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Development of digital competences of secondary school students

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Abstract

Digital competence is essential for education, work and active participation in society. Digitization affects how people live, communicate, study and work.
For this reason, the lifelong development of digital competences is important. For school education, in addition to understanding the competence itself, it is equally important to know how to develop it.
Teachers need to realize that, as a cross-cutting competence, digital competence also helps us to master other key competencies such as communication, language skills or basic skills.
In this article we pay attention especially to the area of key competencies of secondary school students, questions of development of their digital competences, but also to basic knowledge, skills and attitudes of students to these competences. We are dealing with the methods and forms of teaching that teachers should choose in education in order to achieve the digital competences of secondary school students.

Entwicklung digitaler Kompetenzen von Studenten der Sekundarschule

Zusammenfassung

Digitale Kompetenz ist für Bildung, Arbeit und aktive Teilhabe an der Gesellschaft von wesentlicher Bedeutung. Die Digitalisierung beeinflusst, wie Menschen leben, kommunizieren, studieren und arbeiten.
Aus diesem Grund ist die lebenslange Entwicklung digitaler Kompetenzen wichtig. Für die Schulbildung ist es neben dem Verständnis der Kompetenz selbst ebenso wichtig zu wissen, wie man sie entwickelt. Die Lehrkräfte müssen erkennen, dass digitale Kompetenz als Querschnittskompetenz uns auch dabei hilft, andere Schlüsselkompetenzen wie Kommunikation, Sprachkenntnisse oder Grundkenntnisse zu beherrschen.
In diesem Artikel widmen wir uns insbesondere dem Bereich der Schlüsselkompetenzen von Sekundarschülern, Fragen der Entwicklung ihrer digitalen Kompetenzen, aber auch den Grundkenntnissen, Fähigkeiten und Einstellungen der Schüler zu diesen Kompetenzen. Wir

beschäftigen uns mit den Methoden und Formen des Unterrichts, die Lehrer in der Bildung wählen sollten, um die digitalen Kompetenzen von Schülern der Sekundarstufe zu erreichen.

Keywords:
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Schlüsselwörter:
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1 Introduction

By developing key competences in the education, the teacher prepares students for lifelong learning and for their realization in the real life of the European area, so that life is a learning and learning life.

2 Concept and definition of key competences

Experts in the fields of philosophy, sociology, pedagogy, psychology and economics have tried to define the term 'key competences'. In order for competences to be crucial ,it is needed to be beneficial and necessary for the individual and society at large. All life situations are subject to change, so key competences must enable people to constantly renew their knowledge and skills to keep step with the latest developments. (Učitelský Zpravodaj, 2007, p. 8)

Key competences are the most important competences from the set of competences. They are adequate to solve unforeseen problems that will allow an individual to cope successfully with rapid changes in personal and social life. (Turek, 2014, p. 203) They are characterized by precision, multifunctional and necessary for every person. Without their adoption, person cannot achieve success in any of three areas: personal life fulfillment and personal development, full participation in society and lifelong employment.

According to the European Reference Framework, key competences are defined as a combination of knowledge, skills and attitudes appropriate to the context. Key competences are those, that all individuals need for personal satisfaction and development, active citizenship, social inclusion and employment. ”(European Commission, 2007, p.3)

Key competences are an internal, interconnected set of acquired knowledge, skills, abilities, attitudes and value orientations that are important for the quality development of an individual's personality, his active participation in society, effective employment and his lifelong learning. (Blaško, 2010, p.103) Other characteristics of key competences:

• are defined on the base of priorities, that contemporary society considers to be very important for the personal development and working life of each individual;

• are equally important, each area of competence is a complex whole, containing knowledge, skills and attitudes;

• the development of key competences is referred to as a long-term and complex process and their adoption in the appropriate type and level of education creates the preconditions for their further deepening, and also changes their quality during the individual's lifetime;

• they have an activity character, each area is formed on the base of practical experience and activity and at the same time the individual is ready to implement it in practice,
• have the ability to develop continuously and can be the base of lifelong learning and personal flexibility;
• their development reach in the teaching of various subjects and activities, including school-wide activities;
• mediation of key competencies is tied to the specific content of the curriculum and facilitating its updating; their acquisition cannot be achieved without the specific content of the curriculum;
• are the result of formal, non-formal and informal learning.

2.1 Key competencies in secondary education

The National Institute of Vocational Education in Prague has created an inspiring version of a set of key competences for secondary vocational schools for vocational education programs. The conceptual plan on which the current model of key competences in secondary education was developed was:
• approximation of competency models in primary, grammar school and vocational education;
• taking into account current international developments, in particular the European Reference Framework for key competences for lifelong learning. (Jezberová et al., 2007)
Its Member States are encouraged to use the European Framework of Reference for Lifelong Learning, which sets out eight key competences:
1. communication in the mother tongue,
2. communication in foreign languages,
3. competences in mathematics and basic competences in natural sciences and technology;
4. digital competences;
5. learn to learn,
6. social and civic competences;
7. Initiative and entrepreneurship,
8. cultural awareness and expression. (European Commission, 2007, p. 3)

Education in each field should aim to create the following key competencies:
• communication (readiness to communicate in mother tongue and foreign languages),
• mathematical and scientific (readiness to use mathematics, basics of science and technology in everyday life),
• information (readiness to use information and communication technologies and information handling),
• for problem solving (readiness to creatively and critically solve problems of everyday life critically),
• teaching (readiness to learn how to learn),
• social and personal (readiness for interpersonal relationships, self-formation, self-management),
• work and entrepreneurship (readiness for the future profession and the realization of ideas);
• civic and cultural (readiness to engage in civic life, to promote cultural values). (Blaško, 2010, pp. 105-106)

Key competences represent the potential to activate and apply a system of knowledge, skills, professional and social skills, values, attitudes and other personality qualities in different

contexts through real-life activity. It is their most important characteristic and at the same time of great importance, they can serve as a base for further learning. While they cannot replace professional knowledge, they help to make it more efficient and effective using.

3 Digital competences of secondary schools

In Slovakia we have the opportunity to use the latest technologies. The digital literacy of the Slovak population is not as good as we would expect and is becoming a digitally divided society. Despite of the total balance of the digital abilities and skills of the population as a whole is relatively favorable, significant differences have been found between social groups and environments. Digital literacy has became more typical of the younger, more educated, skilled, socially stronger population. The young generation is considered one of the most progressive social groups in the field of adaptation to information technology. On the one hand, because he naturally tends to everything new, is not afraid to experiment, has no prejudices, easily absorbs knowledge. On the other hand, there is an official concept of information technology education on the part of society. (Velšic, 2013, p.2)

3.1 Characteristics of digital competences

According to the European Reference Framework, digital competence includes the confident and critical use of Information Society Technology (TIS) for work, free time and communication. It is based on basic ICT skills: using a computer to acquire, assess, store, create, present and exchange information, and to communicate and participate in collaborative networks via the Internet (European Commission,2007, p.7) digital competence as one of the key competences.

Digital literacy is the set of knowledge, skills and understanding necessary for the appropriate, safe and productive use of digital technologies for learning and cognition. (Kalaš, 2010) In general, it also includes the ability to understand and use information in a variety of formats from different sources presented through modern information and communication technologies (ICT).

Digital literacy develops information literacy. The content of the term is historically determined and began to be used in the 1970s. There was talk of algorithmic-oriented computer literacy, which included basic computer operations and the adoption of basic programming rules. Some authors refer to information competences instead of digital competences. Having information competences means using the computer and its accessories to acquire, review, store, create, present and exchange information and to communicate and participate in collaborative networks via the Internet. (Blaško, 2010, p. 120)

Information competences are competences directly related to information. Information and communication technologies (especially personal computers, the internet, mobile phones), which redouble production and effectiveness of work. Therefore, to know the work with information and communication technologies is one of the essential thing of modern man and is also a key competence. In context of information competences, two terms are used: information literacy and computer literacy. (Hrmo, Turek, 2003, p. 21-22)

a) Information literacy:

- recognize when information is needed;
- locate various sources (book, computer) containing the necessary information;

• find the necessary information in these sources;
• be able to critically evaluate this information (its usefulness, benefit, truthfulness, reliability, timeliness),
• use the information to solve problems
• understand and respect the economic, legal, social and cultural problems associated with the use of information;
• communicate information effectively to others in different forms (verbally, in writing, graphically), both in direct contact and through various technologies (including information and communication).

b) Computer literacy:

• know, understand and explain basic concepts of information technology (software, hardware, types of computers, main parts of a personal computer),
• use a personal computer (PC) and work with data files (turn on, restart and shut down the PC, select and work with PC screen icons, search for the desired PC program, delete unnecessary data, make copies, print the required data)
• work with a PC text editor,
• create tables, graphs and work with numeric data (Excel)
• create PC databases and work with them, create PC presentations (Power Point),
• obtain information and communicate via PC (work with the Internet, create web pages, control e-mail). (Hrmo, Turek, 2003, p. 22)

Information literacy thus includes the knowledge, skills and understanding necessary for the appropriate, safe and productive use of ICT in the learning and cognition process, in employment and in everyday life. It demonstrates the ability to effectively use information resources and information tools for the analysis, processing and communication of information, as well as for modeling, measuring and controlling external processes (actions).
Information literate teacher and pupil:

• use information resources and information tools to solve problems
• uses information resources and information tools to support their learning in different contexts;
• understands the social aspects and implications of using ICT.

With the growth of pupil and student information literacy, it can make more efficient use of ICT, can better judge the suitability of the tool and the appropriateness of using ICT for the task, is less dependent and increasingly autonomous in its learning.

3.2 Content of digital competences

The content of digital competence consists of basic knowledge, skills and attitudes related to the development of the competence. These terms need to be defined.
Knowledge
"Knowledge is the acquired, understood and memorized information (fact, concept, instruction, principle of law, relationship, formula and so on)." (Turek, 2014, p.204) The European Reference Framework defines basic knowledge related to digital competence as follows:
Digital competence requires proper understanding and knowledge of the nature, role and opportunities of information service technologies in everyday contexts: in personal and social life as well as at work. These include mainly computer applications such as text and

spreadsheets, databases, information storage and management, and an understanding of the opportunities and potential risks associated with the Internet and communication via electronic media (e-mail, network tools) at work, leisure, sharing information, and networking, education and research. Individuals should also understand how information service technologies can support creativity and innovation and be aware of issues related to the validity and reliability of available information and the legal and ethical principles of interactive use of information service technologies. "(Turek, 2014, p. 208))

The report of the European Parliament and the Council perceives the basic knowledge contained in digital competence as follows:

• a proper understanding of the nature, role and use of information society technologies (essence, role, technological possibilities) in personal life, social life, work and the promotion of sound understanding of information (remembering information, ethnic principles of information technology use).

Blaško (2013, p. 123) lists the following key knowledge:

• support sound understanding of information (remembering information, ethnic principles of using information technology)
• basic computer applications: word processors, spreadsheets, databases, information storage and management systems,
• opportunities and potential risks related to the Internet and communication via electronic media (e-mail, network tools) for work, leisure, information transfer, education and research;
• understanding how IST can support creativity and innovation
• awareness of problems related to the validity and reliability of the available information.

Skills

Skill is a specialized ability to perform a particular activity, to solve a particular problem. Skill is the acquired readines correctly, as quickly and effortlessly as possible to carry out an activity on the basis of acquired knowledge and previous practical activity. (Petlák, 2016, p.42) The European Reference Framework defines basic skills related to digital competence as follows:

Skills needed include the ability to search, collect and process information and use it in a critical and systematic way, judge relevance and distinguishing reality and the virtual world and recognizing links. Individuals should be able to use tools to create, present and understand complex information and to access, search and use Internet-based services. Individuals should also be able to use information society technologies to support critical thinking, creativity and innovation. (Turek, 2014, p. 211) The report of the European Parliament and the Council sees the basic skills contained in the digital competence as follows:

• search for, collect, process and use information;
• judge relevance and differentiate reality and virtual world;
• use tools to create, present and understand complex information.
• use Internet-based services
• Promote critical thinking, creativity and innovation.

Attitude

Attitude is a relatively steady tendency (readiness) to respond in a characteristic way to certain stimuli. It is a relatively stable system of positive or negative evaluations of certain stimuli, phenomena, situations, persons and the like. (Turek, 2014, p. 205) The European Reference Framework defines basic attitudes related to digital competence as follows:

The use of information society technologies requires a critical and reflective attitude towards the available information and the responsible use of interactive media. This competence is also supported by interest in participating in communities and networks for cultural, social or professional purposes. (Turek, 2014, p. 214)

4 Developing digital competences in the teaching process

The idea of developing digital literacy in all social areas, including in the educational process, is supported by a wide range of digital technologies. In order to ensure the development of pupil´s digital literacy, it is necessary to ensure the use of digital technologies for their: learning, information search, implementation, creation and solution of tasks.
Digital literacy refers to the ability to understand and use information in a variety of formats from different sources presented through modern information and communication technologies.

4.1 Teaching strategies to achieve digital competences

Strategies are common methodological practices of teachers (methods and forms of teaching, activities, opportunities, rules) in and outside teaching (at school or subject level), common to all teachers (school or subject) by which the school (subject) purposefully, systematically creates and develops key competences of pupils.
Educational strategies tend to be formulated for each key competence, or together, for a number of key competences, so that it is clear how the school ensures their development for pupils. Strategies are structured according to which of the key competencies they develop preferentially. It goes without saying, however, that the various educational strategies simultaneously lead to several key competences.
One of the basic teaching strategies is the use of ICT, which involves assigning tasks that use the computer and its accessories to gather information and produce outputs. (Turek, 2014, p. 420)
In the hands of a newly educated teacher, information and communication technology is the most suitable way for developing students' competences, as well as an important way for overcoming problems in current teaching, but also for implementing quality management into the creative-humanistic teaching system. The teaching tool to which students would have such a natural, active and positive relationship as to computers has not yet been taught in history.
Teaching strategies:
• we use a combination of computer presentations and heuristic discussions in the concept of learning with problem-solving, which has been ranked among the most effective education strategies;
• we use e-learning as a computer-aided classroom, interactive whiteboard,
• we use e-learning as a way of multimedia learning based on the Internet,
• we use project teaching - project solution, when students search for the necessary information on their own using a computer and the Internet.
The existing homogeneous education, which blocks the path of personal development, development of inner dispositions of pupils, application of their abilities in society, helps to bridge over the introduction of new information technologies into teaching. In this way, it enables the individual to discover and develop their individual potential, helping them in self-realization.

We use digital technologies as one of the tools for effective learning and learning. We consider the fact that the computer is not primarily a teacher-learning tool, but a student-learning tool. Digital technologies are becoming an integral part of our lives, an important "tool" for many of its aspects.

Project teaching is often cross-subject. The projects combine knowledge, skills and skills from many areas and bring them together in one theme. Not integrating them into learning and learning would mean widening the gap between school and real life and thus further reducing pupil´s motivation and trust. Working on projects develops several competencies that students will need in their future jobs. Ability to organize things and activities, cooperate in a team, solve problems and find your own solutions. Creating and flexibly changing plans, transferring knowledge from one field to another while working on a project, students learn to work as a project, which is an important competence for their future application in society. (Turek, 2005, p.157)

Collaborative learning is learning through collaboration, discovery, creation, problem-solving, discussion and mutual improvement. The effectiveness of such learning is largely conditioned by students' social skills and communication skills, as these are the cornerstones for procreative cooperation and dialogue in the group.

Experiential learning, as Kalaš (2010, p. 27) states, the essence of experiential learning is that each pupil comes to knowledge actively through their own authentic experience. The activities are designed to require the student to take their own initiative, personal and emotional involvement, critical deliberate decision-making, the ability to communicate their thoughts with others, and responsibility for the results of their work. This method is suitable not only for acquiring knowledge and skills that students can apply in everyday life, but also for developing creativity and social skills, as students are involved not only intellectually but also emotionally and socially in the teaching process.

Discovery learning leads students to figure out how something works, to discover the principle. We believe that learning by discovery leads directly to the construction of that knowledge in the student's mind, and is therefore a suitable method for applying constructivism in teaching practice. Discovery and guided discovery is best applied to problem-solving tasks and topics that can be addressed as problematic.

Digital technologies play an important role in the learning process of our students. They change the nature of the teacher-student relationship and offer opportunities to support each stage of the learning process. We can use them not only to develop digital literacy, but also to other key competences. The role of a modern teacher also requires constant self-education, to recognize the potential of innovative teaching methods and to look for suitable tools for incorporating them into teaching.

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