

RESEARCH REPORT

Czech teachers in the world of technologies



Czech teachers in the world of technologies (research report)

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Contribution 50:50.

O2 Czech Republic & Palacký University in Olomouc

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Introduction

The new **“Czech teachers in the world of technologies”** research is focused on a topic that has become important and widely discussed recently – during the coronavirus pandemic when a majority of schools were forced to switch from in-house to on-line teaching. We focus on Czech teachers in the world of technologies, both on-line and off-line. We examine how familiar teachers are with technologies, how they use technologies, how they see themselves in relation to technologies, what attitude to technologies they have, any differences between school levels in using technologies, etc.

We also consider security – we examine whether technologies are used securely in schools, how schools protect their computers and networks, whether they have to face security threats, etc.

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1. About the research

The **Czech teachers in the world of technologies** research has been conducted by the Centre for the Prevention of Risky Virtual Communication at the Faculty of Education of Palacký University in Olomouc, in cooperation with O2 Czech Republic. It follows previous research projects on risky on-line behaviour of both adults and children, conducted by the same research team in 2015–2019.

The research has been funded by O2 Czech Republic under so called contractual research. No public funding or EU funding have been drawn.

2. Methods

2.1 Procedure

We chose anonymous on-line questionnaire as the primary research tool. It was distributed to all regions within the Czech Republic,

Data collection was conducted from 1st February 2020 to 25. 6. 2020. Evaluation and interpretation of partial outputs were completed in the following weeks. We used the Statistica software for a detailed evaluation.

2.2 Participants

The total of **2165** Czech teachers aged 21–78 participated in the research. Average age is 47,6 (median 48, modus 53). The sample consists of 74.27 % female and 25.73 % male respondents.

Most respondents come from Prague (15,1 %), the Jihomoravský region (12.52 %), the Moravskoslezský region (11.78 %) and the Středočeský region (10.85 %).

As for education background, 63.7 % are graduates from faculties of education, 10.16 % graduates from faculties of science, 7.76 % graduates from faculties of arts, and 18.38 % have another type of qualification. Most teachers have either Mgr. (80.42 %) or Ing. (9.88 %) academic title. This reflects reality in schools where teachers are not necessarily graduates from the faculty of education. 4.3 % of the sample are teachers with a high school qualification (A-levels).

66.74 % of respondents teach at primary & lower secondary schools, 29.19 % at upper secondary schools, and also some nursery (2.31 %) and college (1.66 %) teachers participated.

As for years in service, the average service age of participating teachers is 20.9 years.

2.3 Terminology

In the research, we focus on what is called **digital technologies**. This category includes all technologies that can be used in both on-line and off-line teaching. Digital technologies therefore include diverse kinds of digital tools used within the school as well as on-line services and apps used in on-line teaching.

2.4 Limits

A good part of the research was conducted when schools were closed and teachers were not physically present in the school. Therefore we were not able to disseminate hard copy documents and reach those who were not willing to complete our on-line questionnaire.

2.5 Context

Introducing digital technologies in teaching has been discussed in the Czech education environment for years. Several government strategy documents deal with the topic – *Digital Education Strategy for 2020* (MŠMT, 2014) and *Digital literacy strategy 2015–2020* (MPSV, 2015), and it is also part of the *National education policy 2030+*. Introducing modern technologies into teachers' work (not only actual teaching) is also discussed in the European Framework for the Digital Competence of Educators (DigCompEdu) (Redecker & Punie, 2018), offering methods of functional and meaningful integration of IT tools in teaching. Although the above documents declare a range of goals, the strategy is failing to be widely implemented.

According to the Czech School Inspectorate report (Neumajer, 2017) focused on the conditions for employing digital technologies in education, the policy and funding is not effective, staffing is insufficient, computers are obsolete, connection is poor, the situation is critical. Only 4.8 % of small schools (up to 150 students) and 9.5 % of bigger schools meet the standards. The rate is 21.6 % with high schools and colleges. A more recent research by the Czech School Inspectorate report (2018) focused on digital technologies in teaching suggests that two thirds of teachers don't use digital technologies the way they should.

The “Czech teachers in the world of technologies” research follows previous research projects in the field and our questions are presented directly to teachers (not school headmasters). Therefore it provides a unique view of reality in Czech primary and secondary schools.

3. Results

3.1 Teachers and digital technologies in the on-line world

We focused on teachers in the world of technologies, on their own experience with using technologies, their attitude to technologies in school, and we were also interested in teachers' self-esteem in relation to technologies. Over half of our respondents consider themselves to be **regular users of digital technologies (66.24 %)**, **a quarter of them see themselves as an advanced users (26.19 %)** and **some as an experts (3,83 %)**. **Mere 3.51 % consider themselves beginners in using digital technologies.**

3.1.1 Digital technologies as a tool for contact with students

Digital technologies – particularly on-line tools and services – are commonly used for communication with students and parents. Traditionally, schools use e-mail, school websites or SMS/MMS, but the use of various messengers and social networks has also been rising. The following charts summarize the services used most frequently to contact students out of school.

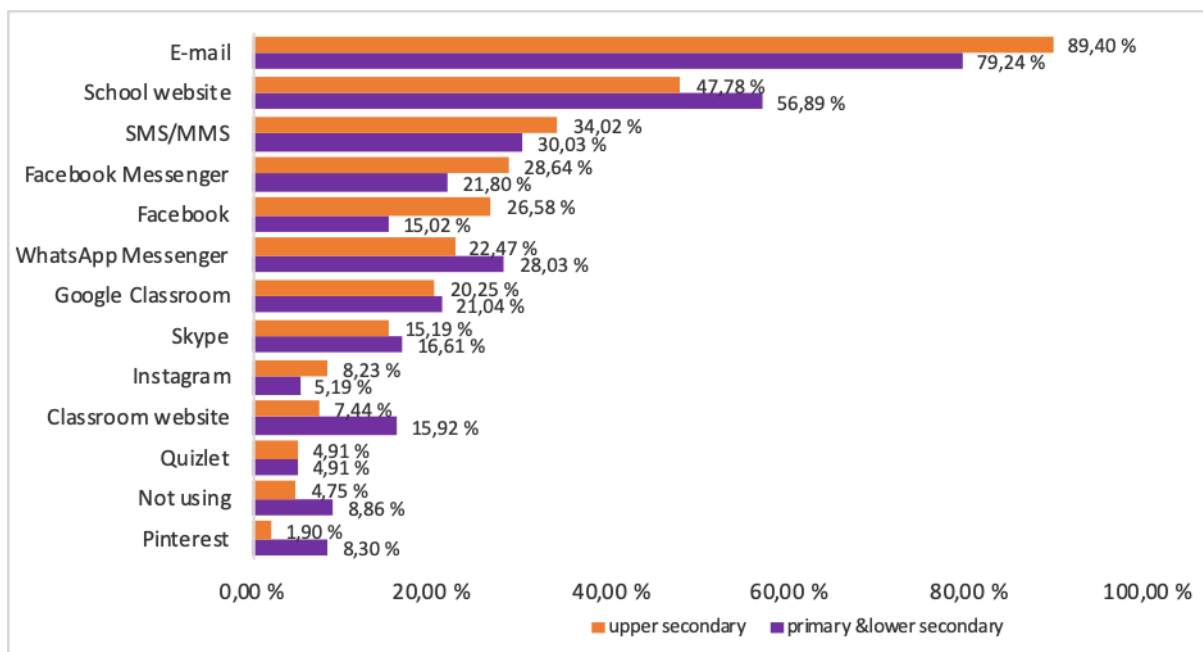
Table 1. On-line tools/services used by teachers to out-of-school contact with students

| Category | Frequency (n) | Relative frequency (%) |
|--------------------|---------------|------------------------|
| E-mail | 1769 | 81.71 |
| School website | 1159 | 53.53 |
| SMS/MMS | 679 | 31.36 |
| WhatsApp Messenger | 567 | 26.19 |
| Facebook Messenger | 514 | 23.74 |
| Google Classroom | 441 | 20.37 |
| Facebook | 402 | 18.57 |
| Skype | 351 | 16.21 |
| Classroom website | 288 | 13.30 |
| Not using | 178 | 8.22 |
| MS Teams | 152 | 7.02 |
| Pinterest | 144 | 6.65 |
| Instagram | 133 | 6.14 |
| Quizlet | 105 | 4.85 |
| Viber | 72 | 3.33 |
| Zoom | 56 | 2.59 |
| Bakaláři | 55 | 2.54 |
| Edookit | 52 | 2.40 |
| iTŘÍDA | 20 | 0.92 |
| Twitter | 16 | 0.74 |
| Not stated | 8 | 0.37 |

(n=2165).

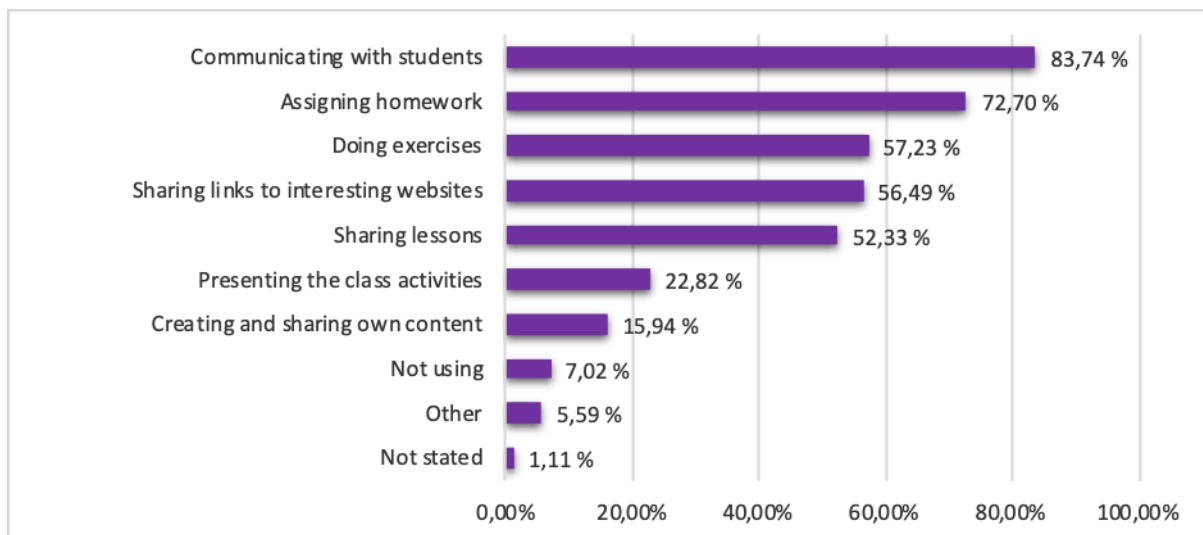
Methodology comment: Teachers received a detailed list of various communication services/tools including the option to add their own. Therefore, complex school information systems (such as Bakaláři) are also included. We will discuss these in more detail further down.

Table 2. On-line tools/services used by teachers to out-of-school contact with students (primary & lower secondary vs. upper secondary)



Teachers use on-line tools primarily to communicate with students (83.74 %), to assign homework (72.7 %) and exercises (57.23 %), to share links to interesting websites (56.49 %), to share lessons (52.33 %), to present the class activities (22.82 %) etc.

Chart 1 What do teachers use on-line services for (in relation to students)?



(n=2165).

3.1.2 Digital technologies as a tool for contact with parents

Teachers also use digital technologies to contact parents.

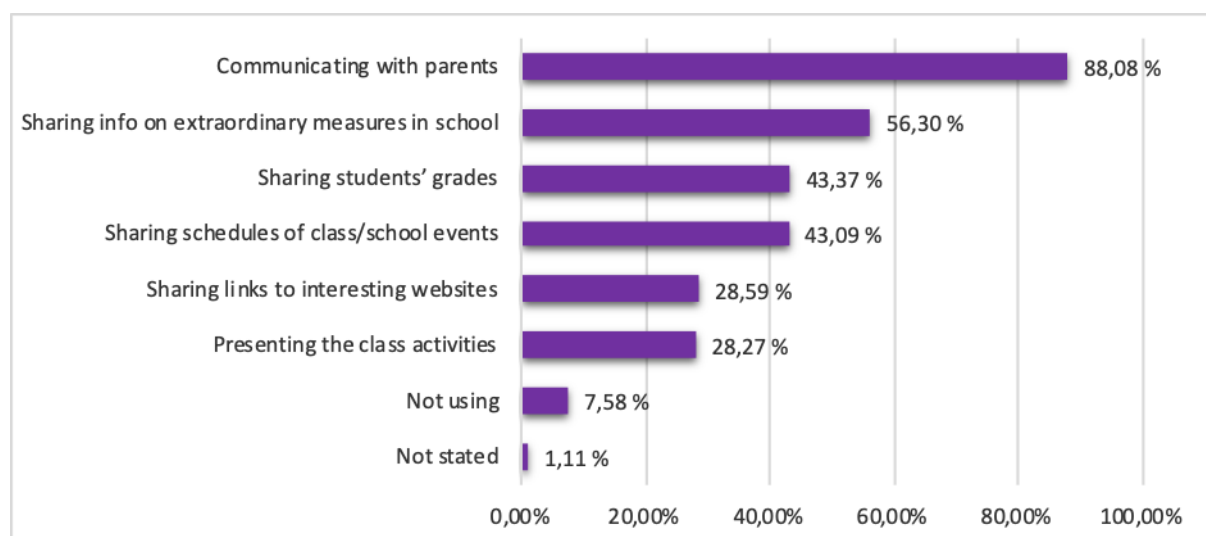
Table 3. On-line tools/services used by teachers to out-of-school contact with parents

| Category | Frequency (n) | Relative frequency (%) |
|--------------------|---------------|------------------------|
| E-mail | 1817 | 83.93 |
| School website | 1135 | 52.42 |
| SMS/MMS | 846 | 39.08 |
| WhatsApp Messenger | 416 | 19.21 |
| Facebook Messenger | 285 | 13.16 |
| Classroom website | 248 | 11.45 |
| Bakaláři | 242 | 11.18 |
| Facebook | 192 | 8.87 |
| Not using | 139 | 6.42 |
| Skype | 124 | 5.73 |
| Google Classroom | 115 | 5.31 |
| Edookit | 68 | 3.14 |
| Edupage | 42 | 1.94 |
| Viber | 41 | 1.89 |
| Microsoft Teams | 32 | 1.48 |
| Instagram | 32 | 1.48 |
| Škola OnLine | 31 | 1.43 |
| Pinterest | 22 | 1.02 |
| iTRÍDA | 11 | 0.51 |
| Zoom | 8 | 0.37 |
| Twitter | 7 | 0.32 |
| Quizlet | 4 | 0.18 |
| Schoology | 2 | 0.09 |
| Not stated | 5 | 0.23 |

(n=2165).

Within communication with parents, teachers use on-line tools for regular communication (88 %), but also to share information on extraordinary measures in school (56.3 %), on students' grades (43.37 %) and on class/school events (43.09 %).

Chart 2 What do teachers use on-line services for (in relation to parents)?



(n=2165).

3.1.3 School information systems

A vast majority of teachers confirmed that they use school information systems. The Bakaláři system dominates, used by almost 60 % teachers (59.08 %), followed by Škola OnLine (11.78 %) and Edookit (6.65 %). 85.77 % teachers also log in to school information systems from home.

Table 4. School information systems used by teachers

| School information systems | Frequency (n) | Relative frequency (%) |
|----------------------------|---------------|------------------------|
| Bakaláři | 1279 | 59.08 |
| Škola OnLine | 255 | 11.78 |
| Edookit | 144 | 6.65 |
| EduPage | 142 | 6.56 |
| dm Software | 137 | 6.33 |
| lŠkola | 73 | 3.37 |
| eTřídnice | 67 | 3.09 |
| aSc Rozvrhy | 23 | 1.06 |
| SAS | 3 | 0.14 |
| Not stated | 148 | 6.84 |

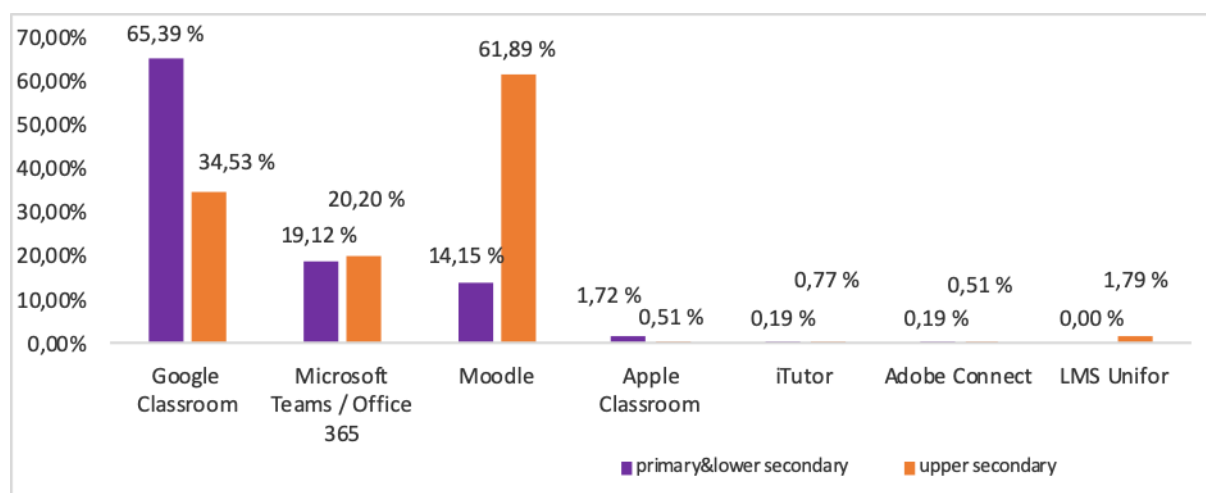
(n=2165).

3.1.4 LMS in school

LMS (learning management systems) are used by less than a half of our sample group (41.52 %). LMS are used more frequently by upper secondary teachers – use confirmed by 59.97 % responding teachers working at upper secondary schools. In primary & lower secondary schools, LMS are used less (uses confirmed by 34.19 % teachers).

Google Classroom dominates in primary & lower secondary schools (23 % teachers having this system installed and using it), followed by Microsoft Classroom (basically it is Teams, it was called MS Classroom only for a short time) and Moodle. Upper secondary schools are dominated by Moodle (use confirmed by 38.3 % upper secondary teachers).

Chart 3 Most popular LMS systems (primary & lower secondary vs. upper secondary)



($n_{\text{primary}}=523$, $n_{\text{upper}}=391$)

Methodology comment: The chart captures the most popular LMS, although schools/teachers can use more systems simultaneously. Apple Classroom was added by respondent teachers, although it is rather a classroom management system than an LMS.

3.1.5 Cloud storage in schools

Over a half of respondents (67.39 %) use cloud storage in school. The dominant service is OneDrive (Office 365 by Microsoft), used by 63.01 % teachers. Second place is taken by Google Drive (part of Google Apps or G-Suite), used by approximately one third (34.95 %) of teachers. 10.56 % of schools use a proprietary cloud storage.

3.1.6 Content management systems (CMS) used for school websites

We asked school website admins whether they use any of the content management systems available for the administration of their websites. Over a half of school website admins confirmed their use of a CMS (57.69 %) while 42.31 % admins run the websites without a content management system.

Table 5. Most popular website content management systems in Czech schools

| Content management system | Frequency (n) | Relative frequency (%) |
|---------------------------|---------------|------------------------|
| WordPress.com | 160 | 36.70 |
| Other | 111 | 25.46 |
| Joomla! | 56 | 12.84 |
| Webnode.cz | 50 | 11.47 |
| Google Sites | 21 | 4.82 |
| Drupal | 20 | 4.59 |
| IPO | 13 | 2.98 |
| PhpRS | 3 | 0.69 |
| TYPO3 | 2 | 0.46 |

(n=436).

School websites are most frequently hosted on private third party servers (58.91 %), while 41.09 % schools use their own servers.

3.1.7 Teachers and passwords

Almost $\frac{3}{4}$ teachers (73.16 %) use different passwords to login into particular school systems while 17.78 % use just a single password. 2.31 % teachers also confirmed that they use the same password to access both school systems and their out-of-school/private accounts.

3.1.8 Teachers in the on-line word – additional information from respondents

Only 6.47 % stated that they actively use MOOC (Massive Open On-line Courses), 54 % stated that they don't know what it is.

13.21 % teachers use open educational resources while 59.49 % stated that they don't know what it is.

36.07 % teachers from our sample confirmed to be members of an on-line teacher community. The most popular communities include Učitelé+ (visited by 13.76 % teachers from our sample), various associations and unions, depending on the teachers' major subject (10.58 % + 6.42 %) and the Pedagogical Chamber (5.45 % of our sample).

We also asked teachers whether they use youtubers' videos in classroom. These videos are used only by 18.29 % teachers while 79.49 % don't use youtubers in classroom or for homework.

3.2 Teachers and technical tools in school

The second part of our research focuses on technical tools and various kinds of digital teaching technologies used by teachers. Teachers can choose from a wide range of technologies, commonly using printers or all-in-ones, interactive whiteboards and desktop computers. These are, however, not available to all teachers. See a mere detailed overview in the following chart.

Table 6. Technical tools in school

| Technical tool | Frequency (n) | Relative frequency (%) |
|---|---------------|------------------------|
| Printer, all-in-one, copying machine | 1666 | 76.95 |
| Interactive whiteboard | 1456 | 67.25 |
| Desktop computer in classroom | 1414 | 65.31 |
| Projector | 1384 | 63.93 |
| Laptop | 1382 | 63.83 |
| Scanner | 1089 | 50.30 |
| Tablet | 791 | 36.54 |
| Video player, DVD player | 586 | 27.07 |
| Tape recorder | 408 | 18.85 |
| TV | 359 | 16.58 |
| Visualiser | 322 | 14.87 |
| Radio | 268 | 12.38 |
| Digital microscope | 144 | 6.65 |
| Interactive and robotic technologies (more details in the following questions) | 143 | 6.61 |
| Interactive LCD panel | 141 | 6.51 |
| 3D printer | 128 | 5.91 |
| Overhead mirror projector (meotar) | 119 | 5.50 |
| Mobile phone | 34 | 1.57 |
| 3D scanner | 27 | 1.25 |
| Not using | 13 | 0.60 |
| Video camera | 5 | 0.23 |
| Camera | 4 | 0.18 |

(n=2165).

Finding out what teachers actually use the technologies for, was also important. The most frequent activity involving digital technologies is showing short educational films (short video snippets), showing presentations (typically MS PowerPoint), showing pictures and looking up information on the Internet. The following chart captures activities involving technical tools in more detail.

Table 7. Educational activities involving technical tools

| Activity | Frequency (n) | Relative frequency (%) |
|---|---------------|------------------------|
| Showing short educational films (such as short tutorial videos, video snippets, etc.) | 1879 | 86.79 |
| Showing presentations (such as MS PowerPoint) | 1848 | 85.36 |
| Showing pictures | 1699 | 78.48 |
| Looking up and presenting information from the Internet | 1512 | 69.84 |

| | | |
|---|------|-------|
| Presenting student projects | 1419 | 65.54 |
| Showing animations (to illustrate certain processes, etc.) | 1213 | 56.03 |
| Testing students' knowledge and skills | 662 | 30.58 |
| Students creating content themselves | 634 | 29.28 |
| Collaborative methods (such as group work with a tablet where students share their work with others) | 387 | 17.88 |
| Taping activities in classroom (with a video camera, mobile phone, tablet) | 333 | 15.38 |
| Polling, decision making (via a mobile phone) | 269 | 12.42 |
| Not using | 17 | 0.79 |
| Not stated | 11 | 0.51 |

(n=2165).

78.66 % teachers confirmed that they use technologies also for preparation. Finding out whether teachers have access to educational technologies, is also very important. Over $\frac{3}{4}$ teachers (76.12 %) have unlimited access to these technologies in school while 16.58 % stated that these technologies are available only in certain classrooms. 6.33 % teachers have access to educational technologies only in special classrooms (a computer room etc.).

Over a half of teachers use technical tools several times a day (56.17 %), or several times a week (29.52 %). Over a half of teachers (62.82 %) have attended a training on educational technologies. 36.21 % teachers have not attended such training.

3.2.1 On-line services in teaching

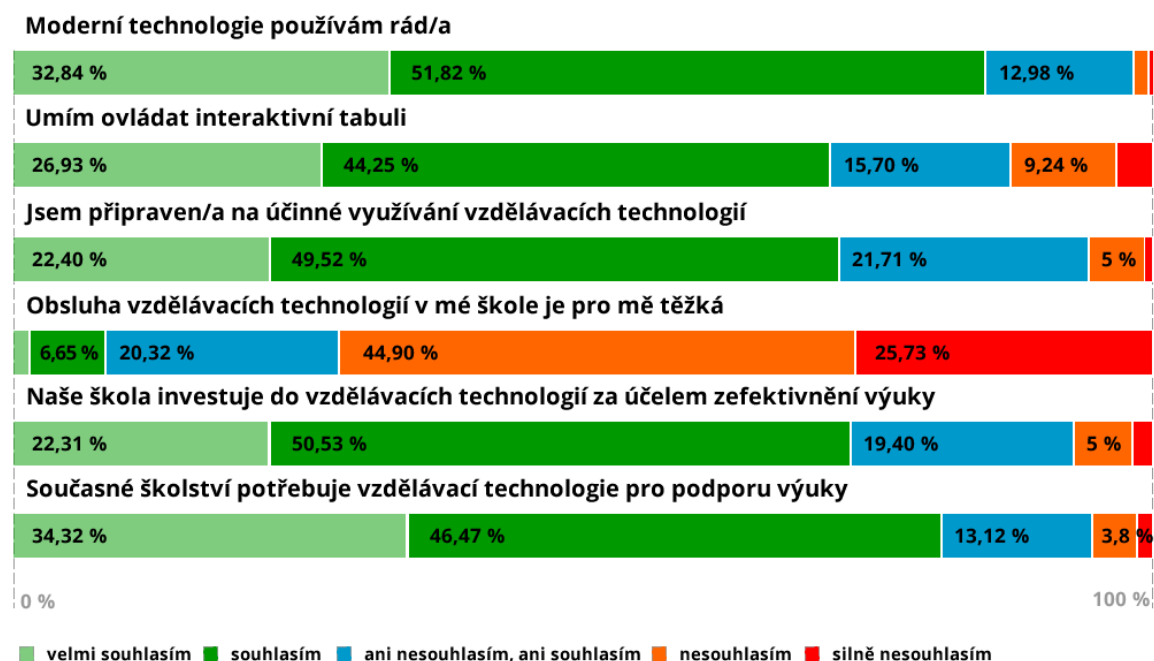
Teachers commonly use Internet search services (92.98 %), video content services (not youtubers, though) (81.52 %), on-line encyclopaedias (81 %), on-line maps (61.94 %), exercise services (55.94 %) etc.

3.2.2 What do teachers think about modern technologies in education?

We also focused on how teachers relate themselves to technologies. We presented teachers with several statements to be evaluated on a 5-point Likert scale.

Teachers (n=2165) have predominantly a positive attitude to technologies, most of them like using modern educational technologies, they consider themselves to be prepared in the field of using modern technologies, and they don't find it difficult to work with educational technologies. Also, most of them understand that today's schools need educational technologies to support teaching.

Chart 4 Teachers and modern technologies



3.2.3 Interactive programmable tools in teaching

We dedicated a separate part of our research to interactive programmable tools in teaching, such as robots, construction kits etc., that can be programmed. We divided the sample into three basic groups – primary schools (530 teachers), lower secondary schools (922 teachers) and upper secondary schools (632 teachers). We then observed what technologies teachers use in each group. We presented our teachers with a list of 30 most popular interactive programmable tools they could choose from, with the option to add their own if not originally included in the list.

A. Interactive programmable tools in primary schools

60 % primary teachers stated that they don't use interactive programmable tools at all. The rest of them use such tools rather rarely. The Bee-Bot robotic bee dominates in primary schools, followed by Ozobot (BIT version), Ozobot (EVO version) and Blue-Bot, an advanced version of the bee.

Table 8. Interactive programmable tools in primary schools (TOP 10)

| Tool | Frequency (n) | Relative frequency (%) |
|---------------------------------------|---------------|------------------------|
| Bee-Bot (robotic bee) | 43 | 8.11 |
| Ozobot BIT | 24 | 4.53 |
| Ozobot EVO | 13 | 2.45 |
| Blue-Bot | 9 | 1.70 |
| LEGO Education WeDo 2.0 | 9 | 1.70 |
| Code & Go Robot Mouse (robotic mouse) | 7 | 1.32 |

| | | |
|---------------------|---|------|
| LEGO Mindstorms EV3 | 7 | 1.32 |
| LEGO Boost | 5 | 0.94 |
| Edison | 4 | 0.75 |
| Micro:Bit | 4 | 0.75 |

(n=530).

B. Interactive programmable tools in lower secondary schools

63.12 % lower secondary teachers stated that they don't use interactive programmable tools at all. The dominating technology in lower secondary schools is Ozobot BIT, followed by Lego Mindstorms EV3 and Ozobot EVO.

Table 9. Interactive programmable tools in lower secondary schools (TOP 10)

| Tool | Frequency (n) | Relative frequency (%) |
|-------------------------|---------------|------------------------|
| Ozobot BIT | 57 | 6.18 |
| LEGO Mindstorms EV3 | 54 | 5.86 |
| Ozobot EVO | 46 | 4.99 |
| Bee-Bot (robotic bee) | 25 | 2.71 |
| LEGO Education WeDo 2.0 | 20 | 2.17 |
| Arduino | 18 | 1.95 |
| Micro:Bit | 14 | 1.52 |
| Blue-Bot | 13 | 1.41 |
| Edison | 13 | 1.41 |
| LEGO Boost | 10 | 1.08 |

(n=922).

The use of Interactive programmable tools in lower secondary schools often depends on the IT teacher. Therefore we wanted to know how IT teachers use these technologies. It has to be mentioned that over a half of IT teachers in lower secondary schools (51.97 %) don't use these tools. The following chart captures technologies used by IT teachers in lower secondary schools.

Table 10. Which interactive programmable tools do IT teachers use in lower secondary schools (TOP 10)?

| Technology | Frequency (n) | Relative frequency (%) |
|-------------------------|---------------|------------------------|
| Ozobot BIT | 44 | 19.21 |
| LEGO Mindstorms EV3 | 35 | 15.28 |
| Ozobot EVO | 34 | 14.85 |
| Bee-Bot (robotic bee) | 19 | 8.30 |
| LEGO Education WeDo 2.0 | 17 | 7.42 |
| Arduino | 15 | 6.55 |
| Micro:Bit | 13 | 5.68 |

| | | |
|------------|----|------|
| Blue-Bot | 10 | 4.37 |
| LEGO Boost | 7 | 3.06 |
| mBot | 5 | 2.18 |

(n=229).

C. Interactive programmable tools in upper secondary schools (TOP 10)

66.14 % upper secondary teachers stated that they don't use interactive programmable tools at all. Dominating technologies in upper secondary schools are Arduino, Lego Mindstorms EV3, Ozobot BIT and Micro:Bit.

| Tool | Frequency (n) | Relative frequency (%) |
|-----------------------|---------------|------------------------|
| Arduino | 40 | 6.33 |
| LEGO Mindstorms EV3 | 30 | 4.75 |
| Ozobot BIT | 21 | 3.32 |
| Micro:Bit | 19 | 3.01 |
| Ozobot EVO | 13 | 2.06 |
| Raspberry Pi | 13 | 2.06 |
| mBot | 10 | 1.58 |
| Bee-Bot (robotic bee) | 8 | 1.27 |
| Edison | 8 | 1.27 |
| LEGO Boost | 4 | 0.63 |

(n=632).

3.2.4 The basics of programming in school

Over a third of teachers (35.33 %) confirmed that introduction to programming is taught at their school. The dominant programming languages are Scratch (31 %), and OzoBlockly (15.72 %). Further down the leaderboard are Basic, Java, programming in Minecraft Education Edition, or C#.

3.3 Are Czech teachers techno-optimists or rather techno-pessimists?

In the research, we also focused on finding out whether teachers consider themselves, in relation to modern technologies, to be techno-optimistic, techno-pessimistic or techno-realistic. **Majority of teachers in our sample (58.48 %) see themselves as techno-realists**, they have a neutral attitude to technologies, they understand the benefits but by the same token, they don't overestimate it. Over a third of teachers (37.32 %) are techno-optimistic. Only a small proportion are techno-pessimistic, with a very negative attitude to technologies (2.77 %).

3.4 Czech teachers and safe use of technologies

We dedicated a separate part of our research to finding out whether teachers behave safely in relation to technologies.

When securing computers within the school computer network, teachers' computers are often overlooked. Therefore we tried to find out whether teachers' computers are secured against inappropriate on-line content.

3.4.1 Are teachers' computers are secured against inappropriate Internet content?

45.31 % teachers confirmed to have their computers secured against inappropriate Internet content (particularly pornography). **23.14 % confirmed not to have their computers secured against inappropriate content.** A quarter of teachers believe to have their computers secured but they have never checked.

3.4.2 How are USB ports on school devices secured?

We also focused on how schools manage access to school computers via USB ports – when connecting a USB thumb drive, external hard drive etc. Many apps, including web browsers, are available in a portable version, i.e. can be used without installation. We directed this question to teachers who administer school computer networks.

Most network admins (64.92 %) stated that they don't have USB port access under control. 22.58 % stated that access is limited on student computers, 9.95 % have these limitations in place on classroom computers. 2.55 % admins confirmed to have such restrictions in place on staff computers.

3.4.3 Security of school computer networks

We were indeed interested in the security of school computer networks, therefore we asked school network admins again.

Most school computer network admins (95.6 %) confirmed that an active firewall (in an active network element, etc.) is used in their school. We were also interested in the security of wireless networks. The most popular security measures are **WPA2 protocol (45.36 %)**, MAC address filtering (19.44 %), client authentication (18.79 %), and hidden SSID* (12.10 %).

Almost a half of respondent teachers (48.45 %) stated that their school WIFI is available to both students and teachers. Approx. 40 % respondents stated that their school WIFI is available to teachers only. 7.21 % teachers have no WIFI access in the school (neither teachers or students).

3.4.4 Do schools experience attacks against their computer networks?

We also examined whether schools experience attacks against their computer networks. **Approx. a quarter (23.29 %) school computer network admins have experienced such attacks.**

Most frequently, schools have to face ransomware that infiltrates the networks particularly through e-mail accounts. Such attacks result in school data being encrypted, and the school must then recover it from a backup. In many cases, schools deleted their data in the end, because they had no backups available. Another frequent kind of attack reported by teachers is DDOS, and malware in general. Breaches based on stolen passwords (or guessed passwords) are rather rare.

Word cloud: What threats do schools face?



3.4.5 Using mobile phones by students in school

In connection with the “Czech children in the cyberworld” research” (2019) asking students how mobile phones are restricted in their schools, we directed the same question to teachers now. Results are very similar to those obtained in 2019.

Table 11. Restrictions on the use of mobile phones by students in school

| | Frequency (n) | Relative frequency (%) |
|---|---------------|------------------------|
| PROHIBITED during lessons, ALLOWED during breaks | 1070 | 49.42 |
| ALLOWED during lessons and breaks | 226 | 10.44 |
| PROHIBITED during lessons and breaks | 625 | 28.87 |
| ALLOWED during lessons, PROHIBITED during breaks | 177 | 8.18 |
| Not stated | 67 | 3.09 |

(n=2165).

We also wanted to find out whether teachers know what students do with their mobile phones during breaks. In 35.8 % cases, teachers stated that mobile phones are prohibited during breaks in their school so students actually don't use them during break times. **48.68 % teachers stated that they don't know what students do with their mobile phones during breaks.** Only 12.19 % teachers have some knowledge on what students do with their mobile phones during breaks.

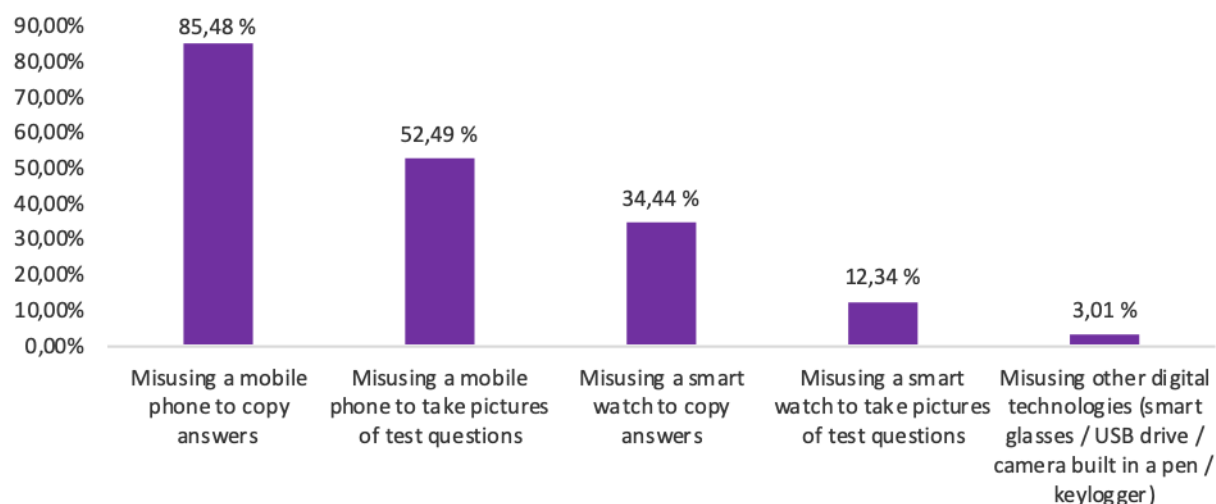
We also asked teachers whether students in their school use mobile phones to visit inappropriate websites (particularly for pornographic and violent content). This was confirmed by 12.19 % teachers.

3.4.6 Students and cheating through technologies

Technologies provide a range of benefits in school, but they can also be misused – for example to cheat. Therefore we asked teachers whether their students misuse modern technologies (such as mobile phones) to cheat.

41.80 % teachers from our sample confirmed that their students have misused technologies to cheat, almost a half of teachers (49.70 %) stated that their students have not misused technologies. However, it cannot be established whether teachers were actually aware of such cheating through technologies.

Chart 5 Which technologies do students use to cheat?



(n=964).

NB: Copying through a mobile phone means that students have a cheat sheet in their mobile phone or they look up answers on the Internet.

Table 12. Technologies used for cheating

| Activity | Frequency (n) | Relative frequency (%) |
|---|---------------|------------------------|
| Misusing a mobile phone to copy answers | 824 | 85.48 |
| Misusing a mobile phone to take pictures of test questions | 506 | 52.49 |
| Misusing a smart watch to copy answers | 332 | 34.44 |
| Misusing a smart watch to take pictures of test questions | 119 | 12.34 |
| Misusing other digital technologies (smart glasses / USB drive / camera built in a pen / keylogger) | 29 | 3.01 |

(n=964).

3.5 Czech schools on the Internet

We also observed whether and how schools present themselves on the Internet, such as on social networks.

Over a half of teachers (52.47 %) confirmed that their school has a social network account. Facebook is the most popular space for school presentations (confirmed by 93.72 % teachers whose school promotes itself on social networks), Instagram (confirmed by 22.99 % teachers whose school promotes itself on social networks), YouTube, and Twitter.

Interestingly, 19.21 % respondent teachers stated that they keep a virtual friendship with their current students (such as on Facebook).

3.5.1 Students' pictures on-line

Publishing students' pictures on-line by the school is a widely discussed topic related to schools on the Internet.

Table 13. Where do schools publish their students' pictures?

| Platform | Frequency (n) | Relative frequency (%) |
|--|---------------|------------------------|
| The school website | 1834 | 84.71 |
| Social networks | 504 | 23.28 |
| The school cloud (proprietary) | 189 | 8.73 |
| An external photo sharing service (such as Rajče.net) | 181 | 8.36 |
| An external cloud (such as OneDrive, Google Drive, Dropbox etc.) | 119 | 5.50 |

(n=2165).

3.6 Further findings

3.6.1 Using CCTV systems and chip access in schools

In view of recent tragic incidents, it is worth exploring how schools secure access to the premises and whether they use CCTV systems and chip access.

39.12 % respondents stated that CCTV is not used in their school. While the remaining teachers work in schools with CCTV in place. 42.49 % teachers stated that CCTV cameras are pointed at the school entrance, while 21.76 % teachers inform that in their school, cameras cover the space in front and around the school building. 15.33 % respondents confirm that CCTV cameras cover the school corridors. Of course, camera installations can be combined, i.e. a school can cover its entrance, surroundings as well as corridors inside.

As for chip access to the school building – **50.21 % respondents stated that they don't use chip access.** In all other cases, chip access is used – 42.31 % for teacher access, 35.20 % for student access, 28.96 % for non-teaching staff access. Again, access options can be combined within a particular school.

3.7 Conclusion

A. Teachers and technologies

Teachers' view on using modern technologies in teaching is **relatively optimistic, a vast majority of teachers (85 %) stated that they like using technologies.** Most of them also feel prepared to use educational technologies effectively and they agree that the current educational system needs technologies to support teaching.

In relation to technologies, most teachers regard themselves regular users (66.2 %) or even advanced users (26.19 %) of digital technologies. Only a small fraction see themselves as beginners (3.51 %).

Teachers see themselves as techno-realists (58.48 %) or techno-optimists (37.32 %).

Teachers utilize a wide range of technologies – both in the on-line world and off-line. To communicate with students, e-mail, school websites and mobile phones (voice calls, SMS, MMS) are used most, while preferred on-line tools include WhatsApp Messenger (26.19 %) or Facebook Messenger (23.74 %). Also Google Classroom is among teachers' favourite on-line tools (20.37 %). Teachers use on-line tools to communicate with students (83.74 %), to assign homework (72.70 %) to do exercises (57.23 %), to share links to interesting websites (56.49 %), etc.

Teachers use a wide range of school information systems while the dominant systems include Bakaláři (59.08 %), Škola OnLine (11.78 %), Edookit (6.65 %) and EduPage (6.56 %). Other on-line systems include so called LMS – these are, however, used less frequently in the school environment. Only 34.19 % teachers use LMS in primary & lower secondary schools, and 60 % in upper secondary schools.

A majority of teachers (67.39 %) use cloud storages in school, the dominant being OneDrive by Microsoft (used by 63 % teachers). Followed by competitor Google Drive by Google, used by approx. 35 % teachers.

We also examined whether teachers use any of the more complex e-learning solutions (LMS, learning management systems). These are used by less than a half of our sample (41.52 %). LMS are used more by upper secondary teachers. Primary & lower secondary teachers prefer

Google Classroom, followed by Microsoft Teams, while upper secondary schools are dominated by LMS Moodle, used by 38.3 % upper secondary teachers (242 out of 632).

Schools normally use websites while 57.69 % school website admins confirmed the use of content management systems. The most popular CMS for a school website is WordPress.

In lessons or to facilitate lessons, most teachers use various information or communication technologies. A vast majority (77 %) use printers, interactive whiteboards (67.25 %), classroom computers (65.31 %), projectors or laptops (approx. 64 %), as well as scanners (50.30 %). Approx. 36 % teachers use a tablet in lessons.

Finding out what teachers actually use the technologies for, was also important. **The most frequent activity involving digital technologies is showing short educational films (short video snippets) (87 %), showing presentations (typically MS PowerPoint) (85.36 %), showing pictures and looking up information on the Internet. (69.84 %).** In approx. 29 % cases, technologies were used for students creating educational content themselves. 17.88 % teachers also use technologies for collaborative tasks (group work, etc.).

Over a half of teachers use technical tools several times a day (56.17 %), or several times a week (29.52 %). Over a half of teachers (62.82 %) have attended a training on educational technologies. 36.21 % teachers have not attended such training.

We dedicated a separate part of this research to interactive programmable tools in lessons. These are considered in reforms in the teaching of IT, currently being introduced. We wanted to find out how these technologies are used in particular school levels.

60 % primary teachers stated that they don't use interactive programmable tools at all. The rest of them use such tools rather rarely. Primary schools are dominated by Bee-Bot robotic bee (8 % teachers), followed by Ozobot Bit (4.53 %) and Ozobot Evo (2.45 %). **Lower secondary schools ranked alike, 63 % teachers don't use these tools at all.** Where used, the most popular tools are Ozobot Bit, Lego Mindstorms EV3 and Ozobot Evo. It can be objected that interactive programmable tools are the realm of IT teachers so we targeted the questions on them. **Over a half of IT teachers in lower secondary schools (51.97 %) stated that they don't use these tools. Where used, the dominating tools are Ozobot Bit, Lego Mindsorms EV3 and Ozobot Evo.** Results in upper secondary schools and their IT teachers were similar, interactive programmable tools are not widely used here either.

As for programming, the most popular programming language among teachers is Scratch, then OzoBlockly, Java, programming in Minecraft Education Edition, or C#.

B. Teachers and security

45.31 % teachers confirmed to have their computers secured against inappropriate Internet content (particularly pornography in web browsers). **23.14 % stated not to have their computers secured against inappropriate content.** A quarter of teachers believe to have their computers secured but they have never checked.

Most network admins (64.92 %) stated that they don't have USB port access under control. 22.58 % stated that access is limited on student computers, 9.95 % have these limitations in place on classroom computers. 2.55 % admins confirmed to have such restrictions in place on staff computers. Access to computers and networks via USB port seems to be the weak link here.

Most school computer network admins (95.6 %) confirmed that an active firewall (in an active network element, etc.) is used in their school. We were also interested in the security of wireless networks. The most popular security measures include **WPA2 protocol (45.36 %)**, MAC address filtering (19.44 %), client authentication (18.79 %), hidden SSID* (12.10 %).

Almost a half of respondent teachers (48.45 %) stated that their school WIFI is available to both students and teachers. Approx. 40 % respondents stated that their school WIFI is available to teachers only. 7.21 % teachers have no WIFI access in the school (neither teachers or students).

We also examined whether schools experience attacks against their computer networks. **Approx. a quarter (23.29 %) school computer network admins confirmed such attacks. Common threats include ransomware and DDOS.**

In connection with our previous research projects, we wanted to know how mobile phones are restricted in schools, now from the teachers' perspective. 49.42 % respondents confirmed that students are not allowed to use mobile phones in lessons without their teacher's permission, whereas using mobile phones during breaks is allowed. Total prohibition (both in lessons and break times) is confirmed by 28.87 % teachers. **48.68 % teachers stated that they don't know what students do with their mobile phones during breaks.** Only 12.19 % teachers have some knowledge on what students do with their mobile phones during breaks.

We also asked teachers whether students in their school use mobile phones to visit inappropriate websites (particularly for pornographic and violent content). This was confirmed by 12.19 % teachers.

C. Students and cheating through technologies

Technologies provide a range of benefits in school, but they can also be misused – for example to cheat. Therefore we asked teachers whether their students misuse modern technologies (such as mobile phones) to cheat. **41.80 % teachers in our sample confirmed that their students have used such technologies to cheat.**

85 % teachers who have caught a cheater, confirmed a misuse of a mobile phone for copying answers (a cheat sheet in a mobile phone, looking up answers on the Internet, etc.), **and for picturing and then misusing test questions (52.5 %).** Also **smart watch is used for cheating (misuse for copying answers confirmed by 34.48 % teachers).** Misuse of other technologies for cheating is rare.

4. Quotes



The Coronavirus age and the related limitations in accessing traditional teaching forms has shown how important information and communication technologies are in education. Thanks to these, educating students and communicating with parents continued, without bringing the education process to a halt completely. In our new research, we explore what attitude teachers have to modern educational technologies, how they use them and how limited they are (even technologically). We also examined whether these tools are used safely by teachers.

In most cases, teachers have a positive approach to modern technologies, actively using a wide range of technical tools in their lessons. However, several limitations have been identified here, such as the use of interactive programmable tools across all school levels. Modern communication tools are not always used with good intentions, though. A large number of teachers confirmed that their students have misused the tools (particularly mobile phones and smart watches) to copy answers, to picture and disseminate test questions, etc. It can be concluded that in the area of introducing modern technologies, Czech teachers at all school levels require support. Not only in funding, but also in methods (training in specific use of specific tools, support by the school management) and within professional communities (sharing good practices and other experience in introducing IT to education within the communities – such as professional associations, teachers' on-line groups, etc.)

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Today's world is coming through a digital and technological revolution. The society, called "information society" is based on digital technologies integrated into many areas of our lives. This results in a pressure on developing appropriate knowledge and skills that every single member should possess. Schools are crucial in developing every child's digital competences, requiring both digitally literate teachers and appropriate technical educational tools. In our research, we explored the current situation in this field and from the results, we can say that teachers have predominantly positive attitudes to digital technologies, frequently using traditional tools/services, school information systems and technical tools.

However, we have revealed an unsatisfactory state in using interactive programmable tools in lessons. We have further found out that teachers are not aware of what equipment is currently available, or they don't have the right attitude to such technologies. Shortcomings have also been found in the secure use of technologies and security measures in schools, and this should be, as we believe, addressed in the future.

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Long term goals of O2's CSR activities include the development of society and preparedness for the future. This does not rely on technologies only, but particularly on the way the new generation can utilise them. Therefore the O2's Chytrá škola scheme supports digital literacy and the digitalisation of education in the Czech Republic. We are aware that an overall change and modernisation of the system also depends on teachers' attitude and readiness. We are glad that this research as well as the coronavirus-induced period of distance learning have confirmed teachers' increasingly positive approach to the on-line world and to the use of modern technologies in teaching.

However, it also reveals concerns related to insufficient support (in respect to human resources, methodologies and technologies) for a wider digitalisation of Czech schools. We have been seeing the demand by schools participating in the O2 Chytrá škola programme for a long time so we have decided to offer help in this area. At www.o2chytraskola.cz, we have recently published a dedicated section related to the introduction of modern technologies in teaching. Funding applications for such projects can be filed under our yearly funding scheme.

*PhDr. Marie Mališková
CSR manager, O2 Czech Republic*



Safety in the school virtual space is very important. For instance, if a school uses obsolete software (such as operating system on its computers), breaking into the school network and causing serious and irreversible damage, can be easy. A school as an educational institute stores, among others, sensitive private data. Today, teachers use various kinds of software to assign tasks, to grade students, to communicate with students, logging in not only from the school but also from home, often with a password that can be easily guessed or that is used for other services. Securing the school network and IT tools used in lessons is a must. Only then, teachers can avoid awkward situations (such as students switching on an overhead projector by a mobile phone, etc.)

We have seen cases of students breaking through the school network protection, being able to send out offending messages from their teacher's e-mail or "improving" their grades in individual subjects. Unfortunately, cybersecurity in schools is closely linked to funding and the effort to keep everything up to date. Schools, despite all efforts, cannot achieve the appropriate security level, particularly when most schools hire only subcontractor IT experts for a prearranged service visit every month. The coronavirus crisis has shown that our teachers are not that bad at computer literacy. As long as teachers (and students) observe the basic rules of cyberspace security, it ends up well in most cases (it has been said that most teachers are techno-realistic or techno-optimistic).

Kpt. Bc. Pavel Schweiner

The department of cyber crime, Olomouc, KŘPOL, Czech Police

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6. About the Centre for the Prevention of Risky Virtual Communication

The Centre for the Prevention of Risky Virtual Communication by the Faculty of Education of Palacký University, Olomouc, (hereafter “PRVoK”) is a certified university department oriented on risky on-line communication of children and adults. It is focused particularly on cyberbullying, cyberstalking, cybergrooming, hoax and spam, sexting, on-line social engineering, the risks of sharing personal information on social networks, disinformation and fake news in the public domain and other dangerous communication phenomena.

In research, PRVoK conducts both fundamental and applied research (including contractual research). It looks, for instance, into risky communication of children and sexual abusers, risky sharing of personal information across communication platforms, specific forms of cyber attacks through web cameras (webcam trolling), it reveals fake profiles, identifies fraudulent e-shops and business proposals, identifies attackers, supports victims, etc.

In research, education and intervention, PRVoK cooperates with a range of companies, namely O2 Czech Republic, Google, Seznam.cz, Vodafone, Avast, but also with the Police, National Cyber and Information Security Agency, the CZ.NIC association and other institutions. The Centre is also supported by the Czech Ministry of Education, Youth and Sports and the Czech Ministry of the Interior.

Apart from research, the Centre also delivers E-Bezpečí (“e-safety”, www.e-bezpeci.cz), a nation-wide project on education and prevention in risky on-line behaviour. It also provides a counselling clinic for victims of Internet attacks (www.napisnam.cz), linked to Linka bezpečí (a helpline), the Czech Police, OSPOD (the National Child Protection Authority) and other specialised institutions.

As an important part, PRVoK also includes Digidoupě – a digital technology lab, focused on meaningful and effective use of modern technologies in teaching. More info at www.digidoupe.cz.

More details on the activities of PRVoK at www.prvok.upol.cz.

7. O2 Chytrá škola

The O2 Chytrá škola programme is designed to help teachers, but also children and parents to find their way through the opportunities and threats of the digital world. The programme includes an educational portal and a funding scheme for primary & lower secondary schools. Detailed and useful information on using the Internet and digital technologies safely, as well as tips on how to discuss these with children, can be found at www.o2chytraskola.cz. It will guide you through all areas of the digital world, from data security to the ways of media manipulation and the use of technologies in education. It includes articles, videos and quizzes suitable for anyone as well as useful info sheets and methodology tips for teachers.

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