

Digital competences of teachers in vocational education in the Czech Republic

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Abstract

With each new generation, a new digital era is also born. There are few professions that can do work without Digital Technologies. Teachers' digital competences in vocational education are therefore key to fulfilling the new professional roles of teachers in response to the ever-changing demands of society. Online teaching in the pandemic era has shown the need for continuous improvement of teachers' digital competences (they apply digital competences in communication; in preparation for teaching or in the teaching process itself). Teachers' digital competences play a significant role in the development of their students' digital competences. Increasing the digital competences of teachers and students' is linked to the development of professional competences. This includes the acquisition of knowledge, skills and habits in the use of digital technologies in the preparation of future teachers at university, but also in teaching practice. In our paper, we offer a few examples of how teachers' digital competences can be enhanced.

Keywords:

Digital competences
Digital competence of a teacher
Vocational Education and Training

1 Introduction

We are surrounded by modern technology in our daily lives and few people can avoid it. We must also be aware that with each new generation, a new digital era is born. Information is now no longer obtained only from books. Digital technologies are playing an increasingly important role in this field. For educators, the use of digital technologies is becoming an integral part of their workload. Digital competence has therefore become an integral part of their daily work, whether in communication, preparation for lessons or in teaching itself. This is a very topical issue, as every educator needs to have digital competences even at a minimum level, regardless of their age, talent or specialisation. Generations from Baby Boomers to Generation Z are now clashing in schools. We can observe significant differences in digital competences, which each student and teacher manage in their own way. The necessity of these competencies is further emphasized by the current pandemic situation regarding Covid-19 (2020-2021), where all educators must be able to fully teach in a purely online environment. We will therefore take a closer look at the digital competences of students and teachers.

2 Digital competences

Digital competence is one of the eight key competences, which also include (Recommendation of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning OJ L 394, 2006) and (European Commission - Council Recommendation on Key Competences for Lifelong Learning, 2021):

- Literacy

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- Multilingualism
- Numerical, scientific and engineering skills
- Digital and technology-based competences
- Interpersonal skills, and the ability to adopt new competences
- Active citizenship
- Entrepreneurship
- Cultural awareness and expression

“Digital competences are defined as the confident, critical and creative use of ICT to achieve goals related to work, employability, learning, leisure, inclusion and/or participation in society.” (Redecker, 2017)

Digital competences are applied in the school environment of primary and secondary schools in many different activities. As a key competence and cross-curricular subject, digital competences help to deepen several other competences, e.g. communication, both with colleagues and parents or students, language skills in different learning applications or online conversation with a native speaker, or basic skills in mathematics or science. The curriculum documents (Framework Education Programme = FEP) for ISCED 2 (ISCED = International Standard Classification of Education) and the curriculum documents (FEP) for secondary vocational education (ISCED 3) are being revised in 2021. These documents are not linked to each other in terms of Digital competences.

DESI's 2021 research (Digital Economy and Society Index 2021) report shows that at least 56% of people in the EU have basic digital skills and 31% have more than basic digital skills (European Commission, 2021). The DESI 2020 research report indicates that 8% of people in the EU had never used the internet.

During an investigation into information literacy in secondary schools in the 2018/2019 school year, the Czech School Inspectorate found that only 15% of secondary schools used a school LMS (learning management system) for administration and organisation of teaching. Many of the surveyed schools consistently used class and student books in both online and paper formats (ČŠI, 2019). At the time of the survey, minimal demands were placed on teachers' digital competences. Some teachers have thus purposefully avoided information literacy. Senior teachers have often resisted education on this issue for fear of humiliation and loss of their own authority. They didn't want to be in the role of an ignorant beginner who doesn't even understand the basic elements and has to learn. Admitting that their students were more educated in this regard was often an insurmountable block for them. However, in the context of education, this is a big problem from several points of view. One is teachers' ignorance of the elements of cybersecurity that they should be teaching their students. On the contrary, teachers can easily become victims of online attacks. It would therefore be advisable for teachers to be continuously guided, for example by the management, to deepen their digital competences.

2.1 Teacher Digital Competency Framework

The term "digital competence" is not just about surfing the internet. Being digitally literate is not just about knowing how to use a computer. Thanks to digital competences, we can understand the digital world, i.e. we can process information, communicate online, create digital content, manage security in the digital environment and solve related problems - these are digital competences in general. For teachers, DigCompEdu's own digital competency framework (Redecker, 2017) focuses on the application of digital competencies within the domains of teachers' professional and pedagogical competencies and learners' competencies and divides the 22 digital competencies into six domains (Redecker, 2017), Council Recommendation on Key Competences for Lifelong Learning. (2021).:

1. Professional engagement: focuses on the professional environment
 - Work communication
 - Professional collaboration
 - Reflective practice
 - Digital continuous professional development (CPD)
2. Digital resources: on sourcing, creating and sharing digital resources
 - Selecting digital resources
 - Creating and modifying digital resources
 - Managing, protecting, sharing resources
3. Teaching and learning: on managing and orchestrating the use of digital tools in teaching and learning:
 - Teaching
 - Guidance learners

- Collaborative learning
- Self-regulated learning
- 4. Digital assessment: on digital tools and strategies to enhance assessment;
 - Assessment strategies
 - Analysing evidence
 - Feedback and planning
- 5. Empowering learners: use of digital tools to empower learners, differentiation & individualisation of education within the class
 - Accessibility and inclusion
 - differentiation and personalisation
 - Actively engaging learners
- 6. Facilitating learners' digital competence: facilitating learners' digital competence
 - Information and media literacy
 - Digital communication and collaboration
 - Digital content creation
 - Responsible use of digital technologies
 - Problem solving through digital technologies

2.2 Past + present = future

In school practice we can meet several generations at the same time. Each generation has its own specificities, motivations, goals, and expectations. Different worlds with very different attitudes towards work and modern technology.:

- For **Generation X**, born in the 1960s and 1970s, television was the primary medium; its members lived their adolescence without the Internet. In their time, they used Walkman or personal computers with less advanced operating systems. (Schroer, 2004)
- **Generation Y**, born from the 1980s to the first half of the 1990s, experienced the explosion of networked technologies during their adolescence; they remember a time without the Internet, but it was during their lifetime that it became a mass medium. In communication, people of this era grew up without mobile phones knew phone booths or landlines, some may have owned their first phone in 1997. This generation was enthusiastic about ICQ (instant messaging service). (Schroer, 2004), (Oblinger, & Oblinger, 2005)
- **Generation Z**, born from 1995 onwards, is the first to take the internet as a natural part of their everyday lives and cannot imagine a world without it. They find the idea of a landline or a letter dropped in the mailbox as communication ridiculous. They were the first true digital natives, born into the age of Facebook, Instagram and YouTube. (Tulgan, 2003).
- **Alpha generation** are people born after 2010, when the first iPad came to market. Of course, it is not a rule that every person born after 2010 is guaranteed to be a digital technology specialist. But it is very common for students to be more adept at working with digital technology than adult teachers. (Robinson, 2014), (Carter, 2016)

Generation X, Y, Z and Alpha are also associated with the terms digital native and digital immigrant (Prensky, 2001)., these in turn are associated with digital literacy, although this may not be the distinguishing factor. It is advisable to distinguish between Digital Natives and Digital Immigrants in order to choose appropriate teaching methods and to make the acquisition of new knowledge and skills as effective as possible for them. Digital natives understand why they use technology and how to use it. It would be better to focus their education on security, privacy, etc. Describe to digital immigrants why the technology is used and how best to use it. (Sládek & Válek, 2017)

We live in a world where we face the influence of digital technologies on a daily basis. We're woken up by a cell phone that rings even though it's turned off. We: turn on televisions, computers, laptops, tablets, pay by payment card, use interactive whiteboards. We communicate with friends and colleagues through social networks, we trade and shop in e-shops. We use apps that connect smartphones and watches, take online courses, and try to use as many things as possible to make our daily lives as easy as we can.

But the world wasn't always like this. In the past, everything was written by hand, e.g. class book, notes in a notebook or on the blackboard. Class books were checked and rewritten several times to make sure everything was correct and half the school was then occupied by a filing cabinet. Everything has changed with the arrival of

modern technology. In the school environment, we find as teachers of generations X, Y, Z, who teach students from the alpha generation, the next generation will appear in time and moreover with new technologies. Differences in the handling of digitalisation are evident. In the context of teaching, older generations managed not to use modern technologies even when they were already present. They dictated the notation and the teacher did not care how the students wrote it down - whether it was written in a paper notebook, tablet or laptop. They managed to draw the sketches using coloured chalk on the board and brought the pictures either on a screen or projected them on a MEOTAR using transparencies. With the advent of electronic class books and the digitization of student data, the older generations have had to be included in this process. (Sládek & Válek, 2017)

The integration of digital technologies into schools is due to the modernization of the educational process, which has introduced the possibility of studying online - e-learning. Černý et al. (2015) define 3 types of education: full-time, where the presence of the teacher and the taught at a certain place and time is important, digital technologies are used more as a supplement to teaching. And distance learning, when, on the contrary, we do not consider the presence of participants in the educational process and in this case e-learning is used. And last but not least, the combined form, which combines the advantages of both previous ones.

The situation with Covid-19 (2020 and beyond) has further accelerated this modernisation and transition to the digital world. All teaching had to go online, but it was not distance learning in the true sense of the word, because participants could take online synchronous classes, just connect at a given time using a link. Many companies have created platforms for online learning for the whole class, e.g. MS Teams, Zoom, Google Classroom, etc. However, this version was not mastered by older generations - they stayed in the background initially and the materials were copied or photographed and sent via email to the children. The transition (to online) was too fast for them and they didn't manage to absorb and use it in the first wave compared to the younger generations. In the second wave, progress has already been observed. The materials were still being sent as part of the self-study. But at least online testing or some communication was already taking place, e.g. in the framework of the established meeting on the MS Teams platform with the help of colleagues from the younger generation. However, this was insufficient for the students, they needed some things explained in more depth and it was left to the younger generation of teachers to replace their older colleagues. In this context, however, we encounter the fact that older generations do not have the necessary knowledge and digital competences needed to teach the new **Alpha generation** and future generations.

3 Digital competences of teachers and Digital competences of students

Teachers' digital competences are useful not only in their pedagogical practice, but also in their everyday life; competences play a significant role in the development of their students' digital competences. The development of digital competences of teachers and students is itself linked to the development of professional competences, which includes the acquisition of knowledge, skills and habits in the use of digital technologies in the preparation of future teachers at the university, but also in teaching practice.

In most European countries, curriculum documents are being adapted to increase the development of digital competences among students. Thus, it is important for teachers to have these skills so that they can educate students at the necessary level. The role of teachers is to prepare students for life in the future modern digital world. The OECD TALIS report (2013) (OECD, 2014) states that 18% of trainers and teachers have a need to deepen their ICT skills for teaching and 16% have a need to develop new technologies in the workplace.

The level of digital literacy of teachers, or their overall digital competence, does not depend only on their free will or on the minimum level necessary for teaching. The development of student' (primary school graduate) digital competences is already firmly anchored in the newly revised FEP (for ISCED 2) as one of the seven basic key competences with which students (primary school graduates) leave primary school. Therefore, in order for a student (primary school graduate) to be able to acquire digital competences at an adequate level for a primary school graduate, his/her teacher has to master these competences at several orders of magnitude higher.

The specific framework of necessary digital competences for teachers in secondary vocational schools is difficult to define due to the great diversity of individual schools. It depends on many factors, such as the focus of the entire educational institution, the specialization of a particular educational field or even the educational subject itself. This means that the demands placed on the digital competences of, for example, a teacher of the vocational subject of engineering technology in the educational field of Bodyworker will be diametrically opposed to the demands placed on a teacher of programming in the educational field of Mobile Application Development.

As already mentioned, digital competences are not yet implemented in the framework of educational programmes for secondary schools. There is the attention paid to the use of digital technologies for task development and information retrieval. However, we can indicatively base this on the digital competences of primary school graduates. Teachers in secondary vocational schools will work with these graduates. According to the primary education FEP (for ISCED 2), the digital competences that these graduates should acquire during their primary school studies are classified into several categories, where the student (primary school graduate) (Framework Education Programme for Secondary General Education, 2021):

- he/she is familiar with commonly used digital devices, applications and services; uses them for learning and for engaging in school and community life; decides independently which technology to use for which activity or problem
- he/she acquires, retrieves, critically evaluates, manages and shares data, information and digital content, choosing processes, methods and means that are appropriate to the specific situation and purpose
- he/she creates and edits digital content, combines different formats, expresses himself/herself using digital means
- he/she uses digital technologies to facilitate his/her work, automate routine activities, streamline or simplify workflows and improve the quality of his/her work results
- he/she understands the importance of digital technologies for human society, learns about new technologies, critically evaluates their benefits and reflects on the risks of their use
- he/she prevents situations threatening the security of equipment and data, situations with a negative impact on his/her physical and mental health and the health of other people, acts ethically when collaborating, communicating and sharing information in the digital environment

Upon graduation from primary school, they are able to work correctly and conscientiously with a variety of digital technologies to facilitate work, create digital content or search for information, all while being aware of the seriousness and risks of their actions. Teachers at secondary vocational schools should therefore be able to work adequately with these students. Unfortunately, however, it may run into a problem from teachers. It is the teacher's duty not to be satisfied with his/her knowledge acquired at university, but to develop and educate himself/herself further. Older individuals (digital immigrants) sometimes have difficulties in critically assessing the credibility of information received through the media. The following chapter relates to this topic/problem.

3.1 Media literacy

Currently, media literacy is also a frequently discussed topic in society in combination with digital literacy. We can imagine this term as the ability to search for information in the media and critically analyse its relevance. A media literate person should be able to differentiate between true and fake news appearing in various media channels. Although one may think that this issue does not concern them too much, it is the media where we receive most of the information and news. The term “fake news” or “hoax” is then used to describe false news. The purpose of these messages is to change the mind of the recipient of the message through misinformation. In recent times, these methods are most often used to change public opinion or to strengthen the political power of a particular person or group. It is often difficult to distinguish these reports from the true ones. Most often, however, they are spread through directly created misinformation websites, chain emails or, nowadays, through the increasingly popular social networks. (Jolls, 2015), (Stix & Jolls, 2020)

3.1.1 Media literacy in teacher's work

One of the basic tasks of a teacher is to convey true information and facts to students. However, only his critical thinking is behind their relevant evaluation. In this case, we will now leave aside the transmission of knowledge in general education subjects such as mathematics or physics, where facts are fixed and invariant. Let's focus on vocational education in secondary schools. If a teacher teaches students a contemporary craft, it is essential, and usually strictly required by the employer, that he/she continually educates himself/herself in his/her field and transmits up-to-date information to students. However, if a teacher does not have sufficient access to accredited training, has too often rely on himself/herself and draw news from current scientific or internet articles and newspapers. If these are not professional publications, it may happen that the authors of the articles are not at all educated in the topic, and the articles then present distorted information that does not undergo any professional proofreading. When teachers are not sufficiently media literate - critical in their reception of information, they may pass on this distorted information to students and then require them to reproduce it. It is, therefore, necessary for teachers to try to keep their media literacy at a sufficient level and to work to encourage their students to improve their media literacy as well. (Jolls, 2015), (Stix & Jolls, 2020)

3.1.2 Improving media literacy

It is the teacher's duty not to be satisfied only with the knowledge acquired during his/her studies at university, but to continue to educate him/herself (§24. paragraph. 1 Act No. 563/2004 Coll.). Media education is used to increase media literacy in primary education. It is a cross-curricular subject of the FEP (for ISCED 2) and can therefore stand as a stand-alone subject, a learning project, or permeate all subjects. Many tools and nowadays also institutions dealing with this issue are used to increase the media literacy of teachers. First of all, it is necessary to find out what level the teacher reaches at all. This is done through a range of tools, often created by the literacy institutions themselves. An example is the MQ TESTER tool of People in Need (People in Need, 2019) which deals with level determination and level raising for both students and adults. It uses a series of tasks and tips for working with your literacy, divided into several categories. The most difficult task for an adult, however, is always admitting that he/she cannot sort information in a relevant way and needs to work on his/her literacy. Based on our article, we have prepared several ways in which the level of digital literacy or competence can be ascertained and, if necessary, deepened and improved.

4 Improving digital competences

"If a teacher today is not technologically literate - and is unwilling to make the effort to learn more - it's equivalent to a teacher 30 years ago who didn't know how to read and write." (Fisch, 2007) Since 2021, the digital competences will already be included in the FEP (ISCED 2). This means that secondary schools will already have fully digitally competent students. Teachers must prepare for this wave.

As this paper has already shown, knowledge of working with digital technologies can not only make teachers' work easier, but also make teaching more effective, for example by using teaching apps. The actual level of digital competence can then be monitored and effectively increased in different ways. For example, there are various apps that detect the level of digital competences and suggest possible further training, so that progress and improvement in this area can be monitored. One of these applications is SELFIE (on web https://ec.europa.eu/education/schools-go-digital_en).

SELFIE is an online application to determine the level of use of digital technologies in education free of charge. The first step is to identify a team of coordinators which will register the school in the app, the coordinators will then log in themselves using the email address they request in the app. Fill in the type of school, size of school or location and the time period when the research will be carried out and who will be part of it.

At the beginning is a sequence of general questions and statements that are part of the questionnaire. Coordinators can enrich the questionnaire with specific items for their school. The coordinators will then invite students and teachers to take the survey. The questionnaire is completely anonymous and the time commitment is 20-40 minutes depending on the number of questions added. Teaching staff can redeem the questionnaire at any time. To ensure a sufficient number of student respondents it is a good practice to include this questionnaire in the lesson. Based on the result, SELFIE produces a final report on the state of the use of digital technologies in education. The results can be accessed only by the school that performed the research. With the SELFIE app, progress or decline in digital technology skills can be monitored at school.

One of the other tools for increasing the digital competences of teachers in the Czech Republic is the SYPO (<https://www.projektsypo.cz>) resources. They are focusing on systematic support for all teachers and school principals. They deal with many branches of the school environment. One of the parts is dedicated to information technology and digital competences. They offer advice, lectures and training on these issues.

Increasing digital competences is one thing, but knowing how to use them directly in the teaching process is another. Here is a small sample of which other applications can be used directly in the learning process. Across subjects from the lowest grades onwards, students use iPads or smartphones, for example. They use them to develop their creativity e.g. to record mind maps, create posters, record instructional videos, notes, keep digital portfolios e.g. in Seesaw (<https://web.seesaw.me>), or provide effective feedback using Kahoot! (<https://kahoot.com> and <https://kahoot.it/>) or Socrative (<https://www.socrative.com>). Kahoot! doesn't just have to be used for feedback. It can be used for repetition at the beginning and at the end of the lesson. Or we can use it as a tool for testing students.

Another application that we can use in the classroom to create interactive presentations is Nearpod (<https://nearpod.com>). In Nearpod we can create a classic slide presentation with the addition of interactive component. In lessons, we can include a quiz after the 20-minute presentation to get immediate feedback from students. Or we can include in the presentation a task where students have to draw (or write). Each student works with their own blank board (online) where they can complete the task. Everything is linked by a unique

code that the teacher generates for his/her presentation. The application works with a small delay, but everything is linked and works as it should. The presentation can be created directly using Nearpod or you can import a PowerPoint presentation for further editing.

To avoid passive listeners in the classroom we can use the Sli.do (<https://www.sli.do>) application. The aim of this application is to involve the listener in the presentation. The core of the app is asking questions that are displayed to the audience in sequence. The question can be asked both anonymously and with a name. We will have a chance to give voice to those who are shy or less assertive. The connection is again via a unique code and requires an internet connection to run.

Another possible application to liven up a lesson or test for upper grades may be Forms (<https://forms.office.com>) or Sway (<https://sway.office.com>) from the Microsoft Office group of programs. The Forms application is used to create questionnaires or quizzes that, if set up correctly, will evaluate themselves after submitting the answers. Students know immediately how many points they scored on the test and the teacher can use graphs to evaluate whether students were successful or how well they understood the material. The Sway application is used to create presentations online, it's not hard to learn how to use the application, but it's a bit different than PowerPoint. Almost everyone already knows PowerPoint, because they learn to use it in primary school, Sway presentations will attract a more demanding audience, if only because it is something new/different. School use is advantageous because students learn to present in a different environment than PowerPoint, and they don't need to have the app downloaded and installed on their device and can easily access it from the web (like office365).

5 Conclusions

In our paper, we have focused on digital competences both from a general perspective and from a teacher and student perspective. It is important to note that in order to develop students' digital competences, it is necessary for their teachers to have these competences as well. We have shown that this problem is being addressed by research surveys in Europe that measure the level of digital competence and literacy among students, teachers, and school leaders.

At the same time, we are witnessing the transformation of the curriculum documents for ISCED 2 and consequently ISCED 3, which gradually include comprehensive requirements for students to be equipped with digital competences. Teachers are supposed to help them achieve this goal, and we assume they will probably be members of Generation Y and Generation Z.

So what can we expect from the future teachers of Generation Y and Generation Z? In their own education, it was probably the traditional approach. In contrast, they will engage digital literacy in the education of their students. But the problem may arise precisely from the discrepancy between how Generation Z teachers will teach and what their class of students will expect from them.

The demands placed on the work of teachers go hand in hand with the current requirements for the use of digital technologies in everyday life. This is also linked to the changing trends in education and schooling in recent years. The use of smartphones, tablets and learning apps is increasing among students and teachers.

The presented applications were used by the authors during the pandemic period. They managed to immerse students at least partially back into the school activities. All applications can be connected directly to learning platforms such as MS Teams where you can easily collaborate with them.

We have listed only a small list of tools that can be used for personal development. There are of course many more tools and video tutorials available on the internet. However, finding such resources and applications depends on each user and his/her approach. Teachers themselves have to find their own ways of what tools to use. Active use of the skills acquired is the basis of all work. By exploring and discovering, and most importantly using, digital competences grow automatically for each user.

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