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ASSUMPTIONS AND REASONS FOR THE USE OF DIGITAL TECHNOLOGIES IN EDUCATION

INTRODUCTION

This paper is based on the study of the project approved by TAČR (Technological Agency of the Czech Republic) for the support of applied social and humanistic research, experimental development and innovation of ÉTA.

Digital technology is nowadays required for both normal everyday life as well as the working one to a larger extent. The ability itself to work with a computer is just a marginal matter in today's concept of digital literacy. Technology is constantly evolving and requirements for digital literacy are increasing.

The concept of digital literacy has emerged together with the growing trend of digital technology in our society. Digital literacy influences the quality of personal life. Internet has a great impact on social life. Due to the use of the Internet, the number of social contacts increases with greater diversity. For example, a combination of mobile phone and Internet creates new forms of family cohesiveness that are based on greater mutual contact, better co-ordination of mutual activities, sharing of topics, experiences, photos and other information. The development of digital literacy is therefore important for parents and grandparents in today's position, when communication between children and grandchildren moves largely to the Internet.

Digital technologies have undergone rapid development in recent years, with implications for education as well. Many of us are sure to ask a few questions. Why is it necessary to deal with digital competencies? What are the reasons for disposing of these competences and digital literacy? What are the preconditions for using digital technologies? Are there barriers affecting the spread of new technologies in education? What is the perspective for the future? This is related with the possibilities of using mobile devices and m-technologies in the educational process and effective school management through digital technologies.

USING OF DIGITAL TECHNOLOGIES IN CONTEMPORARY SCHOOL

As a result of technological changes and innovations, development has been greatly accelerated. Management activity involves the promotion of the formation of a large number of competencies[1] and becomes more flexible and fulfils the needs of effective management of school organizations. Digital technologies are included in the pedagogical practice management model and the role of the Director is crucial when introducing new technologies into the educational process. It is necessary to use digital technology throughout the school year in organizing and managing a school.

An assumption is made that school staff already inadvertently uses current technologies[2] to prepare for meetings, to manage issues with pedagogical colleagues remotely, implementation of electronic conferences, to self-study, for school presentation, in order to process the school agenda, to organize and run a school through appropriate software products (e.g. school information systems), use cloud services, interactive technologies, advanced didactic resources in teaching, e-learning, m-learning and Internet telephony. There is a necessary assumption that school staff is digitally skilful.

APPLICATION IN THE KNOWLEDGE AND INDUSTRY 4.0

Without the inclusion of digital technologies in education, the school loses the credit of a modern educational institution, which is one of the reasons for the use of digital technologies in education[3]. Without digital technologies, students cannot be prepared for further education and application in the knowledge society and industry 4.0. Digital technologies help educate talented and disabled students, evaluate students, enable parents to interact with a school, get acquainted with school documents / school rules, school annual report, ICT plans, school council, admissions, student activities, projects, competitions, offers of courses, tenders, school organizations. Students and parents have the opportunity to watch online classifications on the school website, results of competitions, olympics, educational counselling, participation in workshops, etc. In some schools, students use their own mobile devices with the Internet connection. Parents' awareness of new methods and forms of teaching at school is a considerable benefit at present, bringing interest in school and education.

Digital competences correspond to the lifelong skills and must be considered as key in the field of teacher training[4]. A school employee, who masters a digital competency, effectively works with information and data by using modern information and commu-

[1] V. Lhotková, J. Trojan, J. Kitzberger, *Kompetence řídících pracovníků veškolství.* Wolters Kluwers ČR, a.s., Praha, 2012.

[2] P. Svoboda, *M-learning – use of mobile technologies in teaching,* in:, "Littera Scripta" Caha Z., Stellner F. (eds.), 2016, vol. 3, http://journals.vstecb.cz/category/littera-scripta/9-rocnik/3_2016/.

[3] B. Dixon, *Anytime Anywhere Learning,* 2013, http://www.aalf.org/ (4. 04. 2013).

[4] B. Brdička, *Doporučení evropského ICT clusteru*, 2012, www.spomocnik.cz/index.php?id_document=2460 (1.12.2012).

nication technologies. It means orientation in current new trends in education and the ability to apply it in practice.

The reasons for the manager to have (also developed) digital competences[5]:

- innovative teaching practices, examples of good practice, motivation,
- the importance of digital technologies for management activity, the benefits of change and school development,
- management skills – for example change management, knowledge management, implementation management, time management.

EXTENSION OF NEW TECHNOLOGIES IN EDUCATION

According to the research in the project "Professionalization of key competences of school and school management"[6], barriers, which hold back the spread of new technologies in education, are: lack of school equipment (30%), lack of students interest (20%), lack of trust in new and untested practices 35%). Only 15% of respondents believe that the extension of new technologies to education is barrier-free.

Barrier 1 - insufficient school equipment

Teachers do not include new technologies in their teaching due to the lack of facilities at schools, limited data transmission across the network, lack of suitable software for teaching, teachers' reluctance to use these resources, and financial restrictions on its acquisition and operation.

Barrier 2 - Disinterest of students, teachers

Teachers do not incorporate new technologies into their teaching, because some students prefer to search for information in books rather than use digital technology. In the case of teachers, it is primarily about the older generation, the lack of interest derives from the fact that the technology is complicated for them, they need a longer period for its mastering and digital technology is becoming more of a problem. There are also opinions that in some fields it is not suitable to be used in teaching. Students, who prefer to use these technologies for entertainment rather than studying are also a kind of a barrier. Their attention is taken away from the teaching.

Barrier 3 – Lack of trust in new and untested practices

Teachers are reluctant to incorporate new technologies into their teaching, because they have a lack of confidence in new things, excessive fears of the untested, and financial risks. Ignorance and lack of experience are also the reasons for not being included in educational programs.

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[5] J. Vymětal, A. Diačiková, M. Váchová, *Informační a znalostní management v praxi.* LexisNexis CZ s.r.o., Praha 2005.

[6] P. Svoboda, *Profesionalizace klíčových kompetencí řídících pracovníků škol a školských zařízení, modul ICT*, 2011 – 2012, projekt CŠM PedF UK, CZ.1.07/1.3.00/08.0235.

These statements indicate that the main obstacles for the use and subsequent expansion of new technologies and learning practices are both financial problems and some mistrust, lack of information about new things. It is clear that the personality of the teacher, his interest and willingness to embrace digital technologies, as a part of increasing the efficiency and attractiveness of teaching, plays a significant role here.

If we look to the future to develop new technologies that are appropriate and meaningful to apply to educational reality[7], we can see m-learning, personal learning environments, MOOC, new distant learning objects, wikis, blogs, RSS, use of Creative Commons, sharing of cloud electronic learning support, u-learning, t-learning, educasting, seamless learning, social networks, omnipresent smart phones and tablets, mobile widespread reality, overall move to mobile technologies. New skills, often referred to as skills of the 21st century, are becoming a heart of interest. This can also be concluded from the Innovating Pedagogue report[8].

DIGITAL COMPETENCES

If we want to talk about digital competences, first of all we need to realize the fact that modern times bring new technologies, which are called e-technology. Communication in a traditional school was and is focused on direct verbal and non-verbal contact of communicators. At present, electronic means of communication penetrate the educational space. Some of the most popular ones include: Email, Chat, ICQ, Skype, WhatsApp, Viber, LinkedIn, Facebook, Messenger, MOOC, Cloud, LMS, Webinars, Educasting and Podcasting, eventually other social networks and Internet telephony. They represent effective and prospective support for education as well as a positive supportive means of education. It is up to the teacher and supervisor of today's school if they are aware of digital technologies and use these options for the effectiveness of the teaching process and management activities.

At present, it is more than desirable to address selected aspects of the educational environment[9]:

- Comparison of traditional communication in class with current ways of electronic communication (e.g.: E-mail, Chat, social networks, Internet telephony, LMS systems, MOOC, Webinars, Educasting),

[7] Gartner.com. *Leading in a Digital World*, 2015, http://www.gartner.com (6.12.2015).

[8] Innovating Pedagogy 2013 - 2016. *Open Univerzity inovation report,* 2016, http://www.open.ac.uk/blogs/innovating/ (7.12.2016).

[9] P. Svoboda, *M-learning ve výuce technických předmětů*. Sborník příspěvků z mezinárodní konference – Modernizace vysokoškolské výuky technických předmětů, 1. vyd. Gaudeamus, Hradec Králové 2008. s. 172-175; P. Svoboda, P. Andres, *Multimedia as a Modern Didactic Tool – Windows EDU Proof of Concept Project at CTU in Prague,* in: *Advances in Intelligent Systems and Computing,* Springer, London 2017, s. 29-40, www.springer.com/gp/book/9783319503394?wt_mc=Internal.Event.1.SEM.ChapterAuthorCongrat.

- Modern didactic means (e.g.: multimedia classrooms, interactive whiteboards, visualizers, hypermedia),
- new objects in distance education (remote laboratories, virtual laboratories, e-tech parks with remote and virtual laboratories),
- new technologies called e-technologies, digital technologies, m-technologies (high motivation).

According to P. Svoboda[10], these aspects will allow the application of appropriate supplements as support to increase the efficiency of education, to extend the teaching methods for students, teachers and managers. These aspects will also make it possible to appeal to the necessity of lifelong learning for all school staff to obtain immediate, up-to-date information. We are also talking about creating conditions for a flexible, more accessible and individual learning process. Improving the work of teachers and enhancing their competencies in removing barriers to equal access to education is certainly on the spot, including the provision to every individual to effectively use all their potential. A stimulating environment for stand-alone and combined study is created.

More specifically, we can focus, for example, on m-learning in specific schools (see-Videoukázka - *český jazyk, 3. ročník ZŠ praktická. Využití m-technologií iPad)* [11] or on the use of tablets in teaching, generally (see Videoukázka - *využití ipad)* [12]. Young educators and managers mostly have a very positive relationship with digital technologies and like to try out non-traditional forms of work[13]. Managing activity involves the promotion of the formation of a large number of competencies[14]. With new technologies, the way of teaching and management can be changed. There is an assumption that e-learning and m-learning, on-line and off-line courses (e.g. Blended-learning, C-learning) can become a common support for learning, and the next generation of "correspondent" courses can be outlined.

Benefits of using advanced technologies by educators and school leaders[15]:

- creating space for talented and disabled students,
- the immediate availability of educational materials,
- automatic refill of school materials about useful and new case studies, which derive from specific real situations,
- interactivity and the possibility of continuous innovations of textbooks,
- choice of individual learning paths and goals,

[10] P. Svoboda, *M-learning vevýuce technických předmětů..., s. 272-175.*

[11] Videoukázka - *český jazyk, 3. ročník ZŠ praktická. Využití m-technologií iPad,* 2012, www.youtube.com/watch?v=7BaRulsbLJ0&feature=youtu.be (10.05.2012); *Videoukázka - matematika, 5. ročník ZŠ speciální. Využití m-technologií iPad,* 2012, www.youtube.com/watch?v=eGYNjHWtEFA&feature=related (10.05.2012).

[12] Videoukázka - *využití ipad*, 2012, numerato.posterous.com/tablety-ve-vyuce-vyber-vzdelavacich-aplikaci (10.05.2012).

[13] M. Svoboda, *M-learning – use of mobile...;* P. Svoboda, P. Andres, *Multimedia as a Modern...,* s. 29-40.

[14] B. Brdička, *Doporučení evropského ICT clusteru...*

[15] P. Svoboda, *M-learning vevýucetechnickýchpředmětů...,* s. 172-175

- taking responsibility for one's own learning and decision making, allowing self-control and self-assessment,
- finding activating methods and forms of learning, getting to know new learning opportunities,
- applicability to lifelong learning and guidance, obtaining information quickly,
- the ability of being brought to a much wider range of learners of all ages,
- an appropriate supplement, support and increased efficiency of education, an expanded way of teaching,
- learning opportunities anywhere, anytime, shared learning.

Effective school management through using digital technologies implies the implementation of these selected conditions: the need to use digital technologies throughout the school year, inclusion of m-technology into pedagogical practice management model, application of digital technology for college education, use of digital technology in school organization and management.

Teachers and school leaders inadvertently use these technologies, for example, to prepare for meetings, to manage issues with pedagogical colleagues remotely, to implement electronic conferences, to access the shared space of materials in electronic form (e.g. digital teaching materials - DUM, documents, web links, scenarios, methodical guides, etc.), communication, self-education, school presentation, economic analyses, statistical calculations, school agenda processing, organization and management of a school through appropriate software products (e.g. Open Source, freeware).

The dynamic development of digital technologies in the area of m-technologies leads to their greater expansion, not only in the commercial sphere, but also in the education and school management. M-technologies are a popular novelty mainly due to their properties (accessibility, modernity, practicality, interest, non-tradition)[16]. Their use in traditional teaching corresponds to the needs of improving the quality of education and strategies of digital education by 2020 of the Ministry of Education, Youth and Sports of the Czech Republic[17]. The management activity will become more flexible and will meet the needs of effective management of school organizations.

As it was already said, the use of new technology can change the way of teaching and management. The role of the Director, which is the introduction of new technologies, is crucial. It can be applied to any reform within the school (see L., Flanagan, M. Jacobsen, *Technology leadership of the twenty-first century principal*[18]). This is confirmed in the research plan for the introduction of the school information system[19]. Digital competence

[16] P. Svoboda, *M-learning – use of mobile...*

[17] MŠMT ČR, *Strategie digitálního vzdělávání do roku 2020,* www.msmt.cz/uploads/DigiStrategie.pdf (11.19.2016); *Jednota Školských Informatiků, Jakčeské vzdělávání využívá současné technologie? Sledujte s nám irealizaci Strategie digitálního vzdělávání!* digivzdelavani.jsi.cz/ (8.20.2017).

[18] L., Flanagan, M. Jacobsen, *Technology leadership of the twenty-first century principal*, "Journal of Educational Administration" 2003, vol. 41, no. 2, s. 124-142.

[19] A.H.K. Yuen et al., *ICT implementation and school leadership: Case studies of ICT integration in teaching and learning,* "Journal of Educational Administration" 2003, vol. 41, no. 2, s. 158-170.

includes[20] the ability to use ICT, especially LMS or other systems applicable to this form of education.

Depending on the thematic structure of the issues, which are addressed by the European ICT cluster and the overview of the main recommendations, as outlined[21], they correspond to digital competences with lifelong skills and must be considered crucial in the field of teacher training. In addition, it is necessary to put emphasis on the application of new technologies in teaching, in relationship to the changing needs of the labour market and industry. Support for research into the impact and an impact of digital technologies on the educational process is also essential.

A quote by B. Brdička [22]:

"The digital competence of teachers must include the ability to critically access educational technologies, i.e. the ability to recognize their learning potential."

Teachers and managers need to have digital competences for other reasons[23]:

- to motivate colleagues to make changes and develop a school,
- to convince about the importance and benefits of change,
- to promote further education in digital technologies,
- to take responsibility for making changes,
- to facilitate the integration of digital technologies into the education and administrative processes at schools.

Without developed digital competencies, it will be difficult to flexibly respond to the dynamic development of digital technologies and their application in practice (for future industry development 4.0).

For example, the French Ministry of Education, which has introduced state certificates (predominantly at universities) for achieving digital competences, considers the digital competencies to be of great importance. The reason for the introduction was that all students should receive a certificate of competency, both in the interest of the successful course of study and the future inclusion in professional life[24]. This was mainly

[20] M. Mesarošová, M. Cápay., *Competences for teaching in modern society,* "Technológia vzdelávania. Vědecko-pedagogický časopis", XIX. Ročník, 2014, www.technologiavudelavania.ukf.sk (10.02.2014).

[21] B. Brdička, *Doporučení evropského ICT clusteru,* 2012, www.spomocnik.cz/index.php?id_document=2460 (1.12.2012); *KSLLL.net. Dokuments. ICT cluster*, 2012, http://www.kslll.net/Documents/Key%20Lessons%20ICT%20cluster%20final%20version.pdf (27.01.2012).

[22] B. Brdička, *Doporučení evropského ICT...*

[23] J. Schiller, *Working with ICT: Perceptions of Australian principals,* "Journal of Educational Administration" vol. 41, no. 2, s. 171-185; R. Vuorikari, Y. Punie.,S. Carretero Gomez, G. Van Den Brande, *DigComp 2.0: The Digital Competence Framework for Citizens.* Update Phase 1: The Conceptual Reference Model. Luxembourg Publication. 2016, https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/digcomp-20-digital-competence-framework-citizens-update-phase-1-conceptual-reference-model.

[24] G. M. Cochard, *La nécessité de la certification des compétences numériques les Certificats Informatique et Internet.* Université de Picardie Jules Verne, Université de Versailles, 2012, www.elearningeuropa.info/et/download/file/fid/19416 (1.01.2012) .

about the availability of operational capabilities (ad-hoc solutions) and the ability to communicate and work through ICT.

DIGITAL TECHNOLOGIES IN PEDAGOGICAL AND MANAGERIAL ACTIVITIES

The dynamic development of digital technologies is linked to the demand for systematic changes in the use of digital technologies in teaching and also in the connection with school processes. There is a change in the requirements for the managerial role of school heads[25]. The decision process of school management is influenced by digital technology due to the allocation of time and available resources. There is a certain mismatch between the penetration of the technology into various aspects of society (critical aspects of education) and the considerable uncertainty among teachers about how to use digital technology in the best way. Relationships between new technologies and management issues in education are addressed[26].

From the point of view of the effective use of digital technologies, the provision of educational courses for school and teacher management plays an important role in enabling the continuous development of skills in digital technology within training courses for teachers[27]. It should be also noted that new technologies encourage school principals and teachers to change the ways of planning, acquiring and evaluating continuing education[28]. It is important to deal with the relationship between new technologies and leadership in the field of education[29]: How do they change management prerequisites? How do they support decentralized leadership? Why does the education sector become more democratic? How does it affect resource allocation? How does it support the development of new forms of leadership?

According to the OECD publication[30], the manager must be able to:

- manage the actual change, where necessary,
- manage the allocation of resources,
- control knowledge (knowledge management, management increases their efficiency) and ideas,
- plan his/her own time (time management),
- keep effective team of colleagues together.

[25] L. Flanagan, M. Jacobsen, *Technology leadership of the twenty-first...,* s. 124-142.

[26] C. F. Webber, *New technologies and educative leadership*, "Journal of Educational Administration" 2003, vol. 41, no. 2, s. 119-123.

[27] L. Flanagan, M. Jacobsen, *Technology leadership...,* s. 124-142.

[28] C. F. Webber, *New technologies and educative leadership*..., s. 119-123.

[29] Ibidem.

[30] *New School Management Approaches.* OECD, Paris 2001.

DIGITAL COMPETENCES –ASSUMPTION FOR ACHIEVING SUCCESS IN ALL AREAS OF HUMAN ACTION

According to the DigComp 2.0[31] Joint Research Center, the Digital Competences penetrate all areas of human activity. The most significant are:

Working with information

Digital content is being searched, found and then processed. This also includes information evaluation, critical assessment, analysing, organizing and storing.

Communication and cooperation

Digital media is a part of communication means. Communication and collaboration requires effective interactions and sharing capabilities through digital technologies. It also makes it possible to engage in civic activities. For these activities, when carried out in the digital environment, it is necessary to know and respect information ethics, netiquette and the ability to take care of their own digital identity.

Creating digital content

It is important to create new, but also rework or remix the existing digital content. It is necessary to understand copyright and licenses. In order to solve some problems or perform certain tasks, a student should master at least the basics of algorithmization and programming.

Safety

Security includes multiple sub-areas ranging from protection of computer equipment, through privacy, to health protection, the maintenance of quality of life and environmental protection.

Problem solving

It is solving technical problems, which arise from working with digital devices, as well as selecting and using adequate digital tools and appropriate technology solutions. Creative use of technologies, innovation in traditional practices and cooperation with others in this area are increasingly important. It is important to improve own digital competencies in relation to the dynamically evolving digital technologies, following industry 4.0.

CONCLUSION

It is clear that digital competences are an essential part of the competency model of an employee in education. Consequently, existing competency models need to be broadened with digital competences, to explore, decompile and suggest alternatives to their appropriate expansion in life in the information society and industry. 4.0.

[31] R. Vuorikari, Y. Punie.,S. Carretero Gomez, G. Van Den Brande, *DigComp 2.0: The Digital Competence Framework for Citizens...*

Digital education responds to the needs of improving the quality of education and lifelong learning. It contributes to the possibilities of meaningful use of new technologies in teaching and is desirable in the current conditions of Czech education. Digital technology has become a significant helper in education and management.

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Petr Svoboda: Założenia i powody wykorzystywania technologii cyfrowych w edukacji

Streszczenie: W artykule zostały ukazane założenia i powody wykorzystywania technologii cyfrowych oraz znaczenie ich użytkowania w nauczaniu i zarządzaniu. Treści opracowania nawiązują również do technologii cyfrowych i kompetencji informatycznych jako kluczowej części modelu kompetencji kadry nauczycielskiej w edukacji. W artykule została zwrócona uwaga na fakt, iż istniejące modele kompetencji wymagają bliższej analizy, rozłożenia na czynniki pierwsze, oraz obrazowego sformułowania poprzez rozszerzenia kompetencji cyfrowych.

Słowa kluczowe: technologia cyfrowa, edukacja, kompetencje cyfrowe, przemysł 4.0

Title: Assumptions and reasons for the use of digital technologies in education

Summary: This paper points out assumptions and reasons for using digital technologies, the importance of using digital technologies in teaching and management. It also refers to the digital technologies and digital competences as an essential part of the competency model of a teaching staff in education. It also points out the fact that existing competency models need to be further explored, decomposed, and formulated as an illustration by the digital competences extensions.

Keywords: Digital technology, education, digital competences, industry 4.0