



Information and Communications Technology (ICT) in Learning in the Czech Population

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Abstract

the use of state-of-the-art technology (i.e., modern technology and Internet) in learning for the entire society (from adolescence to old age populations) in the Czech sociocultural environment remain uncertain. To address this gap in the literature, the objective of the current study was to analyze the use of modern technology (i.e., computer, laptop, or tablet) and the Internet (i.e., Moodle, Elportal, e-learning and online interactive programs, YouTube, Google or Seznam, etc.) in learning in the Czech population. The research instrument represented a self-rate questionnaire developed by the author. The sample consisted of 1,008 participants selected to represent socio-demographic distribution of the Czech population. The sample scored average in terms of modern technology and Internet use while learning. This trend was considerably lower the higher the age, regardless of the education level. Moreover, females used printed study materials more often than males. Out of the selected variables, age of respondents most strongly influenced the use of modern technology and Internet while studying. Moreover, education, region, and economic activity significantly varied the level of use of modern technology and the Internet use. The largest use of modern technology was detected among respondents with the largest size of place of residence (100,000 up). In contrast, gender did not vary the use of modern technology and Internet as learning tool. In addition, several potential limitations of the presented study were discussed.

Keywords: technology, internet, learning, ICT, Czech Republic

Introduction

Modern technologies are one of the basic elements characterizing today's society that are not only products of contemporary time and culture, but also factors that make a significant contribution to society and everyday life. Their ongoing rapid development has allowed their use in all areas of human activity. Younger populations in particular use these technologies extensively during their leisure, work, or learning time. Furthermore, the use of modern technology has become a natural environment for today's youth¹ born into the era of digital life.

Although the older generation also uses modern technologies in their lives, the position of these technologies is different. Their social maturation, including the integration of different tools, media, and technologies into behavior patterns and lifestyles took place before those technologies emerged. On this basis, modern technologies are becoming incorporated into existing models of life. As a result, the range of activities such as leisure or working time that are accessible through modern technologies varies by generation. Findings showing the extent that this era of modern technology is reflected in learning for the entire society (from adolescence to old age populations) in the Czech sociocultural environment remain uncertain. Moreover, the use of the Internet not only for social connection and entertainment, but also for academic studies and lifelong learning, has become the aim of presented research studies on the use of modern technology and Internet in learning.

The term modern technology is defined as the use of a computer, laptop, or tablet during learning activities in various

environments, i.e., at home, at school, or in other institutions and environments. The concept of modern technology was chosen for its colloquial meaning, which is generally understood by the whole population and was perceived as a synonym for information and communication technologies (ICT) commonly used in the literature. Furthermore, the use of the Internet while learning was defined as the use of Moodle – a learning platform designed to provide learners with a single robust, secure, and integrated system creating personalized learning environments (Moodle, 2016), Elportal (an e-learning portal of courses and all other forms of e-learning), online interactive programs, YouTube, Google, or Seznam, which is a well-known Czech catalog search server.

The process of learning investigated in this research was conceived in congruence with Zimmerman and Schunk (2011) as self-regulatory oriented learning processes, whereby learners personally activate and express cognitions, effects, and behaviors that are systematically oriented toward the attainment of personal goals not strictly tied only to the school environment or formal institutional activities. Moreover, learning in this perspective was considered an intentional process in which an individual had to decide what to learn, when, how, with what tools, and where, i.e., at home, school, online, or offline.

Implementation of modern technology and Internet in the Czech society

Modern technology began its integration into the Czech education system in the 1990s. Infrastructure equipment and its use in education, as well as its financing, was at the initiative of individual schools. There was no national program or project at that time to coordinate or methodically manage schools in the integration of digital technologies into their lives. The issue of modern technologies was reflected in public and educational policy only after the creation of documents for the National Education Development

¹ Today's youth are often referred to as digital learners (Gallardo-Echenique et al., 2005), digital natives (Gottwaldová, 2015), digital youth (McPherson, 2008), or youth of the net generations (Oblinger & Oblinger, 2005).

Program in the Czech Republic entitled White Paper (MŠMT, 2001), State Information Policy (VČR, 1999), and Concept of State Information Policy in Education (MŠMT, 2000).

Whilst the declarations of the White Paper were very general, the key strategic areas were outlined in the remaining documents. The first area was to ensure the availability of digital technologies (infrastructure) to all learners involved in education (schools, continuing education, or lifelong learning). The second wave of ICT development consisted of the creation of a basic framework for integrating ICT into education at all levels of schooling with a focus on the importance of teacher preparation. An additional document approved by the Ministry of Education, Digital Education Strategy by 2020 (MŠMT, 2014), anticipated the gradual involvement of modern technologies in the formal education. It was in this document that the full incorporation of modern technologies into the teaching of all subjects was seen by the state as a necessary shift within education systems, from the simple memorization of facts to an emphasis on digital literacy, communication skills, and computational and logical thinking (Jelínek, 2015).

The year 1992 is considered to be the beginning of the "Internet era" in the Czech Republic (Kasík, 2012). The largest increase in the proportion of households connected to the Internet and owning a computer is dated to the year 2008. 67% of households owned a computer and only two percent fewer households were connected to the Internet (CSO, 2014b). At the forefront of internet use was the age category of 15 to 30 years, which spent an average of 17 hours a week on the Internet (Koledářová & Tomek, 2012). In terms of the number of Internet users, the population with higher education, i.e. university graduates, were the second most numerous group. Most users (96%) used email, with almost two thirds using it daily. The second most widespread online activity was searching for information. Social

networking quickly struggled from the outset to become one of the most popular online activities, however, only 5% of online users used social networks during most of their time spent online (ibid).

The social profile of computer users has changed with advanced ICT implementation. The turning point for the development of computer literacy was the "Internet to Schools" project. The project equipped elementary schools with computers and Internet access. This period was also known for "generation inversion," where children taught their parents and grandparents to work on and with computers (Sak, 2000; Arnes, Erstad, Jahaňák, & Zounek, 2016). Computer literacy and the general availability of technologies were indirectly influenced by age and directly dependent on education and family income. However, with the considerable shift from fixed to mobile Internet use (Fišerová & Horáček, 2015), the absence of a computer or Internet connection in the household is nowadays more of an exception. More specifically, mobile Internet is preferred by three quarters of connected Czechs (ibid).

Research on Modern Technology and Internet Use in Education

The attitudes of Czech, Polish, and Slovak university students ($n = 260$) towards the personal computer and its role in lifelong learning and leisure were compared by Chráska (2014). The findings indicated that the concept of the PC was perceived in a similar way among Czech and Polish students as an irreplaceable means of work, lifelong learning, communication, and leisure time. Moreover, Czech students achieved the highest frequency of use of the PC for educational purposes. The authors attributed this finding to the most extensive use of an online learning management system (LMS) and computer-aided teaching by the Czech university.

Kolesárová (2014) extended the context of use of ICT to include the identification of

typical characteristics of lifestyles within the Czech population. A representative sample of the Czech population over 15 years old ($N = 1,818$) was used. The author identified a cyber-developmental lifestyle that most strongly demonstrated a computerized character, i.e. predominant computer activity while studying. The cyber-developmental lifestyle was associated with life beyond marriage in younger generations (the average age = 23 years) as reflected by female students or university graduates.

The field of ICT research in education has a wide platform of application (Milková, Pekarková, & Salem, 2016) covering the areas of computer-aided personalized and collaborative learning (Mamat & Yusof, 2013), seamless learning systems (Ogata et al., 2015), and online game-based learning in school education (Jong, 2015). Moreover, students benefited from the application of ICT in the learning of foreign languages (Klimová Frydrychová & Poullová, 2014). Also, combining mobile devices (laptops, tablets) and social networks (Facebook, Instagram) was seen as an attractive refreshment of education in schools, increasing pupils' motivation to learn (Maněna, Dostál, Hubálovský, & Hubálovská, 2016).

Moreover, Zounek and Tůma (2014) mapped the representation of ICT in education covered by Czech scientific journals between 1990 and 2012. In twenty-two years, only nine empirical studies and only thirteen survey studies were published. However, these lacked a focus on the learning processes of individuals, their relation to modern technologies, and offered no information as to whether learners used computer skills and knowledge acquired from the school environment outside school and vice versa.

According to the findings of a systematic review of international literature on emerging technology (ET) in education between 2006 and 2016, all studies aimed to improve and transform the different

educational processes through the incorporation of ET (Neira, Salinas, & Crosetti, 2017). Out of 288 selected studies the most affected population were students in higher education contexts with the objective of improving critical and creative thinking, problem solving, collaborative work, and decision-making. Qualitative research was the most commonly used methodological approach with Web 2.0 technologies.

Dogruer, Eyyam, and Menevis (2011) concentrated on the students' use of the Internet in their academic studies. The participants ($n = 100$) were international students who studied at different levels in English Preparatory School. Students believed that they could easily use the Internet as an educational tool, an online search engine, or a resource of knowledge and discussion about shared school subjects. However, more sophisticated activities such as the use of educational journals and databases, wikis, and e-learning portals were more problematic.

Since coherent information describing the use of modern technology and Internet in studying in a representative sample of the Czech population is still lacking, the primary focus of this research study has been set at the descriptive level. Three main objectives are being investigated. First, to find out to what extent modern technology (e.g. PC, laptop, tablet, etc.) is used during the learning process by the Czech population and what characterizes those respondents who never use modern technology while studying. Second, to find out to what extent the Internet (e.g., Moodle, e-learning, online interactive programs, YouTube, Google or Seznam, etc.) is used during the learning process by the Czech population and the discipline most commonly studied by respondents online. And lastly, to find out the preferred format of study materials.

Methodology

Nowadays the use of ICTs is an integral part

of every mature society. As work with computer, laptop, or tablet reaches almost all disciplines, it is finding its way to becoming a mediator in the process of learning. However, the extent to which the Czech population uses modern technology during learning and how this usage is influenced by gender, age, region, education and other socio-demographic variables has not been fully explored. Therefore, the purpose of this study is to fill this gap and bring the following information across a representative sample of the Czech population. More specifically, the research answered the following questions:

(1) To what extent is modern technology (e.g., PC, laptop, tablet, etc.) used for studying within the Czech population? The fact that a number of citizens or groups do not use modern technology is significant in terms of social cohesion and exclusion. Therefore, respondents who never use modern technology while studying were described further.

(2) To what extent is the Internet (e.g., Moodle, e-learning, online interactive programs, YouTube, Google or Seznam, etc.) used in studying within the Czech population and what is the most common discipline that respondents study online?

(3) What is the preferred form of study materials?

We also investigated whether there was relationship between use of modern technology, use of Internet, and preferred form of study materials against selected variables, i.e. gender, age, education level achieved, size of place of residence, region, and economic activity.

Research and data collection

Given the nature of the research questions, the research was based on a quantitative methodological approach using exploratory

methods. To gather the data, a survey including selected items developed by the author was part of a wider Omnibus random data collection using a CAPI method facilitated by trained interviewers and implemented in Autumn 2016.

The survey covered socio-demographic items including gender, age (in years and also expressed in age categories: 15-29 years; 30-44 years; 45-59 years; 60+), education (basic; secondary without leaving examination (vocational); secondary with leaving examination; university), size of place of residence (up to 4,999 inhabitants; 5,000–19,999; 20,000–99,999; 100,000 and up), region (Prague; Bohemia; Moravia), economic activity (economically inactive vs. active), and professional career specialization (e.g., economics and administration, pedagogy, building construction, etc.).

Specific items were designed to be used in analyses as single items of nominal or interval nature. These variables were considered manifest variables that can be observed directly. More specifically, respondents answered the question concerning the usage of modern technology (e.g., PC, laptop, tablet, etc.) and the use of the Internet (e.g., Moodle, e-learning, online interactive programs, YouTube, Google or Seznam, etc.) during their learning process on a seven-point Likert's scale ranging from 0 (*never*) to 6 (*very often*). The findings on Internet use during learning have been expanded to identify the field in which respondents most often engaged in their study online. The International Standard Classification of Education (ISCED 1997) was used to select the field of study (i.e., foreign language, computer science, general education programs, etc.). Lastly, preferred form of study materials was investigated (printed study materials; electronic study materials; no preference).

Data Preparation and Statistical Analysis

Influential multivariate outliers and the possible occurrence of missing values were checked. First, descriptive statistics of the individual socio-demographic variables were calculated. Second, the general assumptions that apply to parametric techniques were investigated. The Kolmogorov-Smirnov test and the Shapiro-Wilk test were used to confirm ($p < .05$) the application of nonparametric statistics (U test, K-W ANOVA, Chi-squared test, and Spearman correlation). Effect size for all tests was calculated (η^2 , Cramer's V , r^2). The null hypothesis was rejected given the significance level of .05. However, multiple comparisons were checked using Bonferroni correction to reduce the likelihood of incorrect rejection of the null hypothesis (Type I error). SPSS v. 24 was used for all presented analysis.

Participants

The research sample included a representative sample of the Czech population ($N = 1,008$). The sample was randomly selected to represent socio-demographic distribution of the Czech population according to gender, age, education, and region. The mean age of the sample reached 45.3 years ($SD = 17.05$)

ranging from 15 to 89 years. The gender distribution was quite even with 482 (47.8%) males with an average age of 44.3 years (age ranged from 15 to 89 years, $SD = 17.52$) and 526 (52.2%) females with an average age of 46.3 years (age ranged from 15 to 85 years, $SD = 16.56$). The distribution presented also corresponded to the general gender distribution of the Czech population (CZSO, 2014a).

A third of respondents had acquired secondary education either without a leaving examination (37.6%) or with a leaving examination (33%), followed by university (16.2%) and elementary school graduates (13.2%). Almost two-fifths of respondents (37.1%) lived in a place of residence with up to 4,999 inhabitants. More than half of respondents (63.4%) were economically active, with the region of the capital city Prague most represented (12.6%). As far as the professional career specialization of the respondents was concerned, mechanical engineering (117, 11.6%), economics and administration (84, 8.3%), business (66, 6.5%), pedagogy (61, 6.1%), building construction (58, 5.8%), and healthcare (52, 5.2%) were the most frequently profiled professions in the sample. The socio-demographic distribution of the sample can be seen in Table 1.

Table 1: Socio-demographic distribution of the sample

| Socio-demographic characteristics | | Frequency | | Socio-demographic characteristics | | Frequency | |
|-----------------------------------|---------------------------------------|-----------|----|-----------------------------------|-------------------------|-----------|----|
| | | N | % | | | N | % |
| Gender | Male | 482 | 48 | Size of place of residence | up to 4,999 inhabitants | 374 | 37 |
| | Female | 526 | 52 | | 5,000–19,999 | 183 | 18 |
| Age | 15-29 years | 224 | 22 | Region | 20,000–99,999 | 239 | 24 |
| | 30-44 years | 268 | 27 | | 100,000 up | 212 | 21 |
| | 45-59 years | 263 | 26 | | Prague | 127 | 13 |
| Education | 60 up | 253 | 25 | Bohemia | 480 | 48 | |
| | Elementary | 133 | 13 | Moravia | 401 | 40 | |
| | Secondary without leaving examination | 379 | 38 | Economic activity | active | 639 | 63 |
| | Secondary with leaving examination | 333 | 33 | | inactive | 369 | 37 |
| | University | 163 | 16 | | | | |

Note: For a general overview, relative percentages are presented here and after without decimal places.

Results

The level of use of modern technology during learning processes is important information for the future planning of both national and international forms of education. The results of the aforementioned research questions are presented chronologically below.

To what extent is modern technology (e.g., PC, laptop, tablet, etc.) used during the learning process?

The central values ($M = 3.3$, $SD = 2.44$) of the seven-point scale used in the survey ranging from never (point 0) to very often (point 6) lie just above the midpoint of the scale. The results suggest that on average respondents used modern technology while studying. However, two main groups of respondents stood out compared to other respondents included in the survey: (1) those who never used modern technology while studying (276, 27%), and (2) those who on the

contrary used PC, laptop, or tablet very often while studying (318, 32%). Apart from these two opposite trends, the middle point three was the point reached most frequently (12%) followed by a high frequency (11%) of answers on the right side of the scale (point five of the seven-point scale).

Age of respondents had a high statistical and interpretive influence on the level of modern technology use while studying. The use of state-of-the-art technology (i.e., PC, laptop, or tablet) was considerably lower the higher the age, regardless of **education level**. This trend was found in all age categories. University graduates, while reaching the highest level of modern technology involvement in their learning, used modern technology while studying at higher level at younger ages.

276 (27%) of the sample size (1,008) **never used modern technology while learning**. More specifically, 47% (129) males and 53% (147) females were represented by the

oldest age group (60 years and older). Out of these respondents, 52% (144) of respondents reached secondary education without leaving examination (vocational), followed by 74 respondents (27%) who obtained a diploma from secondary school with leaving examination, 41 (15%) of respondents who completed elementary education, and 17 (6%) university graduates. Based on a comparison of the absence of use of modern technology by region, 22 (8%) lived in Prague, 100 (36%) lived in Bohemia, and 154 (56%) in Moravia. Slightly lower use of modern technology was shown by economically inactive respondents (153, 55%) vs. economically active (123, 45%).

What Is The Influence Of The Selected Variables On The Level Of Modern Technology Use?

The proportion of use of modern technology by males ($Md = 4$, $n = 482$) was not significantly different from the proportion of females ($Md = 4$, $n = 526$), $U = 126150$, $z = -.14$, $p = .891$, $r = .004$. The age of respondents reached a statistically significant difference, $\chi^2(3, n = 1,008) = 173.36$, $p < .001$, $\eta^2 = .18$. The youngest age group (15-29 years) recorded the highest use of modern technology while studying. The effect size calculated using η^2 showed the percentage of variability in the dependent variable explained by the test variable. It was found that quite high proportions (18%) of the change in modern technology usage could be accounted for by the age of the respondents.

Studying across four different education groups also significantly influenced the use of

modern technology while studying, $\chi^2(3, n = 1,008) = 76.51$, $p < .001$, $\eta^2 = .08$. Higher level of education achieved was associated with higher use of modern technology. Moreover, a larger size of respondent's place of residence was associated with higher use of modern technology, $\chi^2(3, n = 1,008) = 12.60$, $p < .01$, $\eta^2 = .01$, with the largest use of modern technology in the region of Prague, $\chi^2(2, n = 1,008) = 21.66$, $p < .001$, $\eta^2 = .02$. Lastly, there was a small negative correlation between economic activity and use of modern technology while studying ($r_{rho} = -.20$, $p < .001$, $r^2 = 4\%$). Use of modern technology decreased with economic inactivity.

We also wondered whether the use of modern technology while studying went hand in hand with studying online, and how this usage differed across the age categories of the respondents (see Table 2). The findings showed a large negative correlation between age and use of modern technology while studying ($r_{rho} = -.48$, $p < .001$, $r^2 = 18\%$) and use of Internet ($r_{rho} = -.43$, $p < .001$, $r^2 = 18\%$). High levels of use of modern technology and online studying were associated with lower age of respondents. A perfect correlation was found between the use of modern technology and use of Internet ($r_{rho} = .90$, $p < .001$, $r^2 = 81\%$). These results were not surprising since the Internet can only be used together with modern technology. However, modern technologies such as PC, laptop, or tablet could be used for studying purposes in general without necessarily surfing the Internet, i.e. studying online.

Table 2: Average values and intercorrelations between selected variables

| Variables | Average values (SD) | Age | Modern technology |
|-------------------|---------------------|---------|-------------------|
| Age | 45.3 (17.05) | 1.000 | |
| Modern technology | 3.3 (2.44) | -.418** | 1.000 |
| Internet | 3.2 (2.47) | -.433** | .901** |

** = $p < .01$.

Moreover, a partial correlation was used to explore the relationship between use of modern technology and Internet, while controlling for the most influential variable, i.e. age of respondents. On this basis, the significant partial correlation between use of modern technology and Internet, controlling for age, $r = .89$, $n = 1.005$, $p < .001$, remained almost unchanged. High levels of modern technology use were associated with high levels of studying online, suggesting that controlling for age had no significant effect on the strength of the relationship between these two variables. Where modern technology was used, the Internet was concurrently used by the interviewed respondents as well.

To what extent is the Internet used during the learning process and what is the discipline that respondents most commonly study online?

Respondents used the Internet on average ($M = 3.2$, $SD = 2.47$) as a learning tool. Likewise, as presented above in relation to use of modern technology, there were two main groups of respondents: (1) those who never used the Internet while studying (294, 29%),

and (2) those who used it very often (317, 31%). The age of the respondents had a high interpretive influence on the level of the Internet use while studying. The youngest age category (15-29 years) used the most Internet on average while learning (e.g., Moodle, e-learning, online interactive programs, YouTube, Google or Seznam, etc.).

Most of the respondents devoted their online studying to developing personal skills (213, 10%), studying foreign languages (192, 9%), using computers (101, 5%), and (98, 5%) to trade, management, and administration (finance, banking, insurance, accounting and taxation, etc.).

What is the influence of the selected variables on level of Internet use?

There were no significant differences in the use of Internet between males and females, $U = 124391$, $z = -.53$, $p = .60$, $r = .02$. However, statistically significant differences in use of Internet were detected across four different age groups, $\chi^2(3, n = 1,008) = 179.63$, $p < .001$, $\eta^2 = .18$, with greater use of Internet associated with younger age (see Table 3).

Table 3: Examining use of internet according to gender and age

| Variable | Gender | | Age | | | | <i>r</i> | <i>p</i> | χ^2 | <i>p</i> |
|----------|--------|---------|-------|-------|-------|------|----------|----------|----------|----------|
| | male | femal e | 15-29 | 30-44 | 45-59 | 60 + | | | | |
| Internet | 3.2 | 3.2 | 4.5 | 3.9 | 2.9 | 1.7 | .02 | .596 | 179.63 | .000*** |

Note: A seven-point Likert's scale was used ranging from 0 (never) to 6 (very often). *** = $p < .001$.

Education level achieved also influenced the use of Internet, $\chi^2(3, n = 1,008) = 67.16$, $p < .001$, $\eta^2 = .07$. Respondents with a university degree used the Internet to the greatest extent. Size of respondents' place of residence was not associated with a difference in the Internet use, $\chi^2(3, n = 1,008) = 7.02$, $p = .071$, $\eta^2 = .01$. Furthermore, the findings revealed a statistically significant difference in use of Internet while studying

across three different groups of the region, $\chi^2(2, n = 1,008) = 12.26$, $p < .01$, $\eta^2 = .01$. Those respondents who lived in Prague reached the highest level of Internet use for studying. Moreover, there was a small negative correlation between economic activity and use of Internet while studying ($r_{rho} = -.18$, $p < .001$, $r^2 = 3\%$), with high levels of Internet use associated with economically active respondents.

What is the preferred form of study materials?

The area of modern technologies and Internet is also related to preference for type of study materials (i.e., printed or electronic). Therefore, it was tested whether (1) respondents have a preference and, if so, whether (2) this preference was influenced by the gender, age, or education level achieved of the respondents.

What is the influence of the selected variables on the preferred form of study materials?

In general, a quarter of respondents (257, 25%) had no preference for study materials. Half of the respondents (525, 52%) preferred printed study materials and the last quarter of respondents (226, 22%) preferred electronic study materials. The proportion of males was significantly different from the proportion of females in their preference of

type of study materials, $\chi^2(2, n = 1,008) = 12.24, p < .01$, Cramer's $V = .11$. Females used traditional printed materials more often than males and vice versa. Also, the oldest respondents (60+ years) preferred printed study materials, which were on the other hand the least preferred form by the youngest respondents. The opposite trend can be seen in electronic study materials (see Figure 1). These differences were statistically significant, $\chi^2(6, n = 1,008) = 53.78, p < .001$, Cramer's $V = .16$. Although both differences were statistically significant, the strength of the relationship (a post-test Cramer's $V = .11$ and $.16$) indicated that the relationship was weak. Knowing the independent variable (i.e. gender and age) did not help in predicting the dependent variable (i.e. preferred form of study materials).

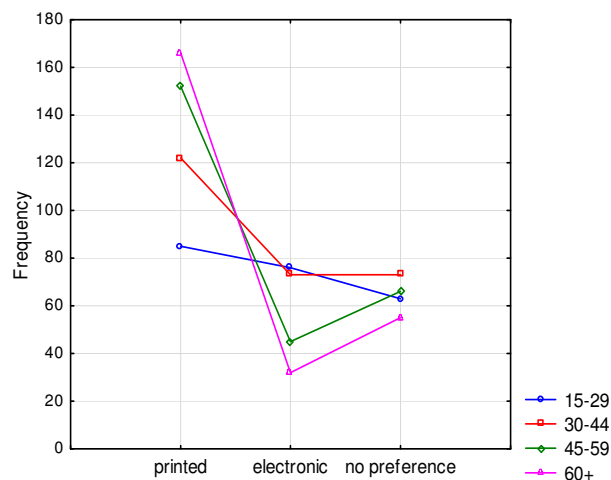


Fig. 1: Absolute values of preference of study materials by age

Surprisingly, there were no significant differences between education groups and respondents' preference of form of study materials, $\chi^2(6, n = 1,008) = .86, p = .99$, Cramer's $V = .02$. However, in general printed

materials were the most preferred form of study materials across all levels of education.

Research summary

The data revealed the following basic findings. On average, the Czech population ($N = 1,008$) uses modern technology and the Internet while studying. However, there were two main groups of respondents. The first consists of those who never use modern technology or the Internet while studying. The second consists of those who, on the contrary, use PC, laptop, tablet, and Internet very often. The use of state-of-the-art technology (i.e., PC, laptop, or tablet) and the Internet was considerably lower the higher the age, regardless of education level. Such a trend was found in all age categories. University graduates, although reaching the highest level of modern technology and Internet involvement, used modern technology and Internet sources while studying at higher level at younger ages. This finding highlights the fact that respondents born around the year 1957 and older most likely missed the era of rapid development of modern technology and are unable to catch up to this trend.

A third of the research sample never used modern technology while studying. Respondents aged 60 years and older represented the most frequent age category opting not to use PC, laptop, or tablet while studying. Surprisingly, respondents who never used modern technology while studying had most often achieved higher than elementary education, however, with just a few university graduates. Half of the respondents who did not use PC, laptop, tablet, or other modern technology while

studying lived in Moravia, followed by respondents from Bohemia, with the lowest proportion of respondents from the capital city Prague. According to our data, the economic activity of the respondents did not have a significant impact on those who never used modern technology while studying, indicating the financial accessibility of modern technology.

Out of the selected variables, age of respondents most strongly influenced the use of modern technology and internet while studying. Correspondingly, belonging to an age category helped explain 18% of the variance in modern technology and Internet use while studying (see Table 4). Moreover, education, region, and economic activity significantly varied the level of use of modern technology and the Internet. Size of respondent's place of residence also influenced the use of modern technology. The largest use of modern technology was detected among respondents with the largest size of place of residence (100,000 up). In contrast, gender did not vary the use of modern technology and Internet as a learning tool. However, in the case of preferred form of study materials, females used traditional printed materials more often than males and vice versa. Also, the oldest respondents (60 and up) preferred printed study materials, which in contrast were the form least preferred by the youngest respondents (up to 29 years). Although the differences in preferred form of study materials were statistically significant, the strength of the relationship indicated that the relationship was weak.

Table 4: Summary of test criteria and effect of size of tested variables on ICT

| Variables | Gender | | Age | | Education | | Size of place | | Region | | Economic activity | |
|------------|----------|----------|----------|----------|-----------|----------|---------------|----------|----------|----------|-------------------|---------------------------|
| | <i>p</i> | <i>r</i> | <i>p</i> | η^2 | <i>p</i> | η^2 | <i>p</i> | η^2 | <i>p</i> | η^2 | <i>p</i> | <i>r</i> ² (%) |
| technology | .891 | .01 | .000 | .18 | .000 | .08 | .006 | .01 | .000 | .02 | .000 | 4 |
| Internet | .596 | .02 | .000 | .18 | .000 | .07 | .071 | .01 | .002 | .01 | .000 | 3 |

Furthermore, most of the respondents used the Internet while studying to develop personal skills, pick up a foreign language, learn how to use computers, or for future development in the fields of finance, banking, insurance, and accounting.

The research presented has several potential limitations. The first concerns the selected research technique. The questionnaires used measured probable statements by the respondents instead of real study activity. However, a general disadvantage of such an approach is the loss of control over the reliability of the data. This deficiency was balanced by the selection of a representative sample. The second limitation can be seen while working with nominal data in the form of comparison of frequencies (Chi-squared test). The results will always copy the proportion of the frequencies of nominal categories by gender, age, and other selected variables. However, the proportions in the data correspond to the proportions existing in the population. Lastly, it should be noted that in large data sets even small differences show high statistical significance. However, the post-tests were checked and interpreted. Despite all the limitations mentioned, the presented findings represent unique information in the field of modern technology, Internet, and type of study materials use in the Czech environment.

Conclusion

The current young generation is the first generation that is growing up and socially maturing through new technologies and

social networking. Such a development creates differences across generations and makes a significant difference between those who have become familiar with new technologies in a later stage of life. This trend was also reflected by the predominance of the younger generation in the most affected age category by technology development (Kolesárová, 2014).

The competencies needed for the successful self-realization of each individual are different, and the ways in which these competencies can be achieved and developed nowadays differ considerably. Without a doubt, modern technology plays a crucial role and creates the need to re-evaluate educational goals and change practices in the education system. The Vision of the Digital Education Strategy by 2020 (MŠMT, 2014) is that the education system will ensure that every individual without discrimination will achieve the highest possible competencies that will enable him or her to succeed in the present and future information society through the option to use open education in the context of lifelong learning. Despite this effort, the current centralized education system has not responded with sufficient flexibility to information development.

The aim of this study was to find out how the Czech population uses modern technologies and the Internet in learning. The results broaden the knowledge in an area still affected by new challenges and untapped opportunities. Hence, new initiatives are emerging (Arnesh, Erstad, Jahaňák, & Zounek, 2016) calling for increased attention

to this area and motivating further theoretical and research activity in the area of ICT in Czech education.

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