

The widespread use of information and communication technologies by children, youth and adults has become an evolving phenomenon, and there is no wonder that it significantly enters the area of upbringing and education. This entails not only changes in material equipment of schools, but also in teaching strategies, where the role of the teacher is irreplaceable (cf., Mura, Diamantini, 2014).

With so many social media and communication channels utilized by masses, the internet becomes dangerous, threatening but also a tempting place for everyone. Therefore, it is important to focus on the increasing number of negative aspects of social media, which not only children encounter every day (cf., Davison, Stein, 2014).

“Since the developmental period of adolescence includes the needs to explore and experiment, they represent the most vulnerable group by the risks on the internet. There is a second important element linked to the need to experiment and it is the search for identity.“ (Černá et al., 2013, p. 15). The internet is truly an environment that offers countless possibilities, within which it is possible to pursue this search. Because in the period of adolescence there is a growing need to meet and keep relationships with peers, especially positive feedback is necessary for

the psychological development of the individual in relationship establishment. If these relationships are disrupted by, e.g., cyberbullying, very often the individual's self-esteem is decreased. It is known that self-esteem in the period of adolescence is a very important aspect of perception and behaviour (cf., Macek, 2003).

Macek (2003, p. 12) states that "adolescence has gained, mainly in the last decades, special meaning – it has its own social, economic, educational, health and cultural dimension."

According to Roberts et al. (2015), there are seven elementary features affecting the addiction to social media:

- Friendliness (people, who are interested in the well-being of others have a higher tendency to develop this addiction);
- Extraversion (extravert individuals need constant stimulation, they are thrill seekers);
- Need for excitement (also typical of the emergence of other – particularly drug – addictions);
- Emotional instability (especially neurotics' use of social media as a means to achieve emotional balance);
- Impulsiveness (impulsive individuals fail to foresee the consequences of their actions);
- Materialism (materialistically oriented individuals are more susceptible to this type of addiction);
- Conscientiousness (unscrupulous people are more prone to addiction).

Research Methodology

The aim of the research study was to find out in what range and in what way contemporary adolescents use a variety of modern and communication technologies (hereafter ICT) and with what potential risks. We focused on a group of adolescents: respondents were represented by 1542 students aged 15–23, with average age $M=16.99$, $SD=4.28$, 647 boys and 895 girls. The independent variables were: gender, the respondents' age, the type of attended school, i.e., secondary vocational school=106 respondents, college=697 respondents, grammar school=739 respondents, marks from the last school certificate in the Czech language and Math.

All the respondents use ICT equipment either on its own or in various combinations.

Table 1. Use of ICT equipment

ICT equipment	Number of respondents/users	%
PC only	214	13.88
Laptop only	319	20.69
Tablet only	38	2.46
Cell phone only	103	6.68
Combination of all 4	868	56.29

More than a half of the respondents use a combination of all 4 types of equipment daily.

Questionnaire on the use of ICT and its risks

The questionnaire detecting the use of ICT technologies and possible risks of this use is of our own construction. The original questionnaire contains 44 statements, where a respondent gives answers on a Likert scale (1 = never ever, 2 = almost never, 3 = sometimes, 4 = almost always, 5 = always). Questionnaire reliability: Cronbach's $\alpha = 0.86$.

The obtained data were subjected to factor analysis. Program Varimax orthogonal (NCSS) for the calculation and according to the amount of Cronbach's Alpha a critical value $|0.30|$ was chosen. 3 factors were generated; statements in factors are ordered from the highest one to the lowest supercritical communality (We gave factors working names: *F1 Tendency to ICT addiction*, *F2 ICT- a study aid* and *F3 Current daily use and misuse*). In the following tables there are statements which create these factors; they are ordered by the degree of agreement with the statement, or more precisely by an arithmetic mean.

Results

Table 2. Questionnaire results

Factors	M	SD	Median	Min-max
F1 Tendency to ICT addiction	39.12	10.04	39	16–80
F2 ICT- a study aid	24.55	4.48	25	7–35
F3 Current daily use and misuse	24.98	7.83	24	11–55

The level of addiction to the internet is average; the internet as a study aid is used highly above average, daily use and misuse is slightly below average.

Other results

Table 3. Statement order about the Tendency to ICT addiction according to M

Statement	M	SD
1. When I connect to the internet and it's being loaded, I feel excited.	3.50	1.02
2. It happens to me that I miss something because of the internet (e.g. a meeting, keeping a promise).	3.09	1.09
3. It happens to me that I postpone my studying because of the internet.	2.83	1.14
4. When doing homework or writing an essay I "borrow" a ready-made text and I use it for my work.	2.79	1.18
5. I conceal what I do on the internet at home.	2.69	1.2
6. When I am online, I lose the track of time.	2.68	1.15
7. Even though I have other duties I postpone them because of the internet.	2.61	1.17
8. The computer is my true and intimate friend.	2.47	1.15
9. When I have some time off, I connect to the internet automatically.	2.42	1.3
10. I get up early in the morning and I immediately connect to the internet.	2.39	1.12
11. When I forbid myself the use of the internet just for one day, I cannot resist and I connect to it.	2.32	1.01
12. I lie to the question of how long I was online.	2.23	1.02
13. Because of the internet I have no time for hobbies.	2.03	1.00
14. I am fed up if I cannot connect from anywhere.	1.78	0.93
15. I spend more time on the internet than with my family or friends.	1.76	0.93
16. Because of the internet I am up till late at night.	1.52	0.9

Because the internet is not easily available from all contemporary ICTs, but it is also currently the most widely used medium, we chose it as a representative of all possibilities of ICT and included it in the statements of the questionnaire.

As seen in the table, the respondents agree most with the statement: *When I connect to the internet and it's being loaded, I feel excited*. It can be understood as evidence of spontaneous positive emotional perception, nevertheless we can also find here significant similarities to the perception of the addicted: a smoker feels excited to have his/her first morning cigarette, a drunk craves his first glass. With respect to the topic, we rather see it as a display of a starting addiction to the internet, which is closer to the average in our respondents.

Furthermore, it is also seen that because of the internet the respondents postpone their duties, spend a great amount of time there, do not admit how much time they spend there, they cease to perceive time. An important fact is that the respondents have an intimate relationship with the internet (precisely a computer and other ICTs). The above-mentioned statements, therefore, illustrate the adolescents' starting addiction of to the internet, although we have not found a greater occurrence of extreme addiction in our group of respondents.

Table 4. Order of statements ICT- a study aid according to M

Statement	M	SD
1. I consider the internet as a source of information necessary for studying at secondary school.	3.91	0.97
2. During self-study I use electronic sources of information.	3.80	0.94
3. I cannot imagine my study without the internet access.	3.68	0.92
4. Social networking sites can be also used for studying.	3.44	1.06
5. I say to parents that I study with the use of the computer but in fact it is not so.	3.41	1.19
6. I use the internet while writing a test in order to find out correct answers.	3.31	1.09
7. I communicate on social networking sites during a lesson.	3.00	0.99

We can consider as gratifying that ICTs are used above average by our respondents as a study aid; they use them as important sources of information, they cannot imagine life without them.

Table 5. Order of statements about current daily use and misuse according to M

Statement	M	SD
1. I have a feeling that time spent on the internet is wasted.	2.90	1.23
2. I am inspired by works published on the internet when I do my homework or write an essay.	2.86	0.99
3. I swap information regarding lessons on social networking sites with my classmates.	2.72	1.18
4. I downloaded work on the internet and I handed it in as mine.	2.62	1.18
5. I surf the internet during lessons.	2.59	1.24
6. Educators give study hand-outs to us with information that is not included in textbooks (e.g., in the form of free downloads from the internet).	2.24	1.09
7. I cheat at school with the help of information and communication technologies.	2.18	1.17
8. We share study material on social networking sites.	2.00	1.07

Statement	M	SD
9. It happened to me that someone did homework for me and I sent him a photo or a video with sexual content in return.	1.92	1.09
10. I receive and send text messages during lessons.	1.64	0.99
11. I study on social networking sites also by chatting with classmates.	1.32	0.91

Within self-reflection, the respondents state that they have a feeling that the time spent on the internet is wasted, however, they consciously do not reduce it, which can be understood as symptoms of an incipient addiction. There are also obvious possibilities of ICT misuse, e.g. when somebody else's work has been used, downloaded from the internet. Nevertheless, a slightly below average occurrence still indicates the existence of misuse.

Relationships between the questionnaire factors

Table 6. Relations between the questionnaire factors

Factors	F1 Tendency to internet addiction	F 2 Internet-a study aid	F 3 Current daily use and misuse
F1 Tendency to ICT addiction	xxx	0.30**	0.48**
F2 ICT-a study aid		xxx	0.28**

**p<0.01

The more the internet is used for studying, the bigger the possibility is of increasing addiction and the tendency to daily use and misuse.

Relationships of independent variables and results of the questionnaire

Note: See also only statistically significant results at 5 %, or more precisely 1 %, level of significance.

In the project of our research survey, we set the following independent (variation) variables:

1. Respondents' gender
2. Respondents' age;
3. Type of school (secondary vocational school, college, grammar school);
4. Marks in the Czech language;
5. Marks in Math.

Table 7. Respondents' gender

Factor / M gender	ANOVA (F test)	M men	M women
F1 Tendency to ICD addiction	15.25*	40.19	38.34
F3 Current daily use and misuse	32.64*	26.20	24.10

* $p < 0.05$

The male respondents indicate a significantly higher tendency to ICT addition and a higher tendency to daily use and misuse.

Table 8. Differences between men and women in the area of tendency to ICT addiction

Statement	ANOVA (F test)	M men	M women
I lie to the question of how long I was online.	6.92*	2.30	2.17
Because of the internet I have no time for hobbies.	18.35*	2.14	1.94
When I forbid myself to use the internet just for one day, I cannot resist and I connect to it.	28.12*	2.47	2.21
When I am online, I lose the track of time.	5.89*	2.76	2.61
When I have some time off, I automatically connect to the internet.	5.36*	2.33	2.48
Because of the internet I am up till late at night.	8.03*	1.6	1.46
When doing homework or writing an essay I "borrow" a ready-made text and I use it in my work.	5.91*	2.69	2.85
I get up early in the morning and I connect immediately.	18.10*	2.25	2.49
I conceal what I do on the internet at home.	13.39*	2.85	2.58
Computer is my true and intimate friend.	4.16*	2.54	2.42
When I connect to the internet and it's being loaded, I feel excited.	10.12*	3.40	3.5

* $p < 0.05$

In seven out of eleven statements, the male respondents indicate possible addiction to the internet; the female respondents have a significantly higher scores only in the following areas:

- *When I have some time off, I automatically connect to the internet.*
- *When doing homework or writing an essay I "borrow" a ready-made text and I use it in my work.*
- *I get up early in the morning and I connect immediately.*
- *When I connect to the internet and it's being loaded, I feel excited.*

Table 9. Respondent's age

Factor	Correlation coefficient
F1 Tendency to ICT addiction	$r = 0.080^{**}$
F3 Current daily use and misuse	$r = 0.082^{**}$

** $p < 0.01$

The older the respondents are, the more danger of addiction there is and a higher tendency they have to use and misuse ICT daily.

Table 10. Type of school (secondary vocational school, college, grammar school)

Factor/type of school	MANOVA (F test)	Secondary Vocational School	College	Grammar School
F1 Tendency to ICT addiction	5.99*	40.02	39.80	38.34
F2 ICT- a study aid	12.52*	23.48	24.33	24.91
F3 Current daily use and misuse	3.90*	23.92	25.67	24.48

* $p < 0.05$

The highest tendency to addiction is indicated by the apprentices (this addiction has no relation to learning and the ICT use as a study aid, see below), the lowest by the grammar school students; ICT as a study aid is mostly used by the grammar school students, the least by the apprentices of secondary vocational school. The most daily use of ICTs also with the possibility of misuse is indicated by the students of college, the least by the apprentices.

Marks in the Czech language ($M=2.28$, $SD =0.85$ in the whole sample of respondents)

The highest level of addiction to ICT occurs among the respondents who have mark 4 in the Czech language, the lowest among the ones who have mark 1; ICT as a study aid is mostly used by A students, then with deteriorating mark less and the least with mark 5. The ICT is daily used, also with the possibility to misuse, by the students who have mark 4, the least by those with mark 5 in the Czech language.

Marks in Math ($M=2.44$, $SD =0.95$ in the whole sample of respondents)

The highest level of addiction to ICT is indicated by the respondents who have mark 5 in Math*, and the lowest by the A students. ICT as a study aid is mostly

used by B students, with worsening mark less and the least by those with mark 5. ICT is used daily, also with the possibility of misuse, by the students who get marks, the least with mark 5 in Math.

* according to all up to date results it is likely that the level of ICT addiction in these students does not correlate with the possibility to use ICT for study, but to a wide range of activities that are not linked to studies and bring an increased risk possibility.

Discussion

Our research survey shows that more than a half of the respondents daily use the following combination of ICT equipment: a PC, a laptop, a tablet and a cell phone. We have found out that the level of addiction to the internet is average; the internet as a study aid is used with the frequency high above average, daily use and misuse is slightly below average. As for the representatives of all the possibilities of ICTs, we have chosen the internet as an easily available current medium. Based on factor analysis we can state that the more used the internet is for the study purpose, the more possibility there is of addiction and the tendency to daily use and misuse.

The frequency of statements concerning factor *F1 Tendency to ICT addiction* among the respondents shows a starting addiction to the internet. This addiction shows certain features of psychological addiction: not only because the respondents are excited when they connect to the internet, but also due to the fact that they do not manage an important meeting or do not keep a promise. Many respondents said that they spent more time on the internet than with their family or friends. Some even admit that their computer is their true and intimate friend. In the group of our respondents we have not found a greater occurrence of addiction extremes, but even average values in our group of respondents are fairly important indicators of development. Addiction increases with age and due to very fast ICT development. It is necessary to highlight the relationship between age and addiction.

Regarding the use of ICT, the respondents stated that they used the internet mainly as a study aid; they understand it as an essential source of information. On the other hand, they are not able to imagine their study without internet access.

Although the respondents know that the time spent on the internet is wasted, they do not reduce it consciously. Therefore, we can distinguish in this behaviour other symptoms of a starting addiction. The adolescents' most common use of

the internet is inspiration of their work (a task) or as a space for sharing study materials. Unfortunately, many respondents said that they cheated with the help of ICT. They admitted that they downloaded work of others from the internet and handed it in as their own.

The addiction to ICT is more frequently found in the men than in the women. With an increasing age of the respondents, the danger of ICT addiction increases, as we recorded higher tendencies to daily use and misuse of ICT in older respondents. The highest tendency to addiction was found in the apprentices, where this addiction has no connection with studying, whereas the grammar school students use ICT as a study aid. The students of secondary vocational school use ICT daily, including the possibility of misuse. The highest level of addiction to ICT is stated by the respondents who have mark 4 in the Czech language, who also use ICT daily, with the possibility of its misuse. The highest rate of addiction is indicated by the respondents with mark 5 in Math, the lowest by the A students. The students who have mark 4 indicate the most daily ICT use also with the possibility of misuse, the least by those with mark 5 in Math.

Conclusions

And what is a contemporary “ICT-addicted” adolescent like? It is a person who lies to the question of how long he/she was online; he/she has no time for hobbies because of the internet, which he/she cannot resist; when he/she is online, he/she loses the track of time. He/she conceals the activity on the internet and considers the PC as his/her friend. With increasing age the addiction deepens. Addiction to ICT is more likely in apprentices. We talk about a student who has mark 4 in the Czech language and mark 5 in Math. It should be noted that the level of ICT addiction in these students does not relate to the possibility to use ICT for study, but on the contrary, to a wide range of activities and it brings increased risks.

Modern ICT technologies have fully entered the daily life of all age groups, particularly that of adolescents, who learn very quickly and are eager to learn how to work with them. However, there is a potential danger of addiction to them, which should not be underestimated.

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