Welcome Note

This year again the 4th issue of **OPUS** is published in English and centred around a special topic, digital pedagogy, a methodology that synthesizes the issues of modern education, applied info-communication, interactive curriculum, online collaboration and media literacy. As a guest editor, ***Zoltán Szűts***, associate professor of Department of Technical Education at Budapest University of Technology and Economics – with contributions from renowned Hungarian researchers – coordinated the edition of an issue.

Only after putting out the call for papers, we found that time had passed. That the idea of digital pedagogy is not a novelty anymore and that has already past and history too. That it consists of best practice, but also of dead ends, in previous ten years, methodologies have been formed, several trends have become popular or disappeared, such as connectivity; flipped classroom; MOOC; virtual and augmented reality; crowdsourcing, and open content development. These are only the major trend to be mentioned that dominated the decade since the publication of Digital Pedagogy with Typotex in 2008.

The core idea behind the current issue was that the teaching and learning process supported by info communication tools and online media has become commonplace and familiar for teachers. Using digital technologies, several instructors have already paved the way for learning and teaching in a tangible universe of virtual, technically determined, info-communication and digital media governed educational space. But just as we got used to technology and this new educational environment, we should stop for a moment and look back. If we do so, we will notice that, in some respects, the traditional methodology is also appreciated. It also means that we should also know when not to use ICT in education. That we should also be aware of its advantages and disadvantages.

The first paper of the issues is written by ***László Z. Karvalics*** and its title: *Students in Science and Knowledge*. According to Karvalics, who is a renowned information society researcher, the time has come to talk about digital initiates rather than immigrants and natives. This new classification could encourage the formation of a new alliance between society, and school, teacher and student. ***Zoltán Szűts***, in his paper *A Critical Approach to Digital Pedagogy - A Holistic Methodology in the Information Society* seeks a path to digital pedagogy that complements previous educational approaches. The author suggests that over the last three decades, after the emergence of the global digital network, online communication and media has become a vital part of the learning process, and by today it has reached the end of the experimental phase and stepped into productivity phase. But for the methodology to be successful, there are several components digital pedagogy architects must take into consideration. ***Tibor Koltay***, as an expert in digital library studies, presents the issue of data literacy in academia, focusing on basics and pedagogical views: data literacy, applied in academic environments, therefore related to research data, which similarly to other types of data, needs to be managed. Koltay argues that technological advances have created opportunities and threats for the free flow of information in society and raised awareness of the importance of information literacy.

In her paper, ***Adrienn Papp-Danka*** reflects on the connections between digital lifestyle, digital citizenship and digital pedagogy. The study centres around the question of how digital citizenship competence can be developed from daily digital life routines. Meanwhile, the role and potential of digital pedagogy to developed digital citizenship competence are discussed.

András Buda states that many are not satisfied with today's education. Some criticize the tools available, others see shortcomings in teacher preparedness, but some also call for a change in the teaching environment. Accordingly, there is a different perception of developments, but everyone

agrees that digital technology will play a very important role in this process. The study presents the results of a survey that are very useful for instructors who intend to involve info communication technology into their classes. ***Judit Mihalik*** has chosen a hot topic, the role of agility in higher education. The author presents the issue through a collaborative research project report and uses a case study approach to show how future-oriented skills can be developed in a higher education subject areas. Presenting a student collaboration project process, it looks at agile in education and explains how a mix of methods and tools have used to facilitate this sort of active learning. The title of the paper published by ***György Molnár*** is *Digital instruction or the digitalization of instruction in the modern ICT environment*. While utilizing the domestic and international trends along with almost 20 years of experience as a teacher and instructor in higher education the author is presenting feedback received from students regarding the application of digital devices, and interactive methodology and technology into education. As an expert in engineer training, ***Dénes Zarka*** presents an online collaboration practice for active learning in the visual age through experiences of the VOCAL project. The finding of the paper is to learn on-line collaboration with given tools; a visual learning process is also essential. The real learning efforts and the needs for this visual learning should be researched further in the future. The final paper of the issue is an author by two researchers, ***Monica Dukić*** and ***Júlia Mecséri***. The High 5! disability awareness program affects the entire school environment and is also important at the level of individuals as it allows students to become better citizens in the whole society. The authors argue that incorporating the understanding of disability into multicultural education has long-term benefits to students as it provides them with tools that will enable them to understand and embrace elements of diversity in the world.

The issue would not be complete without a review. ***András Benedek*** reviews a book published by Zoltán Szűts in 2018 with Wolters Kluwer Publishing House title *Online*. Regarding to Benedek, in terms of the content of the volume, Online deals with one of the important phenomenon history of the latest century, the story of online communication and media, and mainly offers orientation or intellectual impulses for the reader by providing, often wiki-like, descriptions of thoughts connected to some interrelations and associative titles or essayistic reflections and the introduction and elaboration of the author's opinion on the issue.

We hope that you will find this English issue of **Opus et Education** attractive and start your expedition into digital pedagogy at the end of 2019.

András Benedek editor in chief

Zoltán Szűts guest editor

László Z. KARVALICS

Students doing and producing science

The missing last mile in digital science pedagogy

„And to whom we wish to convey our knowledge

Already lives his life as a scholar"

(Oszip Mandelstam)

Introduction

Máté Nászai had been at the first course when he had started his experiments on a mini bio-gas power plant fed with bacteria that would be able to provide energy for his school (Miklós Radnóti Secondary Grammar School in Szeged). Ten years ago when, at the age of 15 and the second year of the school, his work was presented in a newspaper article (Hargitai, 2009), his current research challenge was to jump from the ten-litre size to one cubic metre. And although he was given theoretical support and microorganisms by the relevant department of the University of Szeged, the work he carried on together with his teachers and peers, which was aimed at the development of a new biotechnological know-how, must be considered an *independent applied research project*.[1]

Let us see an example from the world of basic researches, too. The youngest author of the gravity centre of scientific publication products, the Nature, fifteen-year old Neil Ibata contributed to the theory of galaxy evolution when, some years ago, his simulation proved of the dwarf galaxies rotating around the Andromeda that their motion is not chaotic; they form a huge but systematically moving structure through 1 million light years (Ibata, 2014).[2]

We could go on telling several similar stories from each part of the world. It was always clear that after a certain age, some students' performance might reach or even exceed that of the qualified members of the scientific community – or at least can be compared to that in some respects. It was not questioned in the pedagogical tradition either that the contribution of school environment might help child prodigies (wunderkind) create full-value scientific results by "adding" to the "brought" family, cultural and socialization elements.[3] This was clear already at the beginning of the 20th century – in Hungary, too, where it was not only young mathematicians and chemists but "literary historians" and "ethnographers", as well, who approached reviews and editing publications directly from the school

[1] The young scientist's way led from here to national and international student competitions (including the golden medal of the most dignified one, the International Biology Olympiad) and the renowned University of Cambridge (2011-2014); then, skipping an education degree, he started PhD studies at the University of Glasgow in oncology (2014-2018). Since having gained his scientific degree he has been working here as a research assistant.

[2] It does not lessen Neil's merits that he made his discovery as a Python programmer "helping" his astronomer father's research; he published another aspect of his discovery in a review of astrophysics in the very same year, with some other peer authors.

[3] In case we want to pry into the reasons of creativity, innovativeness and the possibility of becoming a child-scientist – as Ginsburg (2011), Tough (2012) or Ripley (2014) did it –, we will get into a much more complex field since several more, unexplored or not sufficiently understood factors might act. Walter Pitts, one of the founding fathers of artificial science did not bear any of the attributes when, as a 12-year street kid of Chicago, he took shelter from a gang war at the public library, and, without any preliminaries, within three days he discovered several mistakes in Russell's Principia Mathematica. See the story at: https://hsm.stackexchange.com/questions/7393/what-were-12-year-old-pitts-objections-to-principia-mathematica (Each content at the referred URLs was downloaded on 19th June 2019.)

bench. István Hajnal conceived it that although medieval "*French universities had no notes about their students, based on the biographies we can highlight several examples of students younger than ten years old but attending university lessons; contemporaries often spoke of prodigy children who recited Latin authors by heart already at this young age"* (Hajnal, 2008: 99). [4]

Sciences and students: some basic narratives

> *„The two fields of creating knowledge are research and education. While scientific research produces new knowledge, the function of education, and primarily of organized school education, is to direct the processes of gaining knowledge and learning"*. (Csapó, 2004:1233)

In case we pair the perception and the interpretation of fantastic student performances and the latest discourses on the education of sciences at school, we will find several common moments that can certainly be called the reigning opinions heavily dominating the theoretical starting points of the topic:

- *Sense of being special and exclusive:* The capability to do full value scientific work is an extraordinary state, it is not part of the "target functions" of school, it does not need deeper reflection, and it is enough to accept that "it can happen".[5] Similarly to vocational teachers' readiness for sciences: it is not bad, it is even good if they have it but they are not required to.
- *„Being outside pedagogy and school":* The extraordinary students' scientific capabilities do not have any impact on the requirements, notions and "philosophies" connecting to the education of sciences and school subjects. It is not even raised as an issue to integrate the phenomenon into scientific education at schools in the hope of massification or some kind of emancipation. It automatically belongs to somewhere else, the world of *talent education*.[6]
- *At the same time, the perception and the definitions of talent* become narrowed to proving and measuring progress in reproductive knowledge of subjects amongst competitive conditions. Of course, a lot more of the student subjects involved in additional classes, study circles and special laboratory work will become scientists later, however, school knowledge processes are sensitive to *skills-base immersion* in the micro cosmoses of vocational scientific knowledge: what happens is *the individual multiplication of the knowledge already created in the scientific sub-system at the highest possible level*. The "most talented" ones are those able to possess and use most of the science distilled into learning materials.
- Composing the talents consciously together (talent groups, talent classes or talent schools[7]) *learning objectives* can be accomplished even more intensively, and it is still not providing juniors for science that is in the focus but the unfolding or development of the students' skills

[4] In his Supplementum Chronicarum (1483, Venice) Jacob Foresti steps beyond the mere recognition of the situation when asking: *"Why shall we prefer old people against their students while diligent studies may open the way towards the very same knowledge for young people?"* (Logan, 1986: 195).

[5] Of course, this implicitly presupposes the "unscienceability" of the major part of students.

[6] The KutDiák (https://www.kutdiak.hu/hu/), the movement of student researchers has reached outstanding results highlights about itself is that it opens a way to *"knowledge and a way of thinking unapproachable from the school bench"*. It takes place at the top of the talent education pyramid: it offers personally tailored and complex support for the few most apt for scientific research so that they can try how far they get as student scientists.

[7] Elite secondary grammar schools and elite schools – owing to their obtained prestige and attraction – build, as a matter of course, their work on children of good capacities. It is worth reading the report on the "school of talents" in Novosibirsk in the mid 70's (Malita, 1976:302). Comparing to this, we can judge worthily the "wonder classes" of Andy Bramante, the teacher of Greenwich High School where average children became innovators and winners of scientific awards not because of its rigid "racing stable" nature but because of the pedagogical methods allowing wide freedom (Tesoriero, 2018).

at a higher level in the hope of their improved labour market chances and life perspectives, in an independent talent pedagogical field.[8]

- If research process appears in any form, it primarily and exclusively *serves learning*. *"Learning by research*" (LbR), as a methodological paradigm became, relatively rapidly, a practice used at the lower levels of public education from a solution supporting the independent learning skills, evolving through the autonomous selection of their topics and research strategy building, of the students in higher education (Roberts, 1994, Schallies and Lembens, 2002). After a while, this method was attended by „*Learning by Collaborative Research*" (LbCR), the pedagogy of cooperative research communities built of students and completed by the training of teachers and the measurement of learning efficiency (Christianakis, 2010, Golfomitsou, 2017). The very popular trend of *inquiry-based learning (IBL*) seems very similar[9]: however, in fact it only concerns the teacher's role that transforms into facilitation from knowledge transfer and the techniques of classroom work that improve the efficiency of learning the knowledge packages by increasing the level of interest and motivation. Literature, some part of which is sensitive to the collaborative/community dimension, as well (Wells, 2001), keeps that the target function is "learning outcomes of higher standard" and the foundation of life-long-learning at school (Nagy, 2010). Today, this prevails in nursery school pedagogy, as well, and it is not exaggerative to say that it is absolutely focused at natural sciences.[10]

The listed points of theoretical outset mean a border to which theoretical thinking (be it pedagogical philosophy, educational policy or subject didactics) only approaches but never jumps across. Luckily, in practice one can see several examples that it is possible to escape from this conceptual pillory, and pedagogical practice is faster and more flexible in adapting to comprehensive civilizational (social macro-evolutionary) changes. The digital ecosystem and information culture that, in addition to communication and knowledge acquirement, affects and transforms more and more existence layers of everyday life has long been pointing beyond this imagined border line. And we should not search for the reasons in the organizational and methodological world of school. If Digital Pedagogy reflected to the challenges set by *networking, the tool environment* and the organization of educational content adapting to these (adaption), Digital Pedagogy 2.0 (Benedek, 2012) probes deeper, and is perceptive to the transforming nature of *processes and structures* (transformation). In case there will be Digital

[8] It tell us a lot that the *Gifted Child Quarterly***,** the review of the National Association for Gifted Children (http://www.nagc.org/) has been published since 1957 (https://journals.sagepub.com/home/gcq). It is also clear that the engine of the talent train is motivation coming from parents, therefore talent industry is a lot wider than the school dimension, especially since the online revolution when lots of parents have hoped to fabricate their children into "above-the-average" by means of special (and expensive) devices, courses or education packages. Of course, the distance between the education-development programs setting developed educational objectives (for example: http://www.minieinsteinslearningcenter.com/) and the market stakeholders established to sell products (for example, Disney's Baby Einstein company https://www.pgpedia.com/t/baby-einstein-company) is enormous.

[9] For the first meeting with the concept of IBL, it is suggested to read the thorough and regularly refreshed Wikipedia article: https://en.wikipedia.org/wiki/Inquiry-based_learning

[10] To accept all this is enough to have a look at the "Bible" of the issue: the 2007 report of the EU's Directorate General for Research and Innovation (Rocard, 2007), that considers the renewed pedagogy of future Europe as equal in value to the more effective (research based) education of science, and finds the reason of its mission in the decreasing interest in sciences (especially the STEM subjects), which might lead to labour market and competition disorders in case we do not "set right" the pedagogical foresight in time. And research-based nature became the "Saint Graal" of the report because the scrutiny of "whys", of the reasons came to a deadlock at the weaknesses of the methodological culture of science teaching and the low efficiency of the teachers' motivation work. In the report welcomed as a revelation, the mission of which is to "pave the way for a new pedagogical culture", I can see nothing else but the actionist substitute by a declining educational policy (necrophilic, with Freire's words) arising from a narrow-minded situation analysis. If compared to desk teaching restricted to reproductive knowledge, research-based education is undoubtedly more up-to-date and efficient – however, it still builds on the objective and tool set of the very same "old" pedagogy as its ancestor, instead of new pedagogy adapted to the changing world.

Pedagogy 3.0[11], it may provide a framework for adjusting the principles, objectives and practices to the *changing image of the world and the child* (social innovation with a planner's thinking). And how could we speak of digital science pedagogy within this field in case we do not analyse the system level changes in science itself and do not try to draw the outlines of Science 3.0 (Z. Karvalics, 2007, 2008a)?

Science and digital culture: message from key developments to school

„science is too important to leave it only to scientists"

(Doug Schuler)

In the next sections, I will mention only the changes of science that are meaning and interesting in terms of the future of science pedagogy, as well.

The primary and most visible direction of the transformation of knowledge plants is the increase in measure and complexity. Bigger and bigger scientist communities are using more and more enormous and so more and more expensive mega-machines that can mostly be built only in international cooperation (space stations, space telescopes, gravitational wave detectors, particle accelerator, laser physical centres etc.); signs that are issued by these tools (as the prime producers of the scientific Big Data) and require analyzation have multiplied many times, as well. In parallel, the spread of automatized signal processing and solutions of artificial intelligence replace some of the scientific routine activities (similarly to other segments of the labour market). On one hand, this allows researcher lifetime move to domains of higher added value and, on the other hand, raises the needs for the implementation of tiny research *micro tasks* not possible to be automatized. This needs supplementary human resources, and this auxiliary army is more and more available due to the high number of volunteers organizing into network communities. And while, technically, this is one form of crowd sourcing, *citizen science*, too, has stepped into a new era. In fact, online database and transaction management have allowed the evolution of cooperating research communities of astonishing sizes: several hundreds of thousands of people (or even million in the Zooniverse / Galaxy Zoo projects initiated in galaxy classification). Some parts of the micro tasks can be fulfilled in a playful way, as well: the platforms built to "wrap" protein structures are extremely popular. Most of the citizen scientific projects deal with local-environmental-nature protection issues.[12] But new possibilities appear this way not only in natural sciences but in the world of cultural heritage (Golfomitsou, 2017) or even history and literary sciences, as well.[13]

The many volunteers offer many material resources, too. Smart phones that serve as mobile laboratories; applications apt to be used for scientific aims; cheap webcams that allow us to glance into the lives of bird nests. Many offer the unused processor time of their computers, and by doing so they contribute to satisfying the calculation needs of scientific projects demanding in signal processing.

[11] Interestingly, we can find methods of systemization (after the example of Web 3.0) that announce the birth of Education 3.0 or Pedagogy 3.0; these, however, do not approach from digital transformation, its elements are only the attributes of the comparisons.

[12] These are joined by many pensioners and students. And the fact that this symptom is really fed by the resource demand of science is clearly reflected by Tóth's remark (2004) about domestic scientific student camps where young people *"… could do scientific observations and examinations that were not undertaken even by renowned research institutions. Not only because of the lack or being busy of their researchers but also because these researches need high numbers of participants. Like, for instance, synchronous ornithological observations, the close examination of a loess lawn or mass soil sampling on a saline territory".*

[13] The digitalized and published photo and document data bases of museums are supplied by family members and volunteers all over the world. In the famous Breitenau research the stories of the individual victims of the labour camp employing only Germans of Hessen and Thuringia were followed by students of 14 or older: http://learning-from-history.de/International/Posting/8553 .

Others offer money or transportation capacities for researches. By doing so, the civil society has joined line with companies and science policy as an agenda setter affecting the trends and possibilities of scientific researches,[14] and science itself is partly becoming "open science".[15] Owing to this, new, participative channels of reflecting to civilization problems have opened up. The social contribution of science is not any more merely the dissemination of its "blessing" but active participation in processes of gaining knowledge; by establishing personal relations and forming own questions and demands.[16] In light of these facts we can understand the importance of *science journalism*, the network dissemination of scientific results and the several amazing platforms of popularizing science in age groups[17] because it deepens the *scientific literacy* of consumers increasingly impressed by science. (Z. Karvalics, 2013a).

The demand for citizen science is growing in parallel with the extension of the results achieved in the cognition of "more extensive terra incognita". It is inevitable that the existing self-motivated and spontaneous forms be completed with systemic and institutional solutions by utilizing the experiences and best practices. And no doubt, the frameworks for this are already available, amongst others, in the form of the mental, material, cultural and human capital of public education. Science pedagogy can meet the epochal challenges if it steps forward and *besides learning science it also includes doing science into its program*. This needs a radical change of attitudes. A giant step by which former borders can be crossed, and all the difficulties of the "final mile" overcome. The ten theses that present the most important arguments and statements that point towards the school revolution of doing science mostly as the "antitheses" of the current practice wish to support the theoretical foundation of this turn. In this part of the paper, I refer mainly to my own former publications because in these I introduced the aspects and conceptual innovations presented here more extensively and in more details.

Producing new knowledge at schools: ten normative theses

Joining in current scientific programs and successful contribution to them must gradually become a standard part of school curricula

The elements of scientific literacy and the acquisition of scientific methods will only become an organic whole and a meaningful, activity-organizing element from partial knowledge if science is done actively alongside. However, the microtask-type[18] possibility of participation presented so far is only a kind of an "entrance level" of this: the way towards the higher level operations of producing new scientific value is open, as well (even to generating and testing hypotheses that contribute to open scientific discourses). Meanwhile, building in the cultivation of science does not "replace" the traditional vocational curricula but enriches them with a new module. Its philosophy is: not to terminate former

[14] It was the *Crowdsourcing and Citizen Science Act* having come into force in the US on 6th January 2017 to recognise this first and draw the necessary conclusions (Z. Karvalics, 2019a).

[15] The narrow understanding of "open science" only covers the publicity of and open access to scientific results; the wider recognition, after the collapse of the former walls, means that the space for doing science includes more and more participants – just like the concept of "open innovation". The "open movement" is an approach that considers the new world of collaboration and sharing as a power transforming education and science at the same time (Jhangiani and Biswas-Diener, 2017), while Hecker (2019) sees citizen science as the source of the pressure creating the new dimensions of society and politics.

[16] Barell (2003) included the strategies of this "personalization" into his book. It is easy to see that the exploration-based approach is only *one* element in the much richer set of motivations where personal affection and the capability of putting independent questions about the natural-social-community environment. Or conversations with astronauts or Arctic explorers in real time, which offers the possibility of getting inspired: it is the world of real personal affection. Problem and solution communities may arise only from here.

[17] Like e.g. the Mad Science Kids Club (https://www.madscience.org/), where advance is supported by the interactive Lab Rat or the Science News for Students https://www.sciencenewsforstudents.org/ (earlier: Science News for Kids). See more details in: Z. Karvalics (2015).

[18] The 2.0 "prototypes" of microtasks are *micro content task systems* (Horváth, 2012).

priorities but raise a new one besides them. Its undertaking is moderate: it is aware of the fact that only certain programs of certain scientific fields are apt to implement researches within the "school architecture" frameworks.

Participative science is a type of experience, skill and task to be provided not only for "talented children" but* all *children in public education

Just as the trinity of 3R (*writing-reading-arithmetic)* meant in earlier times the "common minimum", in digital culture these have been attended by *information literacy* that we can take as the new literacy acting as the condition of active netizenship. Seemingly, scientific literacy accomplishing itself in participation is not a competence the lack of which endangers life perspectives (just as it is possible to live a perfect life with difficulties in writing, reading or calculating). It is, however, more reasonable to put the question this way: how can we argue for not making a general requirement of this aim that is achievable from a pedagogical point of view? Horribile dictu: it is a human right (Z. Karvalics, 2019b). In case a child of evolving mind is like a small scientist (creates categories, asks questions, forms and clashes hypotheses, struggles with meanings and follows the widening circles of cognition through notions and models in order to explore the world), why should anyone be *excluded* from the continuation of this process? During preparation, the pedagogical praxis of the tradition of *critical thinking* (for which the Hungarian phrase is child philosophy) can be used[19], which can beneficially be completed with methods helping the correction of gained disadvantages.

While doing science, learning becomes an objective serving research capabilities

As we have already seen it, the research of "as if" nature, the essence of which is "it should be done this way in case it were real" serve learning processes. When the students are integrated by real researches of real stake, the relation turns around. The prior knowledge necessary to do the operation becomes the precondition of quality assured participation. Directed learning, which is controlled by the teacher as a gate guard. The range of necessary knowledge varies from project to project, but for the teacher it is a great help that it is not authority and the mark that give the student's motivation to learn but the will to become able to join the project. During the planning of the research, the scientist and the teacher's common work prepares the learning phase (Cooper and Cowie, 2010), and the teacher in each case makes an individual decision on which acquired "part of the learning content", as compared to a traditional curriculum, can be replaced by getting deeply engaged in the research.

"Doing" science at school at the same time means founding "lifelong research"

In case joining in performing sciences is general and of mass measures, the school may be the controllable "entrance-training" level of citizen science. And just as joining network scientific programs has been voluntary so far, after quitting school, everyone still has the possibility to participate in programs according to his/her interest, value set and choices if (s)he wants to. Only, not in a spontaneous but in a pre-educated way, by means of pre-education, meeting higher levels of challenge. In other words: public education is the launching station not only for lifelong learning but for *lifelong research*, as well. (As part of the re-calibrated social responsibility of schools.)

[19] Let us also also add that the successful phase of Hungarian adaption getting under way with translations, books and teacher training was followed by silence, so it is high time to reconstruct the domestic school of critical thinking and get to know the latest international results of the previous decade. Similarly, it is worth "getting back" to the action experiment of József Zsolnai's science education at Zalabér.

Scientific programs of mass and big volumes require adequate infrastructure and research environment

Certain teachers, certain classes and certain schools themselves can only start projects of limited size. (Although there are research types that do not need an online hinterland, and take the children to nature; for these, the ideal size is "some classes", 150-200 children, which is easy to organize.) The projects running on the network and based on micro tasks, however, require consent and digital platforms developed especially for this aim where topic proposals that inspire choices appear, decisions are made, the research community is built, productions are aggregated and the results are introduced.

These platforms are not yet available.[20] Their introduction, taking into use and "habituation" may take longer time, while further developments serving the new demands must also be made.

By means of the active participation in creating scientific knowledge the pressure of acute pedagogical problems slackens

A scientific branch squeezed into a (vocational) subject and a schoolbook and the ways of learning and checking are, despite the teacher's all effort, strong "challenges" for the students. And especially as compared to the digital world being, as the citizens of which they enjoy a very high grade of freedom in choosing activities and are self-confident in gaining competences in performance (be it about gaining knowledge, games, using apps or doing transactions). However, owing to the recognized and experienced "importance" and "meaningfulness", through participation in a voluntarily selected scientific project, personal contribution to a wanted and expected common result *becomes an internal need from external obligation*. *Loyalty attended by respect for authority is replaced by interest attended by the sense of responsibility*.

And let us not only think of the students. All these hide special perspectives for the (vocational) teachers, as well. Formerly, they, too had to choose between doing or teaching science; bringing knowledge production into schools considerably eases the absoluteness of this forced choice. From an examination body, the teacher advances into being a coordinator, project manager and supporter. The base for his/her authority will be his/her competence appearing in various dimensions of the research process. *Power-based asymmetry turns into collaboration*; teacher and student make one team. Compared to the repetitive use of the unchanging curriculum, all this raises strong demands in terms of following the latest developments and interesting discourses of the given scientific fields, searching for entrance points, conscious self-education, forming bold own dreams, search for partners and communication and interaction between scientist and teacher (Cooper and Cowie, 2010). Thus, to build a new teacher identity layer.

New knowledge can be created not only in the domain of science but in the world of technological and social innovation, as well

Similarly to students' results in the basic and applied researches presented in the introduction, an independent study could be written about the technological developments that have arisen and been implemented from school desks. Some of these (e.g. pharmaceutical researches or new types of

[20] The "*Palaestria"* program has been going on since 2007 at the University of Szeged; during the program, we have organized pilot projects (e.g. space archeological field research with secondary school students of Csongrád county), and a pilot web page had also been launched. This early platform was overthrown by the revolution of applications and smart phones, but was born again on a 3D base in the summer of 2019, under the name Studiolo, with a community media module and the support of the Hungarian UNESCO National Commission.

medical tests) cannot spare scientific background, but these fields are less suitable for mass collaboration. However, community based searches for solutions[21] sometimes require the common efforts of many people; these are either of a scientific nature, or sometimes need technological innovation or implementation, or in other cases simply need a *social innovation* taking us further towards the establishment of a wished future state of affairs. When a nine-year-old girl develops the prototype of a cheap and easy-to-build homeless hut, and also prepares it, or when whole classes in cities collect food for village families, or student informaticians operate and maintain school web pages and background systems[22], they are the active participants of real stories and do not learn through "like-spectacles". In the Hospital School project, students make personally tailored digital learning content[23] by which they help their peers staying at hospital to make up for subject lag. This is *participative knowledge technological development* of full value, which is motivated by the patterns of recognized and experienced solidarity. The very same thing happens as it does in scientific projects: without intense learning attained through inherent motivation development cannot be successful.

The projects of various scientific fields can be started independently or hybridized with technological, social and arts dimensions

Arts succeeded to get included in the STEM (Science, Technology, Engineering and Maths) quadruple that had been born in the '80s of the last century; this is how STEAM[24] was born about twenty years later. However, a narrowing and elitist interpretation of the acronym became dominant. It did not only express the fact that these five fields are connected but also that it is *primarily* these five knowledge worlds that must be preferred from public education to higher education (in many cases quite openly with the background argument that these are the clue fields of fulfilling the innovation potential and the labour market demands). Today we already know that all of the arguments lack ground (Z. Karvalics, 2008b): labour market demands *social skills*, and information and material technological industries are joined by *human technology and human economy* (Z. Karvalics, 2019c). But if it were some other way, "non-STEAM" subjects (history, literature, language, philosophy, social geography or physical education) would still not be of lower rank, although some of the education and science policies take this as evident. And this even more applies to them if mentioned as possible fields of scientific research: here, the acronym needs to be completed with *Society, Humanities and Community engagement*.[25]

Thus STESCHAM could perhaps be the fantasy name of *the integrated school "knowledge domain"* including all possible fields. Meanwhile, one can define less and less projects being sensitive of just one piece of knowledge. What technological philosophy calls "*entanglement*" can manifest in the world of potential community researches, too, in several ways. (With various hybrids and "directions

[21] https://www.livingknowledge.org/fileadmin/Dateien-Living-Knowledge/Dokumente_Dateien/Toolbox/LK_A_DIT_CBR_Process_Map_Sept_2015.pdf

[22] All his can be compared to the emptiness of the "prodigy child discourse"; for example, the silly competition for the record of the youngest Microsoft system administrator. The title was gained over from the ten-year old Pakistani Arfa Karim by a nine-year-old Indian girl (who could cite 1300 verses from the legendary poem of the Tamils, the Thirukkural already at the age of three); everyone then was overtaken by the Macedonian Marko Calasan who took his successful exam at the age of eight (then, before he reached 10, wrote a 300-page installation book for Windows 7). https://gizmodo.com/8-year-old-macedonian-boy-becomes-youngest-microsoft-ce-5134468

[23] https://osztalyfonok.hu/cikk.php?id=1597

[24] The only accepted and widely used interpretation is the concept innovation linked to Georgette Yakman's name. In 2015, a STEAM review was launched (https://scholarship.claremont.edu/steam/). Kimura's (2019) notion of "technoartescience" includes social science but construes integration rather in terms of the spiritual and not the community dimension.

[25] Some earlier extension trials (like involving the "R" of Reading and wRiting as STREAM) wished to enrich the meaning of the notion "backwards", with the basic skills but this is clearly unreasonable, it is a blind alley. Integration is going on "sidewards", involving the omitted fields.

of tour", which is no sense to be illustrated with flagship projects because even the best practices so far show extreme diversity.)

The program of making scientific performance general at schools does not reflect to the crisis phenomena of public education and pedagogy but the epochal change of civilization.

At the end of the 19th century, the birth of the modern public education system and modern science was part of a comprehensive social macro-evolutionary transformation during which aristocratic control structures were replaced by bureaucratic control structures in almost each field of life, which started to serve the new system size and complexity effectively. Through several generations, school played a revolutionarily new role by successfully shifting the outlet towards higher qualification and positions of higher added value, being at the same time the engine of social mobility and the reduction in inequalities.

The mass of phenomena perceived as the "world crisis of education" from the 60's of the 20th century *did not reflect the inherent dysfunctions of the world of school and pedagogy but the process of the bureaucratic control structure becoming less and less appropriate* (Z. Karvalics, 2009, 2010). That is why all "pedagogical reforms" disregarding the fact that the school has to fulfil its system function in a changed social scope proved to be unsuccessful and ineffective. The core of this change is a new leap in system size and complexity that leads towards new patterns of work, society organization, resource consumption, distribution, autonomy, cooperation, coordination and responsibility. And although it seems that the clue is technology, artificial intelligence, the Big Data or the dynamics of the internet, in fact they are only components of the balancing mechanisms necessary for the new system level. I referred to this change when I suggested to complete the schoolbook theoretical triple (Politicum, Pedagogicum, Informatorium) with a fourth element, Civilisatorium (Z. Karvalics, 2013b). Today, I consider the raise in the value of human technology and economy as part of this and as a direction unthinkable without searching the ways leading to *substantial equality* formulated by István Mészáros. It depends on the school system and the pedagogical practice how much they can contribute to this already now, at the beginning of the transition. It is, however, sure that doing science and STESCHAM knowledge production push schools into this direction rather strongly.

The student performing science and producing knowledge is not any more simply the under-age subject of education but, owing to his/her contribution to and resource role in the solutions in the society understood as a life and problem community, is a partner to be emancipated

During the latest two or three decades, we have witnessed certain phenomena. Childhood, becoming an adult, selection of one's career path, founding a family and starting an independent life are delayed, taking place at a higher and higher age; meanwhile "digital natives" gain competences possible to be integrated into extra-school processes of problem solution at a lower and lower age. Recognizing and accepting this must (after the example of the Finnish teachers who were taught to use computers by children at the dawn of the online culture) necessarily change the attitudes of the school, the teacher, the parent and the society towards the children. This does not entail the radical revision of safeguard, taking care, development or education adapted to psychosocial specialities but the permanent re-arrangement of the learning and teaching environment the horizon of which leans, moving away from frontal forms, through embedding into game ecosystems being in line with the given age (Z. Karvalics, 2018) to, *amongst others*, involvement into knowledge producing mass communities. Belonging to various types of local, national and global communities can be experienced through research tasks and participative processes entailing knowledge production, as well, together with the evolution of the relevant structures of perception, identity and responsibility. In this transformation, involvement into

the institutionalized systems of scientific performance and knowledge production is like a permanent initiation. Yes, like in former tribal societies where "abiding the test" was the way to get full admittance into the community.

This is why I think it has been high time for years to speak about *digital initiates* (Z. Karvalics, 2013d). By doing so we could not only renew the, sometimes really useless, "generation discourses" using the letter codes (X, Y, Z, Alpha) but could also inspire a set of "new alliances" between society and school, teacher and student, community and community.

Epilogue

As emphasized above, the vision of the theses is very normative. Of course, many current developments underpin their direction or "authenticity". The prime sense of considering them is that they are comparable to daily affairs, interventions, plans and innovative ideas. Do they point to this direction? Do they cross thresholds and contribute to the manifestation of the last mile?

Let us not be deceived by the fact that meanwhile bureaucratic control is fiercely defending all its beach-heads, even the ones it does not need. Politicum is striving to overcome Pedagogicum and Informatorium, neglecting Civilisatorium. And while at the domestic schools we can feel happy about thousands of tiny little steps as examples of successfully adapting to the changing world, the atavistic shades of the Past[26] appear many times to retard necessary and inevitable transformation not only in science pedagogy but the whole of public education.

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Zoltán SZŰTS

A Critical Approach to Digital Pedagogy – The Search for an Organic Methodology in the Information Society

Introduction

In present, the use of info-communication technology has become a living communication reality that pervades everyday life. The relationship between the learning and teaching process to medialization and digital technology has become increasingly prominent. Since the spread of digital data, and especially the emergence of the World Wide Web, many phenomena and trends and could have been observed regarding the use of ICT in education. Some of these trends have reached on their peak the plateau of productivity since the 1990's, but more have proven to be merely fad. One of the most frequently used methods in the present is, for example, the flipped classroom, where students acquire the theory at home through digital curricula, while in the classroom they deepen their knowledge and interact with teachers. From the 2000s, e-learning has become a new educational environment which includes novel forms of learning and teaching supported by ICT, both in form, content, and methodology. In present, E-learning continues to be an important trend, and many teachers are just now discovering the benefits of the platform and some of them turn to blended learning (Kis-Tóth – Lengyelné, 2012).

The use of a Learning Management Systems (LMS) relies on multimedia and linking texts - hypertext - while requires interaction between the learner (user) and the text (information). Gamification supports the player within, where point systems, levels, and healthy competition between students play an important role. Although not a traditional methodology, the use of social media and web 2.0 in education is becoming more and more important, students follow or write blogs, or edit Wikipedia. As it is observed that nowadays students' attention can be maintained for a shorter period of time then in the case of previous generations, the use of micro-content in the transfer of knowledge adapts to the accelerated information-taking habits. In the universe of micro-content, the use of smaller curricula reinforces the popularity of independent learning. Finally, current trends include the strengthening of the interactive visual learning environment, (Benedek, 2019) and the use of augmented reality content, or how Microsoft refers to it, mixed reality.

The lesson of the past 30 years might be that using technology itself, without a complex methodology that takes into account as many didactic aspects is not enough. The technology-centered approach teaching-learning process is just as much a mistake as the thinking that automatically assumes the effectiveness of learning organization due to the use of modern technology. Any methodology in which the demonstration is given prominence describes that its application, if unrelated to the process, can very easily become a dead end. The use of technology, unless it is based on methodological principles, does not lead to an increase in the efficiency of the learning process. By focusing merely on the application of technology, unrealistic expectations cannot be met." (Ollé, 2013: 102.)

Aim of the paper

This paper represents an approach to digital pedagogy that complements previous educational approaches from the field of communication and media science. It is safe to assume that over the last three decades, after the emergence of the global digital network, it has first become a vital part of the learning process, and by today it has reached the end of the experimental phase. We have to develop a complex, holistic methodology theory and prove it in practice. Our previously published book on online communication and media, Online, discusses some of the theoretical issues of learning from the perspective of communication and media science.

Our study states that, although we know a number of good practices, a unified methodology (later specialized in special the field of training, for example in vocational education) can only be developed if we take into consideration the well-established didactic rules that ensure the effectiveness of teaching and learning processes in the information society that exists in a constantly beta state. Although the technology: interfaces and standards are constantly changing - evolving - a methodology that critically approaches digital pedagogy should be based on both previously effective pedagogical practice and the rules of online communication.

We are in a transition period where old methods may not work just because of the digital divide. This divide is made up of several elements. One of its components is economic, as the cyclical purchase of high-end digital devices entails a substantial investment. The other component is a social one. It depends on the status in society and the position on the labor market, to which degree an individual lives in line with technology, and if one possesses the necessary knowledge to use it properly. Although the initial perception of the divide was based on generational distinctions, we believe that economic and social aspects should be taken into account instead of X, Y and Z generalization.

There are several questions to be addressed. Does the seemingly endless offer of content support personalized learning or does it enhance the mass production character? Does artificial intelligence help humans' cognitive development and individual learning paths, or does it drive humans out of the labor market and thus reduce the importance of acquiring knowledge? Is Big Data providing a useful pattern for improving the quality of education, or is it a tool for classification and surveillance? Does outsourced human memory make it easier for us to focus on the point or the lack of data reduces our creativity? If a person does not memorize the information, then how it combines knowledge and be creative? Will an e-learning training reduce drop-out rates or do those without digital devices and mentors get even further away from acquiring knowledge in the information society?

We are aware that it is impossible to put into practice an effective methodology without dipping the theoretical approach into practice (Duchon – Tóth, 2016), so this paper is a part of a bigger project. There is another paper to follow, that will provide the necessary empirical background.

Digital pedagogy: a friend or a servant?

The biggest change compared to the traditional classroom environment in digital pedagogical systems is that learning supported by electronic devices is independent of time and space and apparently aims to transform both student and teacher roles. As a result, the educational framework expands and blends with leisure time (Benedek, 2013), and it is already difficult to separate learning processes from work or mere information consumption. „We might understand this flexibility to reflect Bauman's 'liquid modernity' in which the boundaries between the study, work and leisure become thoroughly blurred" (Bauman, 2017).

The cornerstone of an effective methodology is a self-reflection ability to continually learn the nature, the implications, and the ways of thinking of the information society, and become familiar with its techniques. Even if institutionalized education really takes the principle of lifelong learning seriously, it will not be able to adapt itself to intensive use of technology according to the present rate of development (Ollé, 2013, 11.) The changes should come changes must come quickly; otherwise, there will be a gap between common and educational use of ICT (Molnár, 2016). By placing the digital transition of the educational environment at the center of our study, the changes in the methods of the new learning environment are brought to the fore (Racskó, 2017).

Due to the nature of the information age, students want to gain knowledge on a wider scale, while searching and processing digital curricula according to patterns of everyday user practice. Following the strategies offered by their teachers who grew up on printed textbooks, the students of today are no longer able to navigate online safely, they are not able to determine the relevance or credibility of information provided on a variety of websites. New communities are emerging around the learning process; websites and web 2.0 provide time and space-independent access to information and

opportunities for individuals to become members of virtual study groups. At the same time, this explosion of information radically changes teachers' roles. Teachers (and textbooks) are no longer the only source of information. They are intended to provide methodological assistance to students in the form of a moderator, similar to one that dwells in online forums. This moderator role is already linked to the online environment, as moderators select the content of the forums and coordinate workflows. There has never been such a close connection between the online communities, collaborative workspaces, and the learning environments. Not only does the technology make a significant difference in storing information, but it also plays a major role in achieving unprecedented levels of accessibility, sharing, and interactivity, (i. e. crowdsourcing). The use of all of these also provides the students with enormous motivational power.

There has never been a case in history where an infrastructure development (a computer network) had such an impact on society. Among its indicators, we can easily grasp the impact of content creation, message delivery, the democratization of dialogue between different social agents, or even more active participation of citizens in the public domain.

Students spend an active amount of their free time in interactivities related to online communities, only a small percent of it is a learning activity. We have to assume that if students spend a significant amount of their free time online, not only do they learn in this environment, but they are also affected by different educational impact systems (Lévai, 2013, 90). At the institutional level, the issue of digital pedagogy is also emerging: In other words, the European Union has developed a Digital Competence Framework for Educators (DigCompEdu) in 2017 to help identify teacher training needs.[1]

Information Society

In order to develop a coherent methodology, we need to thoroughly explore and map the framework within which teaching and learning processes take place. In an information-based information society since the early 1990s, online communication has overcome the physical boundaries that air travel has begun to demolish in the industrial era. In digital literacy based on hypertext, a distance between nods is only a click away. All objects (texts, images, sounds, and videos), all the information is just a few clicks away, and it can be accessed through the network from anywhere in the physical world. Today this process is marked with the challenge if deciding which information is authentic or relevant, and which is fake and not useful.

In the new digital paradigm, data can now be transferred, shared, searched, copied or even faked online, while the technology is accessible to everyday users. Of great importance is the fact that the internet is decentralized as opposed to industrial communication systems. In addition, social media bypasses gatekeepers or at least pushes them further from the content. Due to the easily editable nature of online context, it allows users to become authors or content creators - prosumers. The structure of online media content is non-linear, with hyperlinks providing free passage of information, but the same time, digital content does not have a distinctive body as for example books, so the worth of it is often underrated (Szűts, 2018).

In the information society, digital technology, embedded in all stages of human life, simultaneously facilitates and complicates the learning-teaching process. The question is, does the seemingly endless supply of content support the development of personal learning paths? IT corporations today play a key role in the development of Artificial Intelligence, Big Data, smart devices, smart homes, and smart cities, and it is largely up to them to decide what type of applications will dominate everyday lives of citizens. But it also means that info-communication technology is getting cheaper and gaining prominence in everyday life and that more and more users are accessing it. Governments also have a crucial role to play, as although their own developments do not approach the corporate sector, they have a strong say in the application of technology.

[1] See: https://ec.europa.eu/jrc/en/digcompedu

The question is whether artificial intelligence helps the individual's cognitive advance and supports the development of individual learning paths or, on the contrary, removes the weak students from the educational system. In a dystopia, artificial intelligence erases non-skilled workers from the labor market and replaces their work with algorithms. This reduces, for example, the importance of acquiring knowledge. The Big Data systems are useful when they show patterns that help improve the quality of education, but it can be a tool for selecting the weakest students and excluding them from the learning process. Human memory outsourced to digital storages makes it easy for individuals to focus on issues without having to memorize large amounts of information. In a negative scenario, in the absence of memorized data, human creativity diminishes because there is nothing to build on or combine with. E-learning can reduce drop-outs by removing barriers of time and spaces from education. But is it possible that those individuals without digital devices will be left without the help of teachers and mentors and thus move away from the labor market?

György Csepeli and Gergő Prazsák point out that "the role of memory is changing. The new culture, among other things, means we have to learn again how to search. There remains more space in our brain for thinking and creation. The use of the internet in society reaches a critical point when the network loses its technological novelty and merges with culture. This marginalizes those who see the Internet as a digital utopia and a means of redeeming society, but also those who demonize the Internet and accuse it of permanently cutting off the cultural roots of humanity" (Csepeli – Prazsák, 2010, 13).

Bertalan Komenczi (2002) on his book on information society listed factors that determine its nature:

- the constant transitional state makes it difficult to include short-term forecasts;
- there is a strong technological determinism in the information society;
- the information society is embedded in the global economy;
- the information society is a network society;
- the information society is a knowledge-based and learning society;
- the information society is a society overwhelmed by information;
- the information society is a new type of mass society;
- differences in the information society are growing and developing the digital divide.

Digital pedagogy in the information society

In order to develop a framework of a digital pedagogy which will be tested by empirical research, we first need to examine the factors that influence the teaching-learning process in the information society. The following questions must be answered:

Role of external factors in the learning process:

- How can we overcome the fragmentation and reconcile the activities of the public and corporate sectors? What institutional changes are needed to make digital education a success?
- How can new technology be used in education so that machine operators become machine designers?
- In an ecosystem of incompatible devices and formats over the long term, how can knowledge be stored and passed to the next generations?
- If there is a communication platform which teachers have neither control nor awareness of, how can effective communication between them and students be ensured?

- Should different areas of life be separated regarding the use of technology? If everyday activities: getting information, communication, navigation, shopping, managing finances, leisure, are all dependent on technology more than education what does the school has to do to catch up?
- To what extent can individual learning paths be taken into account? Who should develop the algorithms needed for them?

The role of internal factors in the learning process:

- What are the cognitive changes caused by the use of digital content, computers, screens, and networks?
- What are the cultural changes caused by digital literacy?
- What are the changes caused by reading hypertext, which supports a non-linear information reception strategy, especially with the fact that navigating through hyperlinks offers different reading experience as opposed to linear storytelling?
- What are the cognitive changes caused by the new ways of searching for, browsing, and scanning the information?
- If there is constant pressure on humans to communicate online, how can they decide which information is relevant?
- What are the changes caused by virtual and augmented reality used in illustration?
- Do the strong user experience, catharsis, and flow enhance or weaken imprinting?
- How can the urge to create content arise from the passive reception of digital content?
- How can digital content creation develop creativity and learning?
- What are the changes caused by secondary literacy, especially abbreviations, emojis, memes?
- To what extent does crowdsourcing interact with previous creative activities in terms of imprinting?
- To what extent can experience gained in the context of machine learning be used to the process of human learning
- Does the outsourced human memory free up space for creativity or does it lead to digital dementia?
- How can credibility issues be solved in the context of fake news and deep fakes?
- How to overcome information overcrowding?
- What role will libraries play in the process of storing digital curricula?
- Can the gamification based on strong involvement be effectively integrated into the learning process on a global scale?
- What is the role of visuality in maintaining attention? How much of the entertainment content (Netflix and Facebook effect) suppresses educational content?
- How will the Maslow's hierarchy of needs transform and how does it affect learning?
- How can digital-assisted learning be effective without addiction to devices?

Revolutionizing the teaching. Again?

Let us start with a citation: “The promise that digital education will revolutionize teaching and learning through, for example, the wide availability of digital learning resources or radically restructured virtual learning experiences, often passes without comment on the problematic social, ethical and epistemic assumptions underpinning such changes. While digital devices have long since become embedded in contemporary life, our social, cultural and particularly our educational institutions are struggling to keep up with the pace of change” (Lewin - Lundie, 2016: 236).

According to Emile Bojesen (2016: 2), “Alongside questions of how digital pedagogy changes how and what we learn, there is a question of how digital pedagogy and the broader context of what is called the ‘information age’ changes the learner. What are we learning to become? Is our identity prescribed by our technological context or does our context allow us freedoms in inventing ourselves as subjects that other contexts have not?” […] The technologies we utilize to understand ourselves (written, spoken and digital language, as well as physical activities and visual and oral languages) also become who we are. As such, these technological contexts play an important part in the invention of the subject.

There are those who are skeptical regarding the use of technology. Jeremy Knox (2016: 315) states that “technology cannot directly speed up the process of learning because it is positioned very clearly as external to an exclusively human rhythm. It can speed up access to content and assist in the management of time, but ‘learning’ itself remains locked in the framework of the bounded human subject”. David Lundie (2016, 280) adds, that „Anxieties surrounding the values and purposes of education in contemporary Western society are both masked and exacerbated by the increasing emphasis on the gathering and ranking of data on performance”

Currently dominant methodologies

But what are the methodologies that determine the context of learning in the information society? In the flipped classroom, the students acquire the knowledge at home, using online curricula, while the lessons are spent in consultation. “Traditional” e-learning is based on the use of a learning framework or management system that supports education, based on rich media and hypertextuality, providing a lot of images and multimedia. Gamification can be used in the classroom, if appropriate. “During the last couple of years, gamification has been a trending topic and a subject to much hype as a means of supporting user engagement and enhancing positive patterns in service use, such as increasing user activity, social interaction, or quality and productivity of actions. These desired use patterns are considered to emerge as a result of positive, intrinsically motivating gameful experiences brought about by game/motivational affordances implemented into a service.” (Hamari – Koivisto – Sarsa, 2014:1.) Web 2.0 platforms allow users to interact and collaborate with each other in a social media dialogue as creators and authors of user-generated content, in contrast to websites where users are limited to be mere receivers of the information. As such, Web 2.0 narrows the gap between academic and common knowledge, between formal and informal learning (Molnár – Szűts, 2014). According to András Benedek, the unrestricted access to masses of users through interactive online platforms is a crucial feature. “One of the special dimensions of the transformation going on in education and pedagogy these days, which is perceivable by ICT applications becoming more and more commonly used, is that we strive to apply images more explicitly than ever before” (Benedek, 2019).

Digital storytelling takes advantage of user-generated content and helps teachers overcome some of the obstacles to productively use technology in their classrooms. “At its core, digital storytelling allows […] users to become creative storytellers through the traditional processes of selecting a topic, conducting research, writing a script, and developing an interesting story” (Bernard, 2008, 222). The result is a combination of multimedia, images, texts, sounds, video clips. It can be stored on a computer or in a cloud and presented in class.

One of the dominant tendencies in education is the idea of a Massive open online course (MOOC), but can de quantity usher quality? “The term MOOC has been used to describe a diverse set of approaches and rationales for offering largescale online learning experiences. MOOCs have been delivered using both centralized platforms and services including learning management systems (LMSs) and decentralized networks based on aggregations of blog sites and social media feeds. MOOCs have been designed to support university curricula, academic scholarship, community outreach, professional development, and corporate training applications” (Namestovszki et al, 2018). Learning has thus become even more time and space independent and is hosted on the World Wide Web. It is present in users’ homes, transportation vehicles and workplaces. The face-to-face discussion with the teacher has been replaced by chat and online discussion with fellow students. Learning has become horizontal and participants can learn not only from the instructor but their peers too.

Today, MOOC as a term can encompass any learning process in which – both the delivery of content, the communication of the actors and the evaluation take place online; – no input filter conditions, or at least no specific input filtering, level measurement; - the organizers expect a large number of participants to design the course, including a number of criteria, such as content availability, learning activities and the evaluation system (Fodorné, 2018). However, the experience with the MOOCs is not always positive. The dropout rate is high, and without supervision, several topics – such as psychology or creative arts – cannot be studied.

Conclusion

The effective methodology assumes the conscious use of online communication tools and digital media. We are in a specific situation because it has never happened in the history of learning that teachers and students are simultaneously learning how to be effective in a context that is constantly evolving. In the information society, we assume that teachers may not be better armed with information literacy than students. An effective methodology can save them time and energy, as once the most effective methods have been identified, educators can skip the experimental phase.

Effective use of digital pedagogy assumes that the teacher is aware of the dynamics and mechanisms of action of digital media and communication platforms, tools and applications. An effective teacher can distinguish between real and virtual, credible and fake, public and private, including selection and sharing of information and copyright issues. The information literacy that both teachers and students need to possess assumes that the learning process involves not only commenting on information, but also searching for, filtering, evaluating, sharing, developing, revising and protecting it, and it is a horizontal interaction.

Thus, the way students communicate with each other and with their teachers has changed. According to András Benedek, the characteristic patterns of acquiring knowledge are changing: the conceptual distinction between childhood and adulthood is blurring, and formal educational institutions are increasingly being replaced by virtual environments of open education. (Benedek, 2008) However, it should be emphasized that education and especially higher education is filled with best practices and the lack of a holistic methodology.

A good digital education program must meet the following requirements: it should be designed for education, follow pedagogical principles, offers up-to-date, very diverse content, require just as much intellectual effort to ensure continuous use, and use every possible means to deepen students’ knowledge, keep their interest, let them experience digital applications. The increasing quality of multimedia educational content is important, but we often tend to forget that a content-centric approach can override an activity-oriented educational practice if the content is not accompanied by appropriate tasks (Ollé, 2013).

Nowadays, children in schools are mastering the skills of writing and reading with digital skills. Members of society who do not possess digital literacy skills to experience disadvantages in almost every area of life. In the context of the information society, the nature of knowledge also changes: it

becomes practical, immediately applicable and transdisciplinary. All the rituals associated with the phenomenon of learning are reinterpreted. Classroom attendance (time and space constraint), personal consultation (interpersonal communication), master-student relationship (significance of the teacher's personality), note-taking (recording of knowledge), and university civic life (elite awareness) will all be put to new foundations.

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Tibor KOLTAY

Data literacy in academia: Basics and pedagogical views

Introduction

This paper, based on a non-exhaustive review of the literature addresses selected issues of a relative new complex of abilities and skills, i.e. data literacy by providing insight into its nature and the approaches to teaching in higher education.

We live in a data-intensive era, because the capacity to store massive amounts of data and forward them on high bandwidth networks generated interest in research data in the natural sciences, social sciences as well as the arts and humanities, never seen before (boyd and Crawford, 2012). The recognition of this fact motivated varied researchers, universities and different funding bodies to make efforts to encourage the openness of research data. The stakeholders of Open Data are – among others governments, multilateral organisations, journalists and the media. They come from the civil society and the private sector. Last, but not least teaching staff members, and researchers, i.e. the academic community constitute a crucial group of its stakeholders (Corrall, 2019a).

On the one hand, there remain several technological, social, organizational, economical, and legal barriers to data sharing (Sayogo & Pardo, 2013). On the other hand, despite obstacles, we can see a shift away from a research culture, where data is viewed as a private preserve (Pryor, Jones, & Whyte, 2013). This drive toward openness is guided among others by the principle that scholarly research does not need more data, but requires having the right data (Borgman 2015). In other words, researchers require high quality, actively curated data to work with, because data is both the raw material and the output of research (Pryor, 2012).

Research data is the output from any systematic investigation that involves observation, experiment or the testing of a hypothesis (Pryor, 2012) and it consists of "heterogeneous objects and items used and contextualized, depending on the academic discipline of origin" (Semeler, Pinto, & Rozados 2017, p. 3). To serve as research data, little data can be just as valuable as big data, and – in many cases – there is no data, because relevant data cannot be found, is not available, or does not exist at all (Borgman, 2015).

Definitions

Data literacy can be seen from different points of view, such as being related to issues of the civil society, open government, community informatics, journalism, business, and teacher education. Nonetheless, in this paper, it is approached as a "research skill for students and professionals – accessing existing data sets to produce and communicate new knowledge, making scientific experiments robust and reproducible" (Corrall, 2019b, p. 2.).

One of its simple definitions says that it is a "human competence to locate, analyse, organize, present and evaluate" research data (Schneider, 2013, p. 136). A more detailed definition describes it as "a specific skill set and knowledge base, which empowers individuals to transform data into information and into actionable knowledge by enabling them to access, interpret, critically assess, manage, and ethically use data" (Koltay, 2017, p. 10).

Data literate persons know how to select and synthesize data and combine it with other information sources and prior knowledge, recognize source data value, types and formats. They determine when data is needed, then access data sources appropriate to the required information (Calzada Prado & Marzal, 2013).

The nature of data literacy in academia

As said above, this paper focuses on data literacy, applied in academic environments, therefore related to research data, which similarly to other types of data, needs to be managed. Research data management (RDM), consisting of a comprehensive set of activities for the organization, storage, access, and preservation of data (Semeler, Pinto, & Rozados, 2017) is inconceivable without data literacy training, because people, who will use research data need education about how to understand, interpret, and apply what they find, and researchers are no exception from this rule. Seen from a slightly different angle, data literacy instruction is often the first step in supporting researchers (Martin, 2014), then complemented by RDM, while we should not forget about data curation that may be compared to curating a museum collection for exhibit rather than for internal storage, extended by data preservation that involves frequent validation checks and backups (Thomas & Urban, 2018).

It is widely agreed that data literacy is in close association with data quality, which is one of the cornerstones of the data-intensive paradigm of scientific research (Koltay, 2017). Seen from a different angle, data quality analysis requires – among others – analysing the quality of the sources. The analysis of the quality of the data itself may consider accuracy, consistency, completeness, originality and the degree of timeliness of data (Daraio et al., 2016).

Data literacy is closely related to information literacy, the history of which precedes the appearance of data literacy. Nonetheless, the connection between information and data, as well as information literacy and data literacy have been underlined by Andretta et al. (2008), when they declared that presenting, evaluating, and interpreting qualitative and quantitative data is a learning outcome of information literacy.

The strongest connection between data literacy and information literacy is manifest in their attention to critical assessment, which is especially needed because of the presence of misleading or inappropriate uses of data (Carlson et al., 2011). In consequence, attention has to be paid to the version of the given dataset and the person(s) responsible for it (ACRL, 2013). Data literacy is also connected to *media literacy* in pointing towards "the use of tools to use and reuse content in ways not imagined by the content creator" (ACRL, 2013, p. 11).

When focusing on the academic environment, we can see that data literacy, applied to research data clearly interfaces with *academic literacy,* which involves the comprehension of the entire system of thinking, values, cultural identity and information flows of academia by acquiring the ability to read, interpret, and produce texts, valued in academia (Elmborg, 2006). *Statistical literacy* and *numerical literacy* (the latter also known as numeracy) are often mentioned in connection with data literacy (Schield, 2004).

New views on data

Data literacy education is deeply influenced by the changing views on the nature of data. While we traditionally have perceived data as somewhat secondary to information, because it was regarded to occupy the bottom of the data–information–knowledge–wisdom pyramid (Rowley, 2007), the growing importance of data seems to change this view. Consequently, the relationship between data and information is not seen any more as simple as it has been presented by earlier views (Makani, 2015). Liangzhi (2015) affirms this by saying that from the ontological point of view, data and information are closer to each other as both exist as signs. The fact that researchers are less interested in raw data, but give attention to its use and reuse also removes some of the differences between data and information. Therefore, research data can be recognized as information (Schneider, 2013).

Research data can be seen not just as the result of empirical work or the raw material for analysis, but also as a research object in its own right (Golub & Hansson, 2017). Data also may be regarded as anything recordable in a semantically and pragmatically sound way (Frické, 2008), as well as a primary intellectual asset that can be subjected to peer review and other forms of quality assessment (Heidorn, 2011).

When speaking about data literacy, we have to bring forward one of its main defining features, i.e. that it is cognate with information literacy. One of the several reasons to do this is that approaches motivating us to conceive data differently is the new definition of information literacy, which includes not only to print, but to data, images, and the spoken word (CILIP, 2018). This perception is in conformity with the idea that there are convergences between varied literacies of the information age, caused by the convergence among different forms of media and ICTs (Livingstone, van Couvering & Thumin, 2008). Even if not directly connected to these convergences, we witness an increase in the attention towards data literacy, because it shares several features with other literacies and is especially closely connected to information literacy, reinforcing thus the close relationship between data and information (Koltay, 2015).

Speaking about data literacy in research settings requires a short excurse, where researchers' skills and abilities are examined. They are tied not only to research, but practically all kinds of literacy, involving self-management, innovative thinking and problem solving abilities (Lee, 2013).

We may add here skills that are unmistakably tied to both information and data literacy. According to Davies, Fidler and Gorbis (2011), the ideal researcher is able to filter information based on importance and use a variety of tools and techniques. Doing this is unimaginable without sense-making, since there is no serious research without the ability to determine the deeper meaning of what is being expressed at face value. Data-based reasoning has to be coupled with the ability to translate large amounts of data into abstract concepts.

As research is becoming largely determined by computing, the above abilities begin to fit into the framework of computational thinking that might be incorporated into the general thinking about scholarly research, and results in changes in its ontologies and epistemologies. This involves that mediating an object, a digital or computational device requires objects to be translated into the digital code, then being internally transformed, depending on a number of interventions, processes or filters (Berry, 2011).

Approaches to teaching data literacy

Overall, applying the principles of the Scholarship of Teaching and Learning (SoTL), the main ideas of which have been laid down by Ernest Boyer (1990) have their place here. SoTL directs the attention of teaching staff members in higher education worldwide to the need of focusing on student learning. It is geared towards understanding what is happening in the classroom and seeks ways to improve student learning (Hays & Mallon, 2017). According to Hutchings (2000) teaching staff members should ask, what is learning is and what is happening in the classroom. They also need to find out what enables efficient student learning and should have a vision about their future classroom.

O'Brien's (2008) questions show some similarity with the above ones:

- What will my students learn and why is it worth learning?
- Who are my students?
- How do they effectively learn and what can I do to support them to learn effectively?
- How do I know if my teaching and my students' learning has been effective?

According to Kreber and Cranton (2000), SoTL involves ongoing learning about teaching and demonstrating teaching knowledge by reflecting on theory and experience-based knowledge about questions of instructional design, pedagogy, and curriculum. Besides teaching activities, it results in scholarship, published in peer-reviewed venues in order to become part of the knowledge base of teaching and learning in higher education (Richlin & Cox, 2004).

When teaching data literacy skills to students, the overall learning outcome should be becoming data literate in the context of their subject area. Students should be able not only identify relevant data for their field of study, but understand how data is connected to the publication process. Applying critical

thinking strategies to data and understanding the challenges of reusing data, as well as awareness of the importance of metadata and citation are crucial in this process (Duffner-Ylvestedt & Rayner, 2016).

Data literacy education should contain the following data-related competencies:

- discovery and acquisition;
- management;
- conversion and interoperability;
- metadata;
- curation;
- re-use;
- preservation;
- analysis;
- visualization;
- ethics;
- citation (Carlson et al., 2011).

By its complexity (Silvello, 2018), the last task, i.e. data citation requires distinguished attention. Data literate researchers can efficiently retrieve data, even though data retrieval – as described by Bugaje and Chowdhury (2017) – is a less obvious task than retrieving research papers, which are available in a predominantly textual form. On the other hand, data citation is on its way to become a source of reward and acknowledgment for researchers, thus motivating them to share and publish their data (Candela et al., 2015).

Teaching data literacy should go beyond basic literacy, among others by being directed towards understanding, how to transform data into a non-raw, non-numeric representations (Bhargava, 2019).

As advised by Robinson and Bawden (2017), any data related education program could begin with considering the phenomenon of the data deluge, as well as the relation between data, information and documents. It may go so far as to examining tools for exploring data to find meaning in it, including tools of data mining.

All literacies emphasise critical appraisal in general, therefore data literacy education in particular should accentuate checking the provenance and integrity of data, giving attention to understanding factors that may impact the data, including bias, patterns, errors and omissions. It is also important to consider sampling techniques, sample selections and size, as well as survey design. We need to able to distinguish between correlation and causation, as well as understanding how variables influence each other. Having the skills of predicting, generalizing from available datasets, as well as understanding trends, and drawing inferences is indispensable (Mason, Khan, & Smith, 2016).

Data literacy education should give distinguished attention to raising awareness of the fact that it is not exclusively about big data (Borgman, 2015). We also could count with the existence of grey data, which is useful data, produced by universities outside their research realm, but not vetted by peer review (Borgman, 2018).

Big Data is a cultural, technological, and scholarly phenomenon, characterised by the interplay of technology, analysis, and mythology (boyd & Crawford, 2012). It is a vague concept, but – similarly literacy – it would require an understanding of "the technologies used to gather data sets, awareness of the algorithmic operations used to analyse them, and critical abilities to assess the aura of accuracy that surrounds them" (Bhargava, 2019, p. 2). Big data is big by its volume, and is defined by velocity and variety (Laney, 2001). Notwithstanding, from the point of view of data literacy education, we have to pay attention to the warning of (boyd & Crawford, 2012), who state that big data is less about size, but capacity to search, aggregate, and cross-reference large data sets, without forgetting about the interplay of cultural, technological, and scholarly phenomena, related to it. Let me add that analysing

small sets of data is relatively simple, relying on basic numerical literacy, while in the case of big data, machine-assisted algorithms play the main role. One of the related problems is the existence of bias toward quantitative data, leading to disrespect of qualitative methodologies. In big data environments qualitative data is analysed through a quantitative lens: looking at words counts in text, or detecting face locations in images (Bhargava, 2019).

A less recognised, but apparently useful component of data literacy education could be applying data governance principles, which are connected to data quality by being beneficial in delineating the practical domains of decision and defining accountability for decision making. Being based on standardised, repeatable processes, rules, policies, and standards, data governance's advantage to other approaches is in its transparency (Koltay, 2016).

There is also a somewhat different goal of data literacy education, i.e. fostering a culture of scholars, who are aware of their own scholarly communications' potential to become primary sources of data (Haendel et al., 2012).

When approaching these issues, we should heed the warning of Robinson (2016), who states that examining patterns and syntax and using quantitative methodology is not enough. There should be attention, given to meaning, semantics and the use of qualitative methods. In the case of research data, neglecting any of them will contribute to overly narrow approaches and lead us to building silos.

Although the variety of related terms may be sometimes disturbing, we have to mention not only data literacy and digital literacy, but digital literacy. The reason for this given – among others – by the existence of a comprehensive approach to the later. As Robinson (2016) direct our attention to an analogy here. Paul Gilster (1997) stated that digital literacy encompasses the use of printed document, because they either have been, or may become, digital. This viewpoint and helps to emphasise the importance of data. When speaking about digital literacy, we see competing views, enumerated by List (2019). Although empirical work does not support it, it is widely discussed that digital literacy is automatically acquired simply by growing up as digital natives. As mentioned above, in accordance with Gilster's view, digital literacy may be understood as an inter-related set of competencies necessary for success in the digital age.

Taking the close relationship between information literacy, digital literacy and data literacy into consideration, it seem to be expedient to suggest that – despite the obvious differences between them – constructivist theoretical and pedagogical views on information literacy can be applied to data literacy, as well. On the other hand, we must be aware that these skills remain useful, because they are easily measurable.

Most constructivist views on teaching and learning stress the experiential and empowering nature of the learning process. They are based on the idea that learning is experiential insomuch as it involves the continuous building, amending and eventually transforming of previous knowledge structures (Walton & Cleland, 2017).

In the next part of this paper, we are going to three different approaches that are different and related to the ones, described in detail by Limberg, Sundin and Talja (2012). These approaches make use of phenomenographic and sociocultural theories, as well as discourse analytical approaches that provide a broader historical and sociological perspective to these theories.

Phenomenographic approaches

Phenomenography is a constructivist view of learning that sees learning as an activity of constructing meaning, without classifying various learning experiences as right or wrong. Therefore, phenomenographic approaches do not concentrate on a transfer of knowledge from teacher to student. They centre on the importance of understanding the learners' perspective instead (Limberg, Sundin, & Talja, 2012).

In the centre of phenomenographic research are participants' experiences, thus independently of the perceptions that are behind the given research, questions are asked to find out why something happens, but how and what the participants do and how they feel about it (Morrison & Secker, 2017).

Phenomenographic studies can provide a range of meanings that information literacy and data literacy can have within any group of information users. It is able to paint a complete picture of the given knowledge domains and knowledge-based capacities (Forster, 2016).

Although originally conceived (again) for information literacy, but rooted in phenomenography-based research Bruce (1997) indicates the following activities:

- being able to use information and communication technology (ICT) for seeking and communicating information;
- seeking and finding information sources;
- executing information seeking processes;
- organising and controlling information;
- building a knowledge base in a new area of interest;
- working with knowledge and personal perspectives for novel insights;
- using information wisely for the benefit of others.

The sociocultural perspective

The sociocultural perspective pertains to the family of constructivist approaches, but instead of emphasising the role of the individual, it underlines social relations, communities, and culture (Wang, Bruce & Hughes, 2011). It emphasises the situated nature of learning, thus focuses on the relationship between individuals and various forms of collective practices. The sociocultural perspective can be defined as ways of understanding and doing things in the world. In other words, they are based on everyday life activities (Thorne, 2013). Foundational to it is the communities of practice' concept. These communities are groups of people, which share similar goals and interests. They employ common practices, work with the same tools, and use a common language that can be defined as sets of relations among persons, activities, other communities of practice and the world. The participants in a community of practice learn not only the rules that prescribe how to perform the actual practice. Based on the community's history, assumptions, beliefs, values, and rules, the members acquire information about the legitimateness of particular practices and knowledge (Lloyd, 2010).

The process of learning involves interactions with culturally constructed tools of practice, such as objects, signs, symbols, language, and technologies, therefore the sociocultural theory focuses on tool-based information literacy practices and do this within the context of learning communities. As learning is connected to specific situations and practices, following sociocultural approaches means questioning the generic nature of learning information literacy (Limberg, Sundin, & Talja, 2012). While accepting the broad framework of socially contextualised learning experience, they may help in developing educational practices that move the perceptions and experiences of the individual learner to the centre of educational practice (Talja & Lloyd, 2010).

In the sociocultural perspective, information literacy is conceptualised as a collective view through a people-in-practice perspective that considers situated learning and complex social realities (Lloyd, 2012). Learning in relationship with social events and interacting with other people, objects, and events are seen in a collaborative environment.

The discourse analytic perspective

The word "discourse" may simply refer to groups of linguistic signs that expresses what has been said or written. However, but considering that social realities are formed through discourses, discourse can be understood as rule-driven productive practices for creating knowledge (Haider & Bawden, 2007). Therefore, this perspective not only recognises language's central role to social life (Walton & Cleland,

2017), but allows "capturing the socially and culturally shaped ways of understanding information competencies and information practices" (Limberg, Sundin, & Talja, 2012, 110).

There is a similarity between the sociocultural and the discourse analytic perspectives because they both regard learning as a social activity that uses tools, practices, and conditions for meaning-making (Pilerot, 2016). The discourse analytic perspective focuses on identifying broad historical literacy discourses that lead to research outcomes for understanding variation in interpretive repertoires. It demonstrates that literacies are constructed differently in different conversational contexts.

Discourse analysts study the interpretive repertoires through which people give meanings to information competences and practices, because they do not accept information competences as uncontested phenomena. They define discourses as systems of statements, i.e. sets of interlinked claims, assumptions, and meanings. The assumption is that we are users of already existing discourses, expressions, and conceptualizations, thus we accept implicit claims about the nature of information, even if we would not necessarily readily accept them as truthful or valid if we could consciously scrutinise them (Limberg, Sundin, & Talja, 2012). However, in general, it can be said that this perspective shares several views with the phenomenographic and sociocultural approaches.

As a practical application of the discourse analytical approach, researchers – especially those, who also involved in teaching activities – should teach students not just content but also the conventions of a particular discourse community that includes the ways, how its members write, read, speak, and do research, as well as what assumptions and epistemologies underlay their arguments (Elmborg, 2006).

Conclusion

Technological advances have created opportunities and threats for the free flow of information in society, and raised awareness of the importance of information literacy (Julien & Genuis, 2011). We witness the same development in the case of data literacy.

In general terms, data literacy is a transversal competence. Nonetheless, this paper examined it in a relatively well-defined sense, i.e. narrowing it down to its relationship to scholarly research, in particular to research data. This is the reason, why we could look at it as part of research data management and could approach it by making use of the experiences for information literacy education that already has some tradition, even if there are disputes about it. Our argument was built on this idea, whit the aim of showing selected features of this evolving field of education. Future experience and thinking will hopefully lead to fully developed theory and practice of data literacy education.

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Adrienn Papp-Danka

Digital lifestyle – digital citizenship – digital pedagogy

Introduction

„2017 from within the EU the Internet access households ratio has risen to 87%, which is 32% points exceed the ten years ago, 2007 levels. In 2017, 85% of the EU households used broadband network, which is approximately the double of the 2007 ratio."[1] We can read such and similar to this data in the report of Eurostat called *"A digital economy and society statistics - households and individuals"* report. Our lives are networked with the Internet and its digital tools - as it is proven clearly by the above data.

But do we have the knowledge, ability and attitude to live digitally, not just at the tool-driven level, but to be active participants? Are we able to participate effectively, responsibly and productively in the networked digital world? Does our (widely interpreted) digital competence can follow the accelerated development of the digital, online tools?

In this study, we discuss the question of how we can develop digital citizenship competence from our daily digital life. Meanwhile, we also discuss the role and potential of digital pedagogy which can give the opportunity for the practice and development of digital citizenship competence whether in a formal, informal or non-formal education system.

Digital lifestyle

Today it is a commonplace that digitalisation is strongly permeating our lives. However, not long ago, before the Internet was spreading, we lived a much more located life, and we were exposed to a variety of media. If we wanted to talk to a friend – we needed a line phone; if we wanted to find out about the daily news – we turned on the TV or bought a newspaper; and if we wanted to do some social programme – we had to find new places or visit places in person. We did not know about the existence of many interesting events or groups, because no one "put us", as is often the case with social networking sites and websites.

Nowadays the Internet has become the dominant medium: it has radically transformed and virtually merged our reading habits, watching TV and communication habits. This is confirmed by a recent online market research that was completed at the end of 2018 by the National Media and Infocommunications Authority in Hungary and revealed the characteristics of residential internet use.[2] More than 3,000 Hungarians over the age of 16 participated in the research. According to the data, 88% of the sample has a smart phone, which has been considered as the leading Internet tool since 2017: 77% of the respondents use their smartphone for internet (53% use portable PC and 52% use desktop PC). The following figure shows the prevalence of the types of activities that can be performed on the Internet, which confirms the above statement that the Internet combines all the different media.

[1] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Digital_economy_and_society_statistics_-_households_and_individuals/hu#Internet-hozz.C3.A1f.C3.A9r.C3.A9s

[2] http://nmhh.hu/dokumentum/202180/lakossagi_internethasznalat_2018.pdf

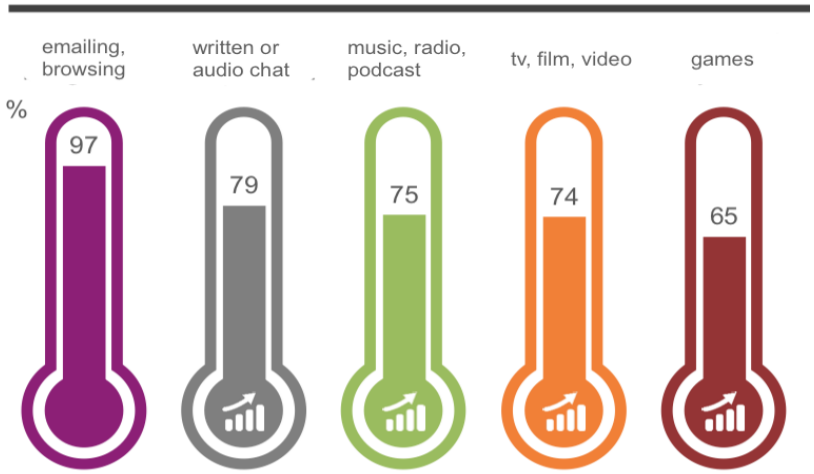

Figure 1: Frequency of internet activity types

In addition to the most frequent activities shown in the figure, the Internet can be used for a number of other purposes: for example it can help us to use e-services in government (vid. filing tax declarations); it can navigate us anywhere (via e.g. Google Maps); and it can provide for us the opportunity of learning at the right time and the right place (vid. MOOC). In 2019, it is no longer a question of whether or not we have a digital device to reach these opportunities. However, there are two other issues that go far beyond digital access. One is the question of **attitudes**, because as with everything in life, we related somehow to the digital world, to the online environment and to the information society. The participants in this research were divided into 8 groups according to the number of accepted and rejected opinions on the role of the Internet in their lives. As you can see in the figure below, the group names are referred to the group's relationship to the Internet. Two-thirds of the participants in the research showed a more positive attitude, while one-third were more negative.

Size of groups	
enthusiastic	12%
friendly	10%
cheery	4%
lukewarm	39%
vindication	5%
pouting	9%
wry	7%
undeveloped	13%

66%

34%

Figure 2: Rate of groups based on their relationship to the Internet

Attitudes can be formed, and people's emotional attitudes can be influenced by the right tools. It would be worthwhile to show good examples of enthusiastic, friendly or cheerful use of the Internet for users with vindication, pouting and enforcing. Attitude formation is necessary because it is the

gateway to change: if there is not enough openness in people, then we cannot enter the gate to get into the digital world that is useful, functional, easy to use and even joyful for the citizens.

Another issue that goes beyond digital access in addition to attitudes is the question of **competence**: are you able to take advantage of the benefits of digitalisation, use e-services or be productive in the online environment?

Digital citizenship

When discussing our digital lifestyle, we have the feeling that we are surrounded by a strongly tool-oriented world. We only know little about what people are doing on their smartphone or laptop and what the quality of each activity is. The introduction of the concept of digital citizenship was justified when online activities had reached a high frequency and level. It brought the expectations from the user's to be useful and valuable in the digital environment both for the community and the individuals as well.

Digital citizenship is known in two different interpretations. One of the conceptual approaches defines digital citizenship from sociology, social theory, and the other from education.

Digital citizenship in sociology

According to the sociological approach, digital citizenship is the extension and promotion of traditional citizenship activities in the online space. In *Digital Citizenship* (Mossberger et al., 2008), the authors explain that the central issue is the access to the Internet for all citizens, because the internet is the necessary link to extend our current offline citizen activities to online space (Ollé, 2011).

Considering digital citizenship in the context of social theory, Estonia can easily comes to our mind, which has built a digital society as a first pioneer in the world. According to their credo, they constantly seek and develop new digital solutions that allow things to get done faster, better, and cheaper. That's how it came today that

- 98% of Estonians have a national ID-card,
- 90% of population uses the Internet regularly,
- 88% of households have computers.[3]

We can find among the more than 500 e-services provided for citizens:

- e-banking: 99% of banking transactions are online.
- e-healthcare: 99% of patients have countrywide- accessible digital records.
- e-government: over 30% of Estonian voters from 116 countries use i-Voting in Estonian elections.
- e-Business: time to establish a business reduced from 5 days to 3 hours so 98% of companies are established online.

e-Estonia is an incredible success story about an efficiently functioning digital society that grew out of a partnership between a proactive government, a forward-looking IT sector and a switched-on, tech-savvy population. When they started building their own information and digital society more than two decades ago, the Internet was not yet available to the citizens, nor did they have digital tools to use e-services. Nonetheless, they were committed on the launch of innovative digital services, because they have been guided by practical benefits. They wanted to provide a digital society where moving services from a traditional environment to a digital environment makes everyday life faster and cheaper. A

[3] https://e-estonia.com/wp-content/uploads/e-estonia-facts-18-09-21.pdf

good example of this is *Skype* application which was originally developed and continues to be developed in Estonia. When Skype was released in 2003, it radically changed the communication habits of the past. It made available to crowd of people (both financially and technologically), to make a video call to their family or friends around the world.

The systematic and step-by-step introduction of electronic services has brought many economic benefits to the country:

- each year, 12 Eiffel Tower-sized paper rolls are saved not only for themselves but for the planet;
- the use of electronic signatures will save $500 million in administrative costs for the country's budget;
- they save 800 years of working time every year thanks to the e-services;
- many foreign investors are attracted by the quick and easy establishment of businesses.

Establish a business online is one of the youngest services in Estonia and is called e-Residency. E-Residency is a vision of a borderless digital society that implements citizens of the global world to join the digital business world. This service makes it possible for anyone in the world to start and manage an EU-based company online through the Estonian platform. That way, people can become so-called e-residents, which is not citizenship, but that they will have access to the EU business environment and can use public e-services through their digital identity.[4]

In addition to the measurable economic benefits mentioned above, we must also explain what kind of awareness-raising power is behind the creation of the digital state and how citizens can access services without barriers and be able to use the electronic services. The e-services become part of the everyday life of citizens: it is not just about emailing, browsing, watching TV, etc. but also using electronic services (from public administration through the health services to intelligent transportation). So these e-services have become one of the most important part of their digital lifestyle.

It's not a question that one of the basic conditions for a digital society is that all citizens have unrestricted access to electronic services, ie they have access to the Internet with the right quality and bandwidth.[5] Thanks to the strong involvement of the IT sector, the access has been provided to all Estonian citizens, as illustrated by the above data on the use of electronic services. In addition to access, citizens also need to use technology at a good skill level while experiencing that the electronic services don't make life more difficult and more complicated, but also can bring personal benefits. It was emphasized by the governance, for example, when Population Register and State Portal were built in 2001. These – and all other e-services – are also interoperable, which means that citizens' simple personal information is in one database to which all e-services have access, and so the citizens have to provide their own data only once.

Digital transformation in schools and the development of digital competence is essential to be able to use digital technology in a very high level. The Estonian government did not set a smaller goal than to develop the digital competence of all the estonian citizens. In Estonia they *„believe that raising smarter kids is the smartest investment a country can make. Estonia's educational digital revolution implements modern digital technology more efficiently and effectively in learning and teaching, improving the digital skills of the entire nation. One example: by 2020 all study materials in Estonia will be digitized and available through an e-schoolbag."*[6] If it will be a reality, then children will gradually become accustomed to the digital environment and its effective use at early childhood. And educators - as they have a digital lifestyle which is permeated with e-services and digital tools - are great examples to

[4] https://e-estonia.com/solutions/e-identity/e-residency/
[5] The European Union Digital Agenda also requires this for Member States by 2020.
[6] https://e-estonia.com/wp-content/uploads/eestonia-guide-a5-14022019.pdf

children for how people can use the online environment responsibly, effectively and productively. Think about how much easier it is for a teacher, or even every teacher, to become a digital citizen with a high level of digital competence, growing up in a digital society. This digital society indirectly affects the education system so these more than 500 e-services is a huge advantage for the education and for the digital transformation in schools as well.

The example of the Estonians shows how people become digital citizens, if the state is committed to making their citizens' lives easier and easier. It is interesting, however, that the concept of *digital citizenship* is nowhere to be read in the descriptions of Estonia. The *digital society and digital citizens* are referred to several times, but despite the fact that many of their citizenship duties are online, they do not use the word *digital citizenship*. Of course, the concept can be easily replaced and described in the social science approach, and in this situation, the *digital citizen* is a pretty good concept of what happens to Estonian citizens. The concept of *digital citizenship* in the educational context is much more definite, as it interprets the concept as a competence and cannot substitute it with other words in this form.

Digital citizenship in education

The discourse on *digital citizenship* (abbr. *digcit*) related to education basically thinks that digcit can be a competence. It is based on the concept that online and offline activities and lives of individuals are not two separate worlds, but our online activities are part of our offline everydays. Therefore, it is expected that an individual's online activities be as constructive, productive and valuable to the community as expected from them offline. While the concept of social theory - and the Estonian example - is strongly technology-oriented towards digital citizenship, the pedagogical approach is characterized by the fact that the use of digital devices is not only a question of technology, but rather a question of functionality at all aspects of life.

Digital citizenship as a competence is published in the Standards of ISTE (International Society for Social Science Education) from time to time. *„The ISTE Standards are a framework for students, educators, administrators, coaches and computer science educators to rethink education and create innovative learning environments. The standards are helping educators and education leaders worldwide re-engineer schools and classrooms for digital age learning, no matter where they are on the journey to effective edtech integration."*[7]

Because the digital world and the technological environment have changed a lot, so the ISTE Standards have undergone major changes over the last 20 years. The first Standard list for Students was born in 1998 (National Educational Technology Standards for Students – NETS-S), followed in 2000 by a Standards for Teachers and then in 2001 for Administrators.

Subsequently, a new standard, ISTE Standards for Students was published in 2007. The main difference between the two standards is a good follow-up of the 9 years of technological change: while in 1998, the major goal was to learn to use digital devices for almost everyone, in 2007 the emphasis has been placed on using technology not only in everyday life but also in learning. It was then focused on the benefits of using digital technology in the classroom environment. The emblematic tool of the era is the mobile cart, which enabled the teacher to use digital devices in any classroom at any age group.[8] Therefore, the standard for teachers (ISTE Standards for Teachers 2008) and the standard for administrators (ISTE Standards for Administrators 2009) had to be updated after the student standard. In 2011, two new target groups were listed: the ISTE Standards for Coaches and the ISTE Standards for Computer Science Educators were released.

[7] https://www.iste.org/standards

[8] https://www.iste.org/explore/ISTE-blog/Because-the-world-is-changing%2C-so-are-the-ISTE-Standards

The results of a 2014 survey encouraged the organization to revise the student standard again. One of the main goals of the research was to explore the BYOD concept by examining the use of own devices in schools.[9] The emblematic tool of the era is the mobile device, which gives you the opportunity to do what you cannot done easily before: the 1:1 learning environment is becoming more and more easily realized within the classroom. As a result, ISTE has set the goal of helping learners and teachers to take advantage of the potential of the devices in their hands and to transform learning through using technology. The new ISTE Standards for Students was released in June 2016.

Figure 3: The evolution of ISTE Standards for Students

Then in June 2017 appeared a new standard for teachers with a new name (ISTE Standards for Educators), and in June 2018, also with a new name, standard for education leaders (ISTE Standards for Education Leaders). Finally, after 2011, the ISTE Standards for Computer Science Educators was renewed in 2019.

Digital Citizenship as a competence has evolved along with ISTE standards. In the 1998 version, digital citizenship was not included in the list of standards, as we were far from being aware of the quality use of the digital tools. In 2007 digital citizenship has became one standard in the Standards for Students and in 2008 in the Standards for Teacher as well. According to both, digital citizenship means that a person understands the human, social, and cultural aspects of technology and is able to act ethical and show lawful behavior in the use of technology (as well).

	ISTE NETS T (2008)	ISTE NETS S (2007)
Digital citizenship means...	A. advocate, model and teach safe, legal, and ethical use of digital information and technology, including respect for copyright, intellectual property, and the appropriate documentation of sources. B. address the diverse needs of all learners by using learner-centered strategies providing equitable access to appropriate digital tools and resources. C. promote and model digital etiquette and responsible social interactions related to the use of technology and information. D. develop and model cultural understanding and global awareness by engaging with colleagues and students of other cultures using digital-age communication and collaboration tools.[10]	A. Advocate and practice safe, legal,and responsible use of information and technology. B. Exhibit a positive attitude toward using technology that supports collaboration, learning, and productivity C. Demonstrate personal responsibility for lifelong learning. D. Exhibit leadership for digital citizenship.[11]

Figure 4: Definition of digital citizenship

[9] https://www.siia.net/visionk20/2014_VK20-ES.pdf
[10] https://id.iste.org/docs/pdfs/20-14_ISTE_Standards-T_PDF.pdf
[11] http://images.apple.com/education/docs/Apple-ISTE-NETS-Students.pdf

In 2011, Mike Ribble released a book that is the most comprehensive and most complex description of digital citizenship as a competence (Ribble, 2011). Ribble deals specifically with this in an educational, school environment, and describes digital citizenship as a complex of nine elements. In the first edition of the book, the nine elements were framed into three categories based on their immediacy to the typical school environment. These categories combine the elements that:

- directly affect student learning and academic performance,
- affect the overall school environment and student behavior,
- affect student life outside the school environment (Ribble, 2011; Ollé, 2011).

In 2016, Ribble said that a lot of things has changed since the digital citizenship first release, but *„the importance of teaching students how to respect and protect themselves and others online doesn't"*.[12] Therefore, in the second edition of the book, you can find a new, different kind of division of the nine elements of digital citizenship: this is the REP model: respect, educate, and protect (REP).

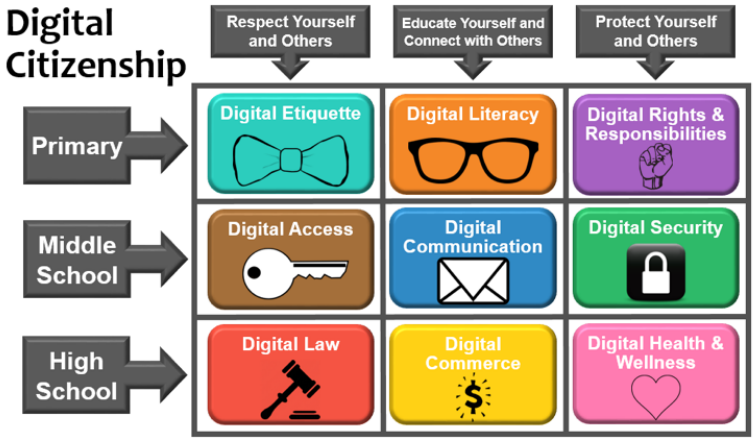

Figure 5: Nine elements of digital citizenship (REP)

- **R is for *respect*** yourself and others.
- **Etiquette.** Students need to understand how their technology use affects others. Remind them that there is a person on the other end of their text, tweet, comment or post.
- **Access.** Not everyone has the same opportunities with technology, whether the issue is physical, socio-economic or location. Those who have more access to technology need to help those who don't.
- **Law.** The ease of using online tools has allowed some people to steal, harass and cause problems for others online. Students need to know they can't take content without permission, or at least give credit to those who created it.

E is for *educating* yourself and others.

> **Literacy.** Learning happens everywhere. Regardless of whether we get our information from friends, family or online, we need to be aware that it might not be correct. Students need to understand technology and what it can do and be willing to learn new skills so they can use it properly.

[12] https://www.iste.org/explore/Lead-the-way/Digital-citizenship-is-more-important-than-ever

Communication. Knowing when and where to use technology is important. Using email, text or social media may not be the best method for interacting with someone. Students need to think about the message first, then the method, and decide if the manner and audience is appropriate.

Commerce. Technology allows us to buy and sell across the globe. Students should be careful about sharing personal and credit card information. Online commerce comes with risks.

P is for *protecting* yourself and others.

Rights and responsibilities. Build trust so that if something happens online, students are willing to share their problems or concerns about what has happened. Students should know who they are friends with on social networking sites so that they can remain safe online.

Security. It is everyone's responsibility to guard their tools and data by having software and applications that protect them from online intruders. When we are all connected, everyone is responsible for security.

Health and wellness. There needs to be a balance between the online world and the real world. Students should establish limits with technology and spend quality face-to-face time with friends and family.

Figure 4 also shows that the nine elements are not only arranged on the vertical axes, but also has an additional aspect along the horizontal axis. These 9 elements may also be organized by the appropriate school level at which each element may be modeled and facilitated: primary, middle, and high school. At the younger grades, digital technology skills may be modeled, with a minor focus on facilitation. At the later grades, the responsibility of skills may be placed more with the students with facilitation by educators.[13]

But not only the REP model is the one and only digital citizenship model, it is also worth looking at the Hungarian model of digital citizenship for those who are interested in the topic, because it goes one step far then the REP model.

In 2013, a Hungarian research group (Eötvös Loránd University Faculty of Education and Psychology – Information Society Teaching and Researching Group) produced a model of digital citizenship in Hungary, which was an adapted and slightly modified version of the Ribble model described above. The design of the model was followed by two different large-scale empirical studies (Ollé et al., 2013; Czirfusz et al., 2015). Using the conclusions of the researches, in 2016 began the rethinking of the Hungarian digital citizenship model. Then the research team took into consideration not only the Hungarian model of 2013 and its original Ribble model, but also the internationally significant DigComp 2.0 framework (Vuorikari et al., 2016). Thus, a new model of digital citizenship was born, which, in comparison with the previous models, completely redefined the relationship between the competencies.[14]

[13] https://www.setbc.org/2018/06/digital-citizenship-2018/

[14] The model was formed in 2016 by a research team consisting of Dóra Czirfusz, Lilla Habók, László Hülber, Sándor Király, Csaba Komló, Anita Lanszki, János Ollé, Adrienn Papp-Danka, Réka Racsko.

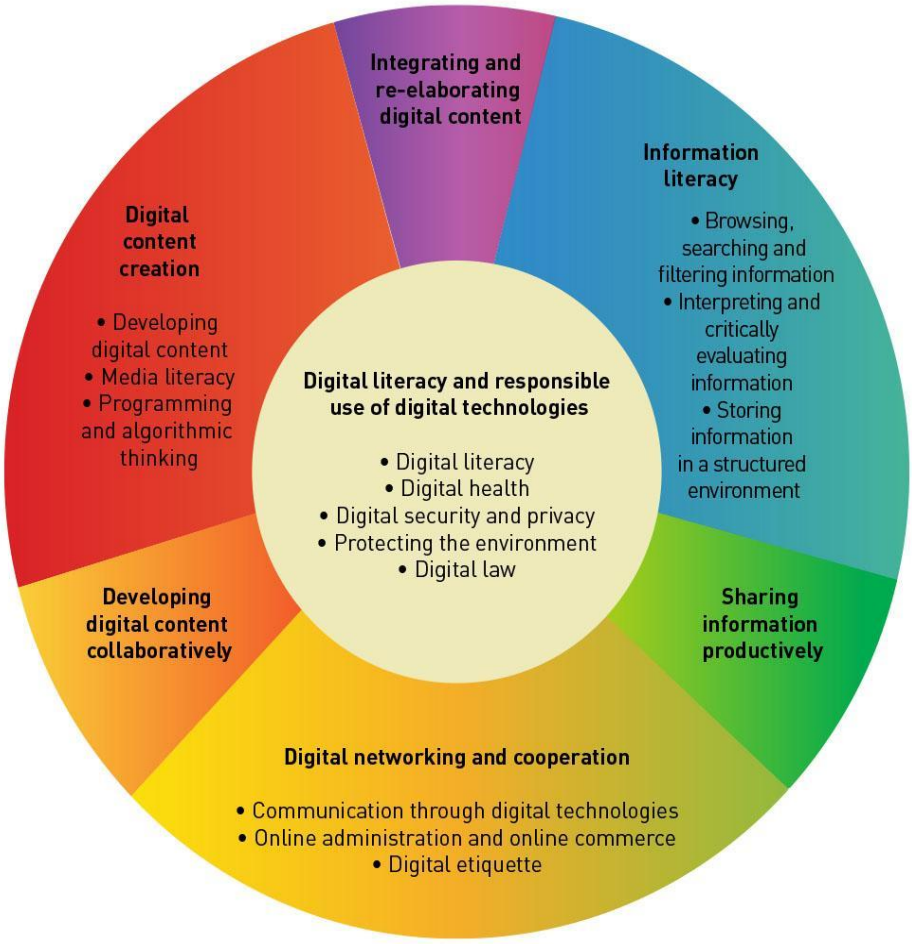

Figure 6: The Hungarian Model of the Digital Citizenship Competence

In the middle of the circle model, *Digital Literacy and Responsible Use of Digital Technology* competence forms the basis and starting point of the model. This is the element which serve as the basis for any further competences and are a prerequisite for their operation. The middle of the circle is built around three core competencies: *Information Literacy, Digital Networking and Cooperation* and *Digital Content Creation*, and intersect three additional sub-competencies. In the circle model we depicted the key competences with basic colors (blue, yellow, red), and in their cross-section, the subcompetences with the mixture of the key competences' colors. The main difference between REP model and the hungarian model is that the latter defines all these elements like competences which all have 3 development levels, like in DigComp: level A, B and C (Papp-Danka - Lanszki, 2016).

The relationship of digital pedagogy and digital citizenship

Digital citizenship as a competence, its integration into ISTE standards, or its role in Ribble's home, school and extracurricular environment all predestine that digital citizenship is learnable, teachable, and developable. Digital pedagogical methods would make it possible, but the situation is not that simple.

It would not be easy to interpret the concept of digital pedagogy or present its history, withal it is not the purpose of this study. However, for some thought, it is worth retrospecting at the changes in the

digital pedagogy theory. Exactly 20 years ago, in 1999 was published Andrea Kárpáti's much-cited study, *Digital Pedagogy: Methods of Computer Assisted Teaching* (Kárpáti, 1999). Twenty years ago, the digital pedagogical toolkit was powered by a personal computer that we know is the least popular digital tool in 2019. (PC rate has been steadily declining since 2015 in Hungary, from 62% at that time to 50%. In parallel, smartphone rate has risen from 62% in 2014 to 83% today. So while before 2015, desktop PCs rate was significantly higher, recently this rate has turned to smartphones completely.[15]) Kárpáti's article 20 years ago discusses i.a. the types of computer-supported teaching tools, and methodological issues such as what subjects can be supported by the computer and how the device facilitates distance learning. Kárpáti expected the computer to be a Trojan horse in the school when behind the walls come up the new digital methods and contents that seem to be dangerous to traditional pedagogical practice (Kárpáti, 1999). It has been a relatively long time before this heightened expectation subsided and we have noticed that digital devices, whether a computer or a smartphone, do not function as Trojan horses and in some respects do not at all represent a "threat" to traditional pedagogical practice. *„Unfortunately, IT solutions and fast, ubiquitous internet access did not work as Trojan horses: innovative educational methods did not capture the power of the world's schools. Considering the ICT skills and abilities expected of educators, it is not surprising why: infrastructure, development, training, mentoring, intellectual and emotional support have fallen behind. As a result, machines have become more responsive to their users, and digital pedagogy is becoming less and less different from traditional pedagogy."* (Kárpáti, 2013)

There are certainly some people who disagree with the statements about digital pedagogy written above. But maybe we all agree that the digital device cannot be a pedagogical tool in itself. The reasons why digital pedagogy did not bring the expected breakthrough are varied, as Kárpáti pointed it out. In addition, researchers have identified more reasons such as teachers' beliefs about what constitutes effective education, lack of technological expertise, and local policies that do not give teachers time and inspiration to explore and experiment.[16]

However, digital citizenship and its introduction into educational practice could be a good opportunity for digital pedagogy to go in the direction it is expected to take. This can be viewed in e-Estonia, who are fortunate enough to have their educators set a living example for their students in terms of how they can, should, and be advised to behave and act in the digital environment. But not only does it matter how authentic the teacher can be as a role model, but also whether good practices on competence development can be born and shared. In many places in the international literature, we can see digital citizenship as a competence in the curricula, and we can also find a lot of lesson plans and good practices are shared to promote and maintain the importance of the topic.

We highly recommend to visit the United States' leading non-profit organization Common Sense Media's Digital Citizenship website (https://www.commonsense.org/education/digital-citizenship), which contains resources on the topic:

- K–12 Digital Citizenship Curriculum
- Ready-to-teach lessons for grades 3–8
- Curriculum training
- Family engagement resources
- Case studies
- Student games

[15] Forrás: http://nmhh.hu/dokumentum/202180/lakossagi_internethasznalat_2018.pdf
[16] https://www.edweek.org/ew/articles/2015/06/11/why-ed-tech-is-not-transforming-how.html?qs=ISTE+standards

We also recommend the ISTE organization's digital citizenship webpage (https://www.iste.org/learn/digital-citizenship), which can help you in these subjects:

- Online course called „Digital Citizenship in Action"
- Posters, videos and blogs about digcit

It's worth to visit Mike Ribble the expert's official website: http://www.digitalcitizenship.net. For more resources here you can find a detailed list which contains podcasts, articles, toolkits, websites and groups on Digital Citizenship. You should read the third edition of Ribble's book (Digital Citizenship is Schools, 2015) because it provides lesson plans, aligned to the ISTE Standards for Students, for integrating the development of digcit into the curriculum. In addition, the book provides professional development activities to help technology leaders educate other technology users in their schools or districts on implementing digital citizenship.

Last, but not least we recommend you an issue by **European Schoolnet eTwinning project**, called *„Aktív állampolgárok nevelése. A digitális állampolgárság fejlesztése az eTwinninggel"* (2016). In this book you can read a short description about more than 30 eTwinning projects connected to digital citizenship and if you are interested in the details of a project than you can visit the official link provided.

Summary

„Digital citizenship is the new citizenship" – Nicole Krueger gave this sounding title to his blog post in 2017.[17] Whether we approach digital citizenship from sociology or pedagogy, the above statement holds true in both respects. The rapid and grand development of Estonia over the past 15-20 years has created the digital citizen who uses and benefits the state-provided e-services. We also see that estonians do not stop at the borders of their own country but open up to the global world and make some of their electronic services available to all (European Union) citizens (see e-Residency). These people will have a new citizenship, in a global digital world where they have the opportunity to become digital citizens, regardless of national borders.

In pedagogy, it is not so clear that digital citizenship is the new citizenship, but it is sure that the concept of digital competence, standards and digital citizenship has changed a lot over the last 15-20 years. Digital pedagogy has not yet found its own way to develop a new methodology by putting theoretical models into practice. We all know that in educational practice, technology can be used in many different ways and it makes the situation of digital pedagogy more difficult. Digital technology can be used in a way that preserves previous, traditional, teacher-centered educational practices – but it is only the first stage of the SAMR model, called ***Substitution***. According to *Puentedura* there are four stages of the impact of digital technology in teaching.[18] But the first two stages are not enough for transformation, because educational transformation starts only on the third level.

[17] https://www.iste.org/explore/Digital-citizenship/Digital-citizenship-is-the-new-citizenship
[18] http://hippasus.com/blog/

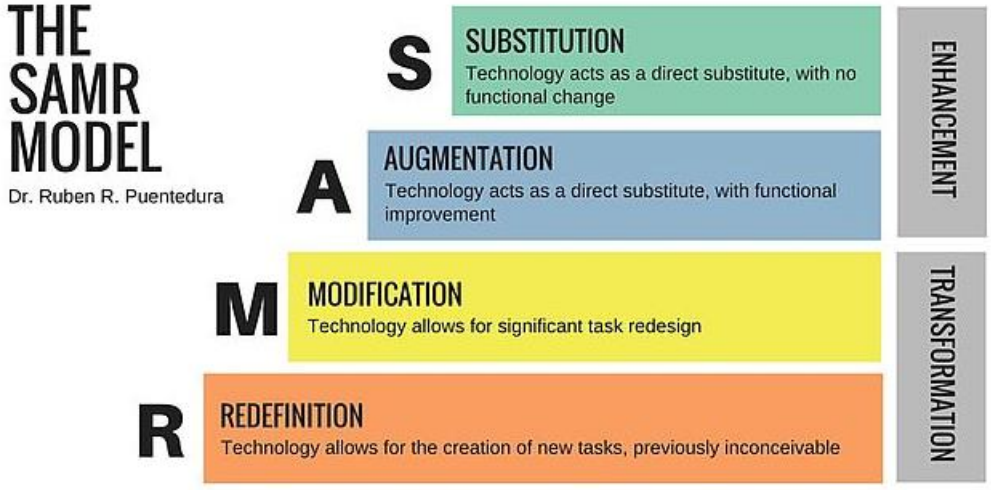

Figure 7: The SAMR Model

While one might argue over whether an activity can be defined as one level or another, the important concept to grasp here is the level of student engagement.[19] In SAMR model it means that on the ***Redefintion*** stage digital technology becomes more important in the classroom but at the same time becomes more invisibly woven into the demands of good teaching and learning. Because the success of the digital transformation and the development of the characteristics of digital pedagogy do not depend on technology. We all know that it is absolutely possible to create a learner-centered, collaborative, action-oriented and problem-oriented educational environment without technology. Devices are the tools but not the aims.

Digital citizenship, however, deserves special attention not only among international organizations and literature, but also in Hungary. Digital citizenship is about developing those the digital capabilities that can serve as the basis not only for our everyday activities, but also for our learning and teaching activities. Of course, it would be an overstatement to say that if digital citizenship competence were to be integrated into the curricula, then pedagogical methods would change radically. But it might not be an overstatement to say what it would be like if we don't always warn the students what not to do in the digital environment and if we don't always protect them from everything in the digital environment. We had better to teach them how to be active and productive participants in digital learning and for what social purposes they can use the amazing power of social media. That is what digital citizenship is about, especially if it is interpreted as the latest hungarian model. Today's students are the main determinants of what the future digital world is going to look like and consequently, they are the creators of digital citizenship. Help them with guides, good practices and proper education to make them living online and offline life! Digital lifestyle, digital citizenship and digital pedagogy should form a complementary relationship such as the circle model shows it!

[19] https://sites.google.com/a/msad60.org/technology-is-learning/samr-model

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András BUDA

Teachers' attitudes in terms of using ICT at school

Many are discontent about today's education. Some criticize the available devices; others think that their teachers are not prepared enough, and many urge the transformation of the teaching environment. Consequently, they have different pictures of the development trends; however, everyone agrees that digital technology will play an important role in this process. As Warlick put it: "We need technology in every classroom and every student and teacher's hand, because it is the pen and paper of our time, and it is the lens through which we experience much of our world" (Warlick 2006, 1). However, "in Hungary, less than 20 percent of the teachers use ICT tools at more than 25 percent of their school lessons" (Digital Education Strategy of Hungary 2016, 8).

Incorporation of digital technology into the education process can be obstructed by several factors; Mumtaz arranged these elements into three groups. He distinguished between obstacles of economic, school and teacher level (Mumtaz 2000). Economic level obstacles do not only include the costs of buying, maintaining and permanently renewing the new technology but producing digital content that needs much of financial resources, as well. School-level obstacles include insufficient support (e.g. to rectify technical problems or acquire new methods) and the lack of time necessary for getting prepared and planning the teaching process. The previous one appears as a problem mainly for those not self-confident enough in solving a problem situation (Rosen – Weil, 1995), and the latter one is mentioned in this group because in many cases the institutions require so much work of the teachers within and outside the classroom that they will have very little time left to get to know ICT opportunities and practice new solutions (Robertson et al. 1996, Ertmer 1999). However, according to Mumtaz, the most dominant factor is the third one, the teacher level; similarly to Veen (Veen 1993), he thinks that the impacts of this are far stronger than those of the institutional or school factors.

It can easily be seen, for example, that the teachers' attitudes about technology exert considerable impact on their activities. Be the most modern ICT tools available in the classroom, "adequate basic knowledge will be in vain if one is not motivated to use it and does not possess positive attitudes; his/her knowledge apt to be utilized will not become operating" (Hercz et al. 2010, 1). The depth of computer knowledge and the self-confidence or vagueness arising from this as well as the feeling of personal effectiveness mean a kind of motivational basis in using digital technology at school. Therefore, in many cases, the problem is the teachers' technophobia; many of them are afraid that the digital tools and programs will break down or not work properly (Rosen – Weil 1995). However, ICT tools and the knowledge necessary to use them provide only the essential – necessary but not enough – starting conditions of change. According to several types of research and studies (e.g. OECD 2000, Csákó 2001, Nikolov 2010, Makrakis 2010, Kadocsa – Gubán 2014), the digitalization of the learning environment with sufficient tools does not automatically bring about the transformation of the education process. The change depends on the participants', and especially the teachers' "capability to adapt, willingness, motivation and activity" (Török 2007, 45). The teachers' attitudes determine the methods used at the lessons; they even affect what solutions and tools of the digital world the teachers notice at all, which of these become important, decisive and motivating for them from some aspect (Juhász – Takács 2006).

Attitudes of the teachers of Debrecen

Below I will present the results of a research series that give us a picture of the attitudes of teachers concerning the adoption of ICT tools at school. During the researches, we did not only try to explore the personal features but also touched upon mapping the opinions about colleagues and the educational environment itself. The teachers do not work in isolation in a narrow and static environment but as parts of a community, in close interrelation with others and under varying environmental conditions. The developments at their schools have various impacts on their work; for example "seeing that their colleagues or students use computers as something natural in solving their everyday problems improves the performance of certain teachers" (Török 2007, 145).

The research series was started in 2006; this was the year when we first asked the teachers working at the primary and secondary schools of Debrecen to answer our query. In the survey repeated in 2009, 2013 and 2016 altogether 2411 persons (1886 women [78.2%] and 511 men [21.2 %], 14 people did not tell their sex) answered our questions. Thus in our survey, men are somewhat over-represented; while according to the national data, the proportion of women amongst teachers has not deviated much from 82 percent since the early 2000s (Varga 2015), in our researches the rate of female respondents was slightly lower each time.

We examined the attitudes of the respondents in terms of using or adopting ICT tools basically with a four-grade Likert scale (4=fully agrees, 3= rather yes, 2=rather not, 1=does not agree); we asked for their opinions about various statements. The statements were arranged into two groups. One included the statements the respondents evaluated about themselves, and the other one included those worded about their colleagues and work place.

Table 1: Teachers' attitudes in terms of ICT tools and using them at school
Rate of the answers 3 (rather yes) and 4 (fully agrees) (%)

Statements	2006	2009	2013	2016
I like teaching. *	98,01	98,95	97,90	98,14
I permanently refresh my teaching methods and tools. *	94,26	90,59	88,99	94,48
I am interested in technical novelties. *	76,97	85,31	79,16	87,45
I feel prepared to apply computers in teaching. **	na.	69,82	68,94	79,67
I am interested in applying ICT tools in teaching, but I am not prepared enough. *	66,42	65,26	61,28	64,67
Besides teaching, I have time for self-education. *	61,50	53,31	41,69	51,47
I am good at using computers. *	58,20	77,97	75,23	87,25
The school consumes all my spare time. *	55,70	65,85	71,96	72,61
I prefer the traditional teaching method of "blackboard and chalk". **	34,58	24,73	32,47	23,33
My school has good technical equipment. *	63,48	64,11	46,73	66,98
My colleagues use computers successfully in their everyday practice.*	52,32	47,54	53,21	66,67
At staff meetings, we do not touch the issue of using computers at lessons.*	43,84	30,63	37,29	31,30
At our school, there are only a few people who are interested in using computers in teaching. *	42,55	29,72	28,57	17,76

* p = 0,00; ** p < 0,01 Kruskal-Wallis test

The statement “I like teaching” stands out of all of them; agreement with this was above 95 percent in each of the four types of research. From this respect, teachers did not change; the Kruskal-Wallis test did not show a significant difference between the results of the various surveys. Unfortunately, there were some who did feel very bad in their jobs: four people in 2006, one in 2009 and two in 2013 and 2016 rejected this statement. (It is a question then why they kept on teaching.)

The query included two more statements that were agreed by the decisive part of the respondents (at least 75 percent) in each survey; both indicate the positive attitudes of the responders towards (technological) innovation.

Moreover, it was only the statement about methodological renewal (in 2009) that no one rejected fully. So all of the respondents strived to exert some level of methodological changes, even the teacher who did not like teaching. This positive attitude is also reflected in the fact that the respondents did not keep themselves fans of the blackboard-chalk method. Only 99 persons (4.1%) gave contrasting responses during the four surveys, i.e. they said they preferred traditional tools. The decisive part of the teachers was interested in technical innovation; concerning them, the question was whether it was a superficial, observing interest or deeper, manifesting in actions, as well. In the latter case, it was an important aspect whether it was their characteristic as private persons or as teachers, as well.

During the ten years between the start and the end of the researches, the biggest change took place in handling computers; according to the data, the teachers of Debrecen thought they were better at using computers in 2016; agreement rate had been 58.2 percent in 2006, which rose to 87.25 percent by 2016 ($p=0,00$). Development in this field was only interrupted in 2013, otherwise, in each of the other years, comparison by pairs indicated a significant ($p=0,00$) positive trend. At the same time, it is also worth mentioning that out of the sentences relating to personal attitudes or feelings it was only the statement “The school consumes all my spare time” in terms of which a change indicating one clear direction could be detected: teachers felt more and more burdened. In 2006, it had been only 7.6 percent of the respondents who thought they did not have any spare time left besides their work; this rate grew to 17.3 percent by 2016. This is an essential issue because if there is no possibility to take rest and get refreshed, it will sooner or later exert a negative impact on the quality and effectiveness of one’s work. Since more time must be spent on working, it is not surprising that less time can be used for self-education ($p=0,00$). However, this is essential in keeping up with the permanently changing digital technology.

The responders formed better and better opinions during the consecutive researches not only of themselves but their colleagues, as well. They thought their colleagues were more and more prepared to use computers and that the issue of using new technology at lessons was more and more often discussed at staff meetings. Perhaps this is also a reason why the rejection of the statement “At our school, there are only few people who are interested in using computers in teaching” was continuously growing stronger during the surveys; in 2016, 82.24 percent of the respondents rejected this statement or agreed very little. We experienced the lowest agreement value of the query at this statement; it remained under 20 percent (17.76%) only in this case. It is important to note that according to our responders, the technical equipment of their schools did not improve so it was not better availability that generated higher interest!

After presenting the results relating to the whole sample, let us examine the differences and similarities that can be seen between the attitudes of the various sub-groups of the respondents (Table 2).

Table 2: Teachers' attitudes in terms of ICT tools and using them at school – by sex
Rate of answers 3 (rather yes) and 4(agrees) (%)

Statement	men	women
I like teaching. *	96,99	98,43
I permanently refresh my teaching methods and tools. *	90,36	93,66
I am interested in technical novelties. *	89,94	78,38
I am at good at using computers. *	79,03	68,07
I feel prepared to apply computers in teaching. *	80,28	71,75
Besides teaching, I have time for self-education.	55,94	54,17
I am interested in applying ICT tools in teaching, but I am not prepared enough. *	40,33	58,23
The school consumes all my spare time.	60,24	64,85
I prefer the traditional teaching method of "blackboard and chalk.	27,77	30,94
My school has good technical equipment.	59,68	61,68
My colleagues use computers successfully in their everyday practice.	52,74	55,75
At staff meetings, we do not touch the issue of using computers at lessons.	37,96	38,22
At our school, there are only a few people who are interested in using computers in teaching.	35,77	31,90

* p = 0,00

In terms of sexes, it is obvious that concerning seven of the thirteen statements, there is no significant difference between men and women. For example, both sexes gave similar answers about their work load, their colleagues and the technical equipment of their institutions. It is, however, noteworthy that according to our results, women are more keen on the teaching career, they like teaching more and also refresh their teaching methods more often than men. However, almost two-thirds of them said that although they were interested in using ICT tools in teaching, they did not have the necessary skills. This feeling might obstruct the work of many to some extent since in case one is not self-confident in using a new tool or methods, (s)he will probably prevent applying it (Hadley – Sheingold 1993).

Since at the various types of schools, different stress is put on the teachers' certain activities, we wished to examine what similarities and differences can be shown between the persons teaching at primary (1363 people) and secondary (913 people) schools. Of course, there might be some differences between the secondary institutions of various profiles but to prevent excess and – about the number of data, disproportionate – polarization we finally ranked each of the secondary institutions into one comprehensive category. On the whole, the rate of those teaching at primary schools and secondary institutions almost equals to the national data; according to the National Statistical Office (KSH 2017), during the latest years, 61.3 percent of the teachers worked in primary educational institutions in average.

We found differences between the attitudes of the teachers of the various types of schools in several fields (Table 3).

Table 3: The teachers' attitudes in terms of ICT tools and using them at school – by institution types
Rate of answers 3 (rather yes) and 4 (agrees) (%)

Statements	primary school	secondary school
I like teaching.*	98,35	97,98
I permanently refresh my teaching methods and tools.*	94,67	91,27
I am interested in technical novelties.*	79,91	82,62
I am at good at using computers.*	64,97	77,67
I feel prepared to apply computers in teaching.*	70,25	77,37
Besides teaching, I have time for self-education.	58,00	50,11
I am interested in applying ICT tools in teaching, but I am not prepared enough.*	56,97	50,34
The school consumes all my spare time.	63,87	64,09
I prefer the traditional teaching method of "blackboard and chalk".	30,82	30,10
My school has good technical equipment.	62,66	59,87
My colleagues use computers successfully in their everyday practice.	54,60	57,13
At staff meetings, we do not touch the issue of using computers at lessons.	38,93	36,24
At our school, there are only a few people who are interested in using computers in teaching.	35,68	28,80

** 35,68; 28,80

* p = 0,00; ** p< 0,05

Since at primary schools, the rate of woman teachers is higher than it is at secondary schools, the differences between the two sexes are reflected in the data gained in terms of the school types. Those working at primary schools like teaching more and according to the average data of the responses, they are more likely to refresh their teaching methods and tools. The latter one, however, is less extended to digital technology although they agree with the statement "Besides to teaching, I have time for self-education" to a greater extent. Therefore, it seems they search for new solutions not used formerly rather within the set of traditional methods, and they are less likely to involve computers into this process. (Even though primary school teachers are more content with the technical equipment, which is a starting condition.) Although their values are of a bit lower level, renewing methods is important for secondary school teachers, as well, and they are more likely to use computers in this process. The reason for this may also be that they are more interested in technical novelties than primary school teachers, and also keep themselves more prepared to use ICT tools in teaching.

Generation theories connecting to age (e.g. Strauss – Howe 1997, Prensky 2001, McCrindle – Wolfinger 2009) often serve as bases for the examination of digital differences even though these theories have been offended several times. Those who counter this opinion usually refer to the point that these are not uniform or homogenous groups but only "pseudo-communities" (Pankász 2016). Several types of research (e.g. Bennett et al. 2008, Hunya 2008, Buda 2010, Fehér – Hornyák 2011) indeed proved the fact that the students equally considered digital natives do not for a homogenous group. With the data collected during our research, we wished to prove the supposition that the teachers, too, had various relations to the application of ICT tools at school; therefore, we examined whether there were any differences between the attitudes of the various age groups of the teachers equally considered as digital immigrants (Table 4). To maintain the relevance of the analysis, we strived to form sub-groups with similar numbers of elements. Thus we made three age groups. The first one included those younger than 40 (751 people), the second one the persons between 40 and 49 (818 people) and the third one those aged at least 50 (750 people).

Table 4: The teachers' attitudes in terms of ICT tools and applying them at school – by age groups
Rate of answers 3 (rather yes) and 4 (agrees) (%)

Statements	below 40	40-49	50 or more
I like teaching.*	98,16	98,17	98,24
I permanently refresh my teaching methods and tools.*	94,01	92,72	91,85
I am interested in technical novelties.*	84,25	78,38	79,78
I am at good at using computers.*	82,52	71,02	58,38
I feel prepared to apply computers in teaching.*	82,22	77,17	65,10
Besides teaching, I have time for self-education.	54,67	50,34	60,70
I am interested in applying ICT tools in teaching, but I am not prepared enough.*	47,46	54,68	60,57
The school consumes all my spare time.	54,06	66,74	68,44
I prefer the traditional teaching method of "blackboard and chalk".	27,04	29,05	35,29
My school has good technical equipment.	57,45	62,90	62,55
My colleagues use computers successfully in their everyday practice.	51,01	53,12	61,49
At staff meetings, we do not touch the issue of using computers at lessons.	42,99	36,42	35,72
At our school, there are only a few people who are interested in using computers in teaching.	36,14	32,98	29,48

* p = 0,00; ** p < 0,05

According to these results, younger teachers are more interested in using digital technology in education than the older ones. They think they are good at using ICT tools, they keep themselves more prepared, and to maintain this, they permanently refresh and develop their knowledge. The older ones feel more burdened and less interested or prepared but are more content with their colleagues than

their younger peers. They have a more positive picture of the technical equipment of their schools, too. However, this might be a consequence of the fact that they prefer the traditional method of "blackboard and chalk" at a larger rate than the younger ones. For those preferring blackboard and chalk, it is in fact of no importance what digital tools are available at the school; from this point of view, even some – not very up-to-date – equipment might seem many.

In terms of the age groups, it was an important result that there was not much difference between them concerning love for teaching and the efforts made for methodological renewal; thus our respondents did not fight the often mentioned burnout of teachers (pl. Skaalvik – Skaalvik 2017, Iancu et al. 2018.

Factors and clusters of attitudes

The answers given to the attitude statements were also examined by factor analysis; at the end of the process, we gained five distinguishable factors. These together explain 61.6 percent of the total variance.

Table 5: Result of the factor analysis done with the variables of the attitude statements (KMO=0,730)

	Factors				
	1	2	3	4	5
I am at good at using computers	,812	-,024	,178	-,085	,062
I am interested in applying ICT tools in teaching but I am not prepared enough	-,724	,045	,334	-,109	,042
I am interested in technical novelties	,596	,019	,386	-,158	-,011
At our school, there are only a few people who are interested in using computers in teaching	-,002	,832	-,046	-,098	-,033
At staff meetings, we do not touch the issue of using computers at lessons	-,045	,798	,016	-,034	,008
I like teaching	-,098	-,031	,724	,069	,037
I permanently refresh my teaching methods and tools	,292	-,036	,673	,077	-,132
My school has good technical equipment	,105	-,087	,134	,692	-,153
My colleagues use computers successfully in their everyday practice	-,082	-,345	,132	,610	,029
I prefer the traditional teaching method of "blackboard and chalk	-,262	,270	-,202	,565	,107
The school consumes all my spare time	,120	,012	,147	,078	,858
In addition to teaching, I have time for self-education	,136	,052	,339	,199	-,692

(The variables of the certain factors are indicated in grey colour.)

In the first factor, we can see the manifestation of the attitudes of those "prepared" for digital challenges; they were the ones who were self-confident in using computers and other digital tools in which their interest in technological innovation played an important role. The second factor could be

characterized by “elusion”. The statements belonging here presented an attitude pushing responsibility for the neglect of digital technology to the staff. Namely, in case there are only a few colleagues interested in using computers in education and the issue is not mentioned at staff meetings, either, those not interested in the topic and lacking the sufficient knowledge to apply the new tools can perceive these phenomena as excuses. The third factor indicates the attitude of those “loving to teach”; they, although in theory, permanently improved their teaching methods, still thought they were not prepared enough to use digital technologies. The fourth factor includes “contented conservatives”. They were satisfied with the technical equipment of the school and the colleagues’ habits of using computers, however, they preferred blackboard and chalk. The fifth factor shows the attitude of the “burdened”. They thought that the school consumed all their spare time, so much that they did not have any time left for self-education.

By making a factor analysis, we can present the hidden system of relations between the variables; using this process we get new, artificial variables (factors) that will show the examined phenomenon more simply than the original variables. The factor structure that evolves from the variables of a reduced number can be interpreted in itself, too – as presented above -, however, the final result will be less informative in terms of the queried persons. To typify our data, and so achieve more detailed information, we also examined our statements measuring the attitudes by using cluster analysis.

Of the various cluster creating processes, several papers (e.g. Székelyi – Barna 2004, Sajtos – Mitev 2007) propose to use the K-center process in the case of surveys with a high number of elements. However, this process requires the knowledge of the number of the clusters. Therefore, we first used hierarchic clustering (Campbell-Hunt 2000) to determine the optimal number of clusters to which our starting point was the five factors we had gained as a result of the factor analysis. After having performed the hierarchic process with several methods and using the dendrograms drawn as a result of the process, it showed to be reasonable to choose a structure containing seven elements. Accordingly, during the K-center clustering process, we set the creation of seven clusters as the starting parameter.

Table 6: The final cluster centres of the K-center clustering process in terms of the attitudes

	Clusters						
	1	2	3	4	5	6	7
1. Factor	-,72345	1,01972	,17965	-,90582	,07890	,36449	-,13275
2. Factor	-,89663	-,59581	-,32882	-,06331	,93050	,17341	1,14607
3. Factor	,31878	,32524	,31505	-,41433	,29550	-1,87986	,57750
4. Factor	-,57350	,53973	-,67513	,98555	-,73527	-,37496	,73624
5. Factor	,46007	,24944	-1,30873	,15846	,77549	-,12495	-,59845

Cluster 1: Resigned “backwards” (N=330)

The most important characteristic of the cluster is that its members are interested in applying ICT tools in education only seemingly, and they do very little to satisfy their curiosity. Therefore, the reality is that they lack the competences to use new solutions, and are weak in handling even a computer. They could improve their situation because staff meetings at their institutions touch the topic of the

educational use of new technologies quite often, and they also assess their colleagues as open and interested, however, they are not convinced that using the new technology would be fruitful, and they also say they do not have time for self-education anyway. Therefore, their backwardness in this field appears evidently.

Cluster 2: Interested “eminent” (N=394)
The members of the group are not only extremely interested in new technologies but are very good at using computers and permanently improve their educational methods, as well. No doubt, they are the “engine teachers” (Báthory 2000) of the digital world. Moreover, they have a positive picture of their colleagues both as individuals and as teams.

Cluster 3: “Hobby teachers” with plenty of time (N=290)
The most typical feature of the members is that they have plenty of spare time out of school since teaching does not mean a great burden to them. However, they do not use the time available for self-education or the development and learning of new teaching methods, but some other activities were not connecting to school. According to their answers, they possess an established repertoire of methods that, however, does not include the classic pair of blackboard and chalk.

Cluster 4: Refusing “hidebound” (N=323)
The members of the cluster are resolute fans of using blackboard and chalk. Their motivation for teaching is not vocation or love but routine, and they are not only uninterested in new technologies but also refuse to use them. Meanwhile, they are contented with the technical equipment of their schools, which is a direct consequence of the fact that they only need a blackboard and some chalk.

Cluster 5: Discontented “overloaded” (N=336)
The members of this group feel that the school eats up all their spare time, so in addition to teaching – which they do not like so much – they have no time left even for self-education. As they give negative answers about elements concerning which leaders have a decisive role, they implicitly criticize the school management. On the one hand they keep the technical equipment of the school insufficient, and think that staff meeting hardly touches the issue of using computers at lessons on the other. They are very much discontented with their colleagues who are, according to them, not interested enough and they do not or not adequately use new technologies in teaching.

Cluster 6: Apathetic “burned-outs” (N=233)
This cluster has very negative attitudes. Its members do not find any joy in teaching. Therefore, they do not make any efforts to develop their teaching methods. They are not interested in using ICT tools in teaching and are not satisfied with the school’s technical equipment. Neither traditional means of education (blackboard and chalk), nor new ones (computers) are important for them. It would be worth examining the reason why despite the many negative attitudes they are still teaching in new research.

Cluster 7: Observing conservatives (N=256)
Although they keep themselves, devotees of the traditional “blackboard-and-chalk” etching method, they do not fully reject innovation. They are still unpractised in using digital technology, but as they have some time left for self-education, they might be able to catch up. Although they could do more to improve themselves, they expect much more interest in their colleagues and more staff meetings dealing with digital technology and methodology.

Conclusions

The teachers' relation to computers and digital solutions determines processes at schools and especially the lessons. This is why we thought it was essential to get to now the teachers' attitudes: our research series was focused on the teachers working at the public education institutions of Debrecen.

One of the outstanding lessons learnt from our results is that more attention should be paid to forming the attitudes of teachers and to-be-teacher students as well as to their preparation in terms of using ICT tools in education. This is not an easy task since the range of tools and programs is very wide and it is continuously growing, so it is almost impossible to keep up with the changes. And in case someone is trying to meet supposed or real requirements desperately, distress or even fear may easily evolve about the new technological solutions. Because of tenseness, many might feel insecure and think they are permanently lagging since they do not know much about digital technology. This is exactly why this point of view or attitude must be changed.

First, the teachers must accept the fact that they cannot be up-to-date in everything. It is impossible to know all the tools, programs, and websites and be immediately informed on each real or unreal scientific discovery and invention. They should, however, make efforts to utilize the available opportunities as fully as possible, and should also be open to innovation and changes. They must be aware that applying new solutions hides plenty of risks, too (e.g. a technical problem should not paralyse them), but they should not look at these problems as obstacles impossible to overcome but as challenges to be met.

The teachers should also accept that their role in the teaching process has changed; they are not any more the only sources of knowledge (Molnár 2011). Many students think that by some clicks on the internet they can gather much more information than they could from their teachers, and also they do not have to wait until the teacher directs his/her attention at them, everything is available "at once". Of course, the student's searches do not always lead to success, and not all of them can select between the results, so impatience resulting from unsuccessfulness will appear about the net, as well. This, again, might give a new chance to teachers. They can support and help their students as mentors or consultants to prepare them for the challenges of the 21st century, including the conscious, targeted and safe use of technology. However, they also need help to be able to do this.

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Judit MIHALIK

Agile Approach in Higher Education

A collaborative research project report

Initiatives

This study covers a report of a learning project, which intended multiple achievements. The project, as an intrinsic part of a regular course,[1] broadened the core knowledge of students within the field of Human Resource Management via active learning methods, while harnessed and developed future-oriented digital skills and competencies for academic and professional purpose.

In Spring Semester, 2019, at Milton Friedman University, Budapest, I held a course titled „New Trends in Human Resource Management". The lectures focused the current technics and concepts influencing the theory and the practice of HRM, such as AI-driven recruiting, new ways in compensation systems and headhunting, searching passive candidates for particular positions via analyzing their social media digital footprints, gamification in onboarding processes and in benchmarking, or even in assessment procedures.

The idea of the collaborative research project itself came from a spontaneous classroom debate, related to their expectations and worries regarding their professional carrier. As students were stakeholders of the question, they were all enthusiastic toward the topic, so they involved quickly in the proposed project idea. Following the suggested initiatives, the study group decided to design and implement a European scope survey on the Millennial's expectations toward the future of work.

The agile approach as a framework

Whereas the idea of the research project came up spontaneously, first of all, I needed to find a flexible, resilient, adaptive framework. This is the agile model, which is well known in the ICT sector as a project management method. The fundamental document of the original agile model is Manifesto for Agile Software Development.[2] However, in the last few years, agile principles have been widespread in different domains, particularly in leadership, management, organization development and education as well. „The most important principle in agile is to take continuous feedback, learn from the previous iterations and try and improve in the next iteration. There is no concept of best practices. Better and better practices will keep on evolving as practitioners master their environment. Agile approach means taking a risk. In the process, one may make mistakes, but the important thing is to detect the mistakes early and fix them as soon as possible" (Kamat, 2012:231).

[1] The course included thirteen 90 minutes-long classroom lectures. Course participants were 22 international BA students studying in Hungary with the Erasmus Program, mostly Management Studies and Finance specialized, originated eight countries: Greece, France, Germany, Luxembourg, Serbia, Spain, Switzerland and Turkey. Since the course has no strict and fixed curriculum (as HRM trends change quickly), it seemed to be fruitful to have a broader look beyond the topic. More precisely, as the design of the course inspired by an interactive, experience-based learning concept (testing the latest technics, tools and solutions: e.g. benchmarking games, provided by a guest speaker), it also offered a great chance to learn the attitudes and biases toward the AI and data analytics-driven solutions, user awareness, personal data protection among the course participants. Whereas students were Millennials, or so-called the "digital natives", who often shows "participatory exhibitionism" (Sherazio, 2015) it was not a surprise that their concerns toward personal data analysis based HR trends were quite open and fearless.

[2] See here: http://agilemanifesto.org/ Last download 12.08.2019.

The agile principles incorporated into learning context are stated in manifestos too, for example in Peha's (2011) version: "We are uncovering better ways of educating children by doing it and helping others do it. Through this work, we have come to value: individuals and interactions over processes and tools; meaningful learning over the measurement of learning; stakeholder collaboration over constant negotiation; responding to change over following a plan" (Peha, 2011:23)

The agile approach seemed perfectly suitable for skill developments in the given educational settings too (see Bruegge, Reich & Schiller, 2009), since there are no strict rules but it provides useful pragmatic principles. "Agile model is not a methodology; it is a way of behaving; it is a culture; it is a mindset" as one of the agile practitioner professional[3] paraphrased in his blog. The agile approach focuses on results, as well on participant's needs and flexible enough during the whole learning and collaboration process. The 'learning by doing' method was an appropriate way to avoid the loss of time[4] gaining full participation and presence.

Developing skills in higher education as a challenge

In higher education, in a university environment, combining traditional education with future-proof skills development has outstanding importance, but it is a great challenge, indeed.

According to the document The Future of Jobs Report, 2018, World Economic Forum, the most required skills in five years are the followings: 1. analytical thinking and innovation, 2. active learning and learning strategies and 3. creativity, originality and initiative (WEF, 2018). These skills are human features that may not be easily replaceable by augmented machines and algorithmic labor in the near future.

The report states that, in five years term, more than half of employees will face the reskilling or upskilling imperative. So, active learning and learning strategy, as a silver medal skill, is not an empty slogan. It is second in line but probably the number one in its complexity since it affects all other elements of the required skills. In the preface, the report emphasizes the responsibility of educators too, stating that "Workforce transformations are no longer an aspect of the distant future. As shown in the five-year outlook of this report, these transformations are a feature of today's workplaces and people's current livelihoods and are set to continue in the near term." (WEF Report, 2018: 18)

Moreover, looking at the expectations of the future workforce, 84% of the companies plan to hire new permanent staff with relevant skills to new technologies. It also opens the door for newcomers, which means, for youngsters, developing proper digital skills combined with those demands mentioned above, is imperative. As a consequence, "policy-makers, regulators and educators will need to play a fundamental role in helping those who are displaced repurpose their skills" (WEF Report, 2018: ix).

Similar forecasts on the future of work and lists of requirements of the prospective human workforce are widely studied by "the big four" companies, consultants[5], academics and professionals. Countless white papers and proposals published, and many are on the way[6].

Apparently, current educational initiatives increasingly aim to meet these demands, for instance, using crowdsourcing in education (Benedek, Molnár & Szűts, 2015), or even open the door into an entirely new world of teaching approaches in developing visual culture (Szűts, 2012).

[3] See this website: http://agilemethodology.org/want-to-be-agile-stop-doing-projects/ Last download 12.08.2019.
[4] A non-academic survey found that university students have an average attention span of just about 10 minutes. "Students only have 10-minute attention span." Retrieved from http://news.bbc.co.uk/2/hi/uk_news/education/8449307.stm Last download 12.08.2019. Last download 12.08.2019.
[5]Example https://www.bain.com/insights/labor-2030-the-collision-of-demographics-automation-and-inequality/ Last download 12.08.2019.
[6] See examples here: Balliester and Elsheikhi (2018)

Methods and practices by phases

For the purpose of implementing these principles in practice, in this project I applied (or, you could say: "this project applied") a mixture of facilitation tools, online and offline collaboration tasks and individual workloads in order to develop a variety of skills and competences.

Within the course, the research project itself included seven short phases (or, using the agile term: "sprints"), each having distinct objectives and applied methods: 1. icebreaking 2. survey project shaping 3. survey processing 4. data collecting 5. discussion of findings 6. individual papers submitting 7. publishing. Following the agile approach, all the phases ended with a brief evaluation (short online or real-time feedback) for a public understanding of the obtained results and objectives.

Seemingly, the first five phases were cooperating issues, while the last two were individual tasks. These phases followed the approach of the project design, helping students to get into the research methods and practice gradually, with more supervision at the beginning, inculcating participants step by step into a self-reliance work.

Below, the project phases are explained in detail.

Project phase 1. Icebreaking

As a start, students could test their team problem-solving skills via "Line Up" experience. It is a training tool, widely used in business training as an icebreaker[7]. In this situation, the teacher took the facilitator's role, whose main task was "to help the team or group increase its effectiveness by improving its processes" (Thayer-Hart, 2007:17). The phase turned a group of classmates into an engaged cooperative team, meanwhile raising the opinion drivers in the team as well as appearing the potential leaders and the most creative one. As a bonus, the facilitator could also capture a brunch of useful information on the dynamics, strengths and weaknesses of the team for the forthcoming phases.

Project phase 2. Survey project shaping

Following the icebreaking, another facilitating tool was applied for the survey project shaping. OPERA[8] is an ideation and decision-making tool. It covers a five-step process: 1. own ideas, suggestions bringing 2. pair suggestions: discuss them in two 3. explain the chosen ones to the team 4. rank the proposals came up within the team 5. arrange them all. During this phase, the project team worked out the main shape of the research and proposed a draft list of questions for the survey. Bringing up individual initiatives, the core interest became visible making clear the research focus as well. During the cooperation, the common interest issues were summed up, putting plans in place for future incorporation. As a result of this phase, a shortlist of questions was raised.

Project phase 3. Survey processing

In preparation for the next phase, participants created a homework assignment suggesting answer options for the previously selected questions. For project tracking, Google Classroom was used since some of the students had to leave for shorter or longer periods (family matters or exams at the resident

[7] "Line Up" short description: as a start, each participant gets a 3-digit number written on a piece of paper. They need to learn it to remember, but not allowing showing it or telling it to their peer. Then the group has 30 minutes to discuss a strategy. The goal is to form a line by ascending order of the given specific numbers, with covered eyes, neither verbal communication at all. Making noise and touch each other is allowed. See e.g.: https://www.sessionlab.com/blog/icebreaker-games/ Last download 12.08.2019.

[8] OPERA is a holistic participative process, developed by Swedish consultants at Innotiimi. "OPERA is advanced as a process that challenges hierarchical dominance in meetings. Originally used for group problem solving, applications of the process are now applied in teaching, learning and planning contexts. Underpinning the process is a desire to counter the negative effects of extroversion. An individual's fear of group critique is managed through the process of engagement. Participants start by considering their ideas on a topic before pairing for further discussion." (Slaen et al. 2014, p.22)

university). The online collaboration helped to keep the project ongoing regardless of the circumstances. The suggested answers were selected by a similar method of the OPERA, using online tools, such as Mentimeter. The final form of the survey was created by a volunteer student (for bonus points), using Google Forms.

Project phase 4. Data collecting

For data collecting, thirty Erasmus Program countries were shared by 22 student-researcher participants, to collect responses from each one. As a result, 281 respondents filled out the survey in a two-week period.[9]

Project phase 5. Discussing findings

Data collection was followed by a classroom discussion. During a brainstorming session, study options were shaped by participants as an individual initiative. Some students decided to analyze the data by gender, by country or by region, while others made a comparative study selecting a specific point if interest or proposed a summary of the entire project. Writing in English was not mandatory; however, most students decided to do so.

Project phase 6. Papers submitting

Finally, papers were submitted in as many as six languages. For the project leader, supervising the content development and proofreading was achievable by online translator applications.

Project phase 7. Publishing

The last part of the project was publishing papers. Students were encouraged to find publishing opportunities, such as university journals, company websites, consultancy firm's portals, or even their own private blogs. 20 of 22 participants submitted his/her research paper.

Table 1. summarizes the project phases, explaining the objectives, skills and competencies used and intended to improve.

Phase	Character	Skills and competences to use	Skills and competences to develop	Core objectives
Line Up	team storming and forming	creativity, originality, innovation	cooperation, assertive communication, problem-solving	icebreaking, engaging, discovering strengths and weaknesses
OPERA	cooperative ideation and decision making process	micro researching, basic information gathering	teamwork, peer work, individual work, rhetorical skills, compromising	design a survey framework in a trustful, safe cooperation environment

[9] Obviously, this research was not a representative survey regarding the statistical sampling, nor did it meet the rigorous academic standards. However, aiming for the first-hand experience of the research process and paper submission in a limited time, was not the focus of its objectives. The raw data are available as open-source material, for further studies and here: https://www.researchgate.net/publication/335263882_Millennials_Survey_data_2019 Last download 12.08.2019.

Survey processing	developing survey: questions and answers	researching, shifting ideas	academic standards incorporating	finalizing survey questionnaire
Data collection	find volunteer respondents	social media use, networking	initiative, complex problem solving	cover all the 30 countries, follow up the link
Classroom discussion	public debate	critical thinking, rhetoric	analysis	framing the study, preparing for submit
Papers submitting	academic writing	data conversion, chart and table design	writing and researching skills, analytics	explain findings, design and submit a paper individually
Publications	release results	creativity, courage	networking, marketing	find and reach a proper audience

Table 1. Summary of Project Phases

Discussion

During the research project, I used different domain practices in order to bring up the best ideas and get the most out of the cooperation and to gain the best results.

The benefits of the project include several layers.

First of all, points of pedagogy: multi-method learning tools and several collaboration methods were applied and tested. The project as a whole proved that diverse digital and offline approaches enforced and kept students engaged/involved in the project, in particular because of the goals and objectives were set by the common understanding of the group. Turning a group into a team happened more smoothly than expected, and a blended, multicultural mix of participants was able to cooperate easily. Moreover, team members became soon enthusiastic about a meaningful, desirable goal and engaged in a shared project with individual outcomes.

The second cluster of benefits showed up on the students' side. Project participants, in a complex process, had to employ their existing competences and personal abilities, while they also developed their skills in cooperation, creativity, and they gained knowledge at a new field of expertise. Processing "OPERA" and participating in public debates, classroom discussions, they all needed to be involved in the goals, they had to cooperate, brainstorm, use their rhetorical skills, and argue for their suggestions. Designing the survey, they were obliged to obtain micro research on previous external studies. Reviewing the literature[10], we encouraged students to browse mostly online open-access academic sources. Setting answer options, they were required to be creative, prudent and reasonable.

[10] For the literature review, a brief manual was provided for participants. A short introduction to Google Scholar practice, useful links for open access research outputs, the most influential thinkers' websites were available in the Google Classroom project tutorial section. Submitting manuscripts, each student received a tutorial revision; getting help to correct mistakes and lacks the work. The final versions completed generally in 2-3 rounds.

Collecting data from 30 different countries, students challenged the use of social media to find proper respondents from the selected target countries. Analyzing the results, data conversion, developing charts, and searching the additional literature required to use or even learn new digital skills. Submitting the papers, participants added a valuable and thoughtful contribution to their background. Being a part of a research project, they obtained a unique readiness that may be put on their resumes or CVs in the future, building their personal brand as a prospective candidate for further study programs, fellowships, or desirable job offers.

For a broader expert audience, findings of the study can be informative and compelling too. Although the research was not based on representative sampling, the outcomes confirmed the previous results, adding some remarkable new details to them. Publishing data through an open-source database allowed further studies to become available for a wide circle of professionals.

For the lecturer, combining different roles was extremely hard. Being a facilitator, project leader, supervisor, academic writing advisor and research conductor at the same time was challenging sometimes but undoubtedly engaging.

Finally, the host institute, Milton Friedman University, also got benefits and positive contribution to its brand and benchmark. The study papers published in six languages, in 22 versions, do gain some publicity to the institute indeed.

Summary: planting together, harvesting individually

The above-explained study project is a potential source of ideas and experiences for those who are seeking good practices in higher education. For the project, neither extra instrumental or financial contribution, nor particular infrastructure was needed, so it is highly recommended for those looking for innovative, efficient and low-cost educational solutions[11]. Agile approach as a framework delivered a fresh and efficient mindset that helped to keep the eyes on the goals and it prompted participants to be engaged during the entire project. Cooperation and teamwork was not a purpose in itself[12] – it was a part of developing useful future proof skills and learning strategies and it also contributed to each individual's advantage: a paper published under one's own name by each team member. It was a far more tangible result than a grade or credit that they obviously also achieved.

Altogether, the benefits and returns of the project were more numerous than a regular university course could achieve; likewise participants, the lecturer, the host university and in a broader sense HR professionals as the target audience of the findings.

[11] Learning agile approach in education, there are many tutorial and learning opportunities (e.g.: https://www.agileineducation.org/examples.html Last download 12.08.2019.) can be found. Some of them voluntary based, sharing best practices in a community. An offspring handbook (ed. Parsons and MacCallum 2019) guides beginners from theory to practice of lean, agile principles and Kaizen.

[12] Despite co-operative games and learning became a buzzword in education; there are voices against the non-competitive models. "In reality, children gain nothing from the manufactured forms of tokenistic rituals that accompany such emotionally correct gestures. When every child receives a prize for 'trying their best,' the youngsters readily see through the empty gesture. Even at an early age they understand that when nobody loses, nobody wins." (Furedi, 2010, p.14.)

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György MOLNÁR

Digital instruction or the digitalization of instruction in modern ICT environment

Introduction

Latest research results and my experience as well underline that the disciplinary mission of digital instruction, in a stricter sense, digital pedagogy, is to reflect all challenges, tasks, and innovation options facing the digital citizens of today's continuously changing world. In addition to acquiring the so-called key qualifications, the five generations of the digital world should be familiar with all aspects of digital competence if they want to lead a successful and productive life.

Our digitalized world is based on the respective technological developments and the modernization of telecommunication and informatics systems. The related technological revolution and its chief manifestation, the emergence of information and communication technology impacted the social, economic, and cultural sphere. Based upon my more than two decades of personal and professional experience as a researcher and university instructor I view the concept of Information and Communication Technology as a sum of devices, technologies, organizational activities, and innovative processes facilitating efficient processing, flow, storing, coding and transmission of information and the implementation of problem and obstacle free communication. While a standard definition is not at hand, most people are familiar with the basic outlines of information and communication technology.

My research efforts performed in the past years have identified several domestic and international solutions for the direct or indirect application of ICT (Information and Communication Technologies) in the teaching and learning process thereby promoting the development of digital competences. Due to background support provided by web 2.0 and e-Learning 2.0, researchers (Piet Kommers, Pedro Isaías, Morten Flate Paulsen, Miguel Baptista Nunes) have developed several new, frequently mobile ICT-based approaches significantly altering the given learning environment. Such achievements anticipate the extent and necessity of the application of modern pedagogical methods.

The everyday use of new technologies, especially mobile ICT devices have played a significant role in the specialization stage of teacher training programs. Vocational training is a promising field for our research efforts as it not only provides a sound theoretical base, but the inquiries into the concept of Opening up Education can provide an overall structure for applied research in Hungary as well. Consequently, we can rely on a BYOD research program carried out in the education sphere without any direct special material or infrastructure-related requirements.

Information and communication technology tends to have an increasing impact in the education process and the respective learning environment. Accordingly utilizing the means of telecommunication various forms of e-Learning have emerged.

My treatise discusses the role and application options of ICT-based systems and the increasing role of digitalization. My hypothesis is supported by the results of an empirical research effort as well.

Theoretical considerations

In today's information based society due to the increased value of information, info-communication technology and techniques the concept of the digital gap is being reinterpreted. Accordingly, it not

only indicates the capability of device use, but the extent of information flow and information transmission. Consequently, while access to digital devices was an important indicator of digital literacy, it has become the marker of obstacle free information flow and the extent of support provided to the communication process. To define it more appropriately, digital literacy implying the ability of controlling and using of more and more ubiquitous informatics devices is considered a basic necessity. This key competence is not only expected in the labour market, but is an essential requirement of everyday life as well. Accordingly, nowadays virtually every second person possesses or has access to mobile communication devices and the Internet. The penetration of such digital tools entails both a device and service as well. Likewise, two or three mobile telephones or subscriptions per person is an increasing worldwide tendency. The mobile telephones contributed to an unprecedented intensity of interaction (Gocsál, 2015). The Web 2.0 reflects a new participatory culture in which the user is not in a position of a passive observer or reader of web-based content, but he or she can shape such content in an interactive manner. (Szűts, 2014). Therefore, in addition to the consumption of content its enhancement, creation and sharing become applicable. (Dragon 2008). The aforementioned developments taking place in virtual and digitalized space without spatial and temporal restrictions facilitate the extension of the learning environment for digital knowledge acquisition. Thus the learning space is converted into a total panoramic 360° area providing openness, and the options of reflection, problem solving thinking and mobile learning. (Benedek, 2013). The National Curriculum determines the essential components of informatics competence as our digital framework systems addressing student needs are based on the internationally accepted digcomp 2.1 recommendations, the digcomp.edu standards are geared at teachers, and the digcomp.org framework is applicable to the institutions of the educational sphere. Vocational education is in a special position as it is considered an important area for technical and technological innovation, while it is expected to provide effective answers to the high technology challenges of the Industy 4.0 phenomenon. (Karlovitz, 2012).

Internet-based communication conquers physical distance as all essential information is only a click away and access into the virtual space is free of any temporal or spatial restrictions. In the network-based learning process supported by social media and Web 2.0 services the user takes the role of the creator, editor, or sharer of content. Consequently, traditional institutions have to be ready to meet these challenges.

In the context of the information-based society the main features of knowledge undergo a fundamental change as it becomes more practical, multimedia-oriented and transdisciplinary. A shift can be observed in the knowledge acquisition patterns as lifelong learning becomes dominant blurring the previous modern age-inspired dividing line or border between children's and adults' learning while formal and traditional educational institutions give way to open learning environments. Formal and traditional knowledge transmission becomes obsolete as presenters will rely on multimedia-based presentations. One of the essential requirements of modern and effective instruction is the inclusion of digital content as texts are enhanced by videos, animations, and e-Books. Such developments and trends lay the foundation of e-Learning-based virtual learning environments along with facilitating the implementation of massive open on-line courses in institutions committed to quality education.

Methodological digitalization

The changes brought on by ICT use in the pedagogical profession inspired several researchers and authors including myself.

In addition to the role changes the generational differences appear significant. The well-known terminology developed by Prensky distinguishes two groups, young people born into the world of modern devices known as digital natives and pedagogues not fully familiar with the use of digital technology, or digital immigrants. (Prensky, 2001).

Instructors of teacher training programs are often wondering what kind of skills should be developed in our fast changing world in order to enable prospective teachers to use devices effectively in the future. (Benedek, Molnár, 2013)

Elemér Hankiss attributes the uncertainty of teacher roles to the "shop window aspect" of teachers' lives. While society expects pedagogues to transmit and inculcate a system of norms, the abundance of information and the impersonal network-based communication frustrates adherence and adjustment to the given norms.

The integration of ICT into teacher training programs is an urgent and well-known task. Device and technology oriented training schemes emphasizing traditional teaching functions and roles cannot prepare teachers to meet the requirements of the experience-based learning approach.

The concept of Flipped Classroom is one such solution in which students prepare at home and apply the theoretical knowledge in specific practice-oriented lessons. (Márta Hunya: Modern School 2015/1)

In the following section we introduce a few publications both by Hungarian and international researchers concerning the challenges of the teacher training process.

The volume titled Best practices in the scientific workshops of teacher training edited by Krisztina Károly and István Perjés contains several relevant essays. Victor Bakos writes about computer assisted Geometry instruction, Attila Buhály discusses the digitalization of instruction in his treatise titled "Seminar 2.0", Zsuzsa Gonda surveys digital texts found in the National Curriculum, in the classroom and in the teacher training process, while Mária Laczkó explores the perspective of literature and grammar teaching in her article titled "Digital world, digitalized teacher of Hungarian language and literature" (Károly - Perjés, 2015).

The connection between vocational teacher training and ICT is characterised by unique features. In our study we rely on some of these research results.

The establishment and introduction of a comprehensive and complex definition of the term "competence" was the driving force behind the publication of a thorough comparative analysis of vocational training and vocational teacher training programs titled Competence oriented modular vocational teacher training. The 222-page volume includes 22 project case studies with several references to the ICT and other competences of vocational teachers. Section 4.5.3 of the summary study describes the ICT competence circle and analyses such concepts as media competence and e-Tutor competence. (Kadocsa - Varga, 2007).

Digitalized and digital systems in education

The electronic educational framework systems are one of the main components of digital systems. Educational framework systems entail integrated electronic learning environments incorporating selected Web. 2.0 internet-based services according to unique pedagogical considerations. Their primary goal is the promotion of blended learning, or the combination of the traditional and the virtual learning environment, in other words the enhancement or augmentation of the former with the latter. (Námesztovszki, 2013). The functions of integrated electronic learning framework systems cover the following areas:

- The provision, transmission, and processing of educational materials
  - file sharing
  - referencing external content
  - concept repositories
  - html based subject contents.

- Communication
  - messages
  - chat
  - forum/news forum
  - voting
- Monitoring and evaluation
  - tests
  - questionnaires
  - attendance sheet
  - task assignment, uploading, and evaluation surfaces.
- Monitoring user activity: the time and type of activities carried out within the framework system can be checked via the logged files (Tóth-Lévai, 2011).

The best known educational framework systems (Moodle, CooSpace, Ilias, Coedu, edX, Coursera, Sakai, Blackboard) all feature the above functions. The respective differences are based on the advanced status, display, usability, and the open or closed source code of the given system.

The so called en-learning or "entertainment-embedded learning" method utilizes audio-visually oriented multimedia devices in helping students to acquire "traditional" knowledge in the field of law, public administration, technology etc., while equipping learners with a cultural and general educational background required by their chosen profession. The en-learning approach utilizing the latest research results of modern pedagogical theory is based on the recognition that the integration of electronic device supported traditional instruction methods (oral presentation and explanation) into an entertaining context multiplies the efficiency of the learning effort. Consequently, student attention can be maintained without decline if a lecture is dynamic and includes either musical or visual components while promoting emotional identification with the given topic, along with facilitating increased participation and the recalling of the acquired information. The en-learning is a pedagogical program assigning priority to strengthening student motivation via making the student interested in the learning process. In order to make the student a "stakeholder" the structure and delivery of the given lesson must be interesting and attention grabbing at the same time. Furthermore, the student's capability to process information acquired via the textbook and the given presentations should be boosted as well. Thus while knowledge acquisition and processing is self-directed as students must fulfil the given task by themselves, all digital and personal assistance should be provided as well. (Verebics, 2013).

In the following section utilizing our own experiences we introduce a few practical educational methodology solutions, which can make the work of teachers easier. There are several web 2.0-based options (learningapps.org, kahoot.it, quizizz, quizfaber, mindomo, mindmister, sli.do, socrative, mentimeter, plickers,) facilitating interactive task solution efforts.

Student feedback

In addition to the theoretical aspects my research program includes an empirical segment. Consequently, I would like to share my experiences related to a course titled Modern technologies in education. The course is in the mandatory part of the study schedule of our students enrolled in vocational teacher training programs and is taught in the first semester of the given academic year. The aim of the course was the familiarization of students with the device systems of digital pedagogy, the application of multimedia-based auxiliary materials, the use of Web 2.0-based ICT services, the basic principles and forms of electronic communication and the role of ICT competence. Additional objectives include providing basic digital skills facilitating the completion of the other requirements of

the program. The overall goal of the course is to introduce and briefly characterise the latest achievements in the field of information and communication technology and the respective options of adaptation into the teaching and learning processes, with special attention to the interactive systems, and network-based and mobile solutions. This practice-oriented course enables students to test the abovementioned digital and Web 2.0 systems and integrate them into their own pedagogical environment along with sharing the respective practical experiences.

In the fall 2018 semester 80 students submitted a class project including the compilation of a professional concept repository, a knowledge map, along with an interactive electronic test. The assignments had to be uploaded to the Moodle system. The next picture shows the evaluation surface of the system.

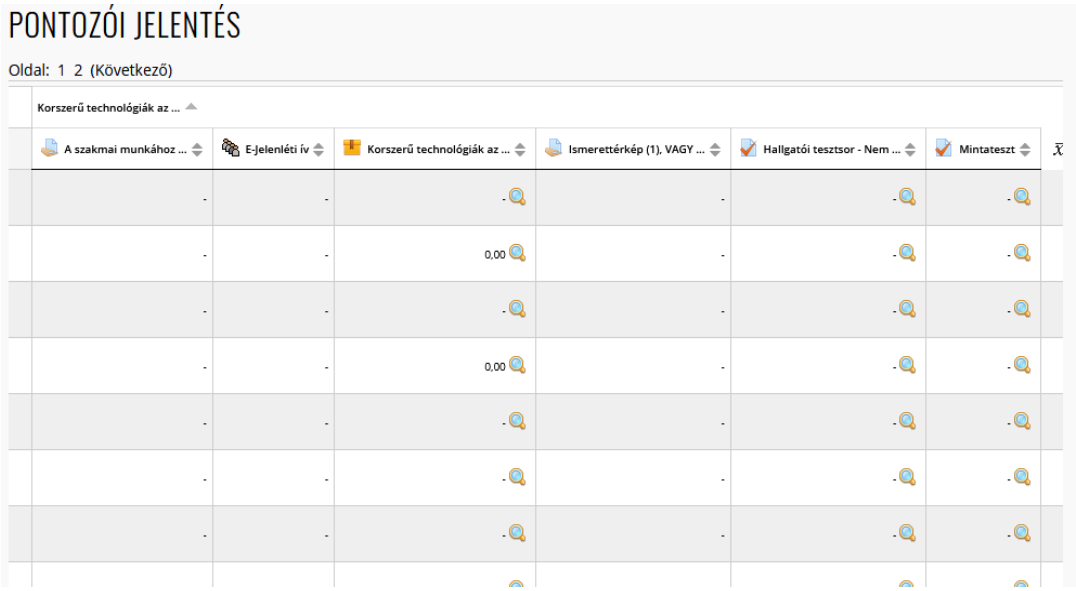

Figure 1. – The evaluation surface of students in the Moodle system, author's own screenshot

Students became familiar with several interactive Web 2.0 services including:

- kahoot
- redmenta
- google drive
- quizziz
- learningapps
- socrative
- ripet
- mentimeter
- quizfaber
- kvizpart
-

The above programs and services were introduced in detail in the form of lectures and students could select one program for solving their assignments.

Having analysed the 80 replies with descriptive statistical methods we summed up the results both in diagram and textual form. In the following segment we introduce only our more interesting and informative findings.

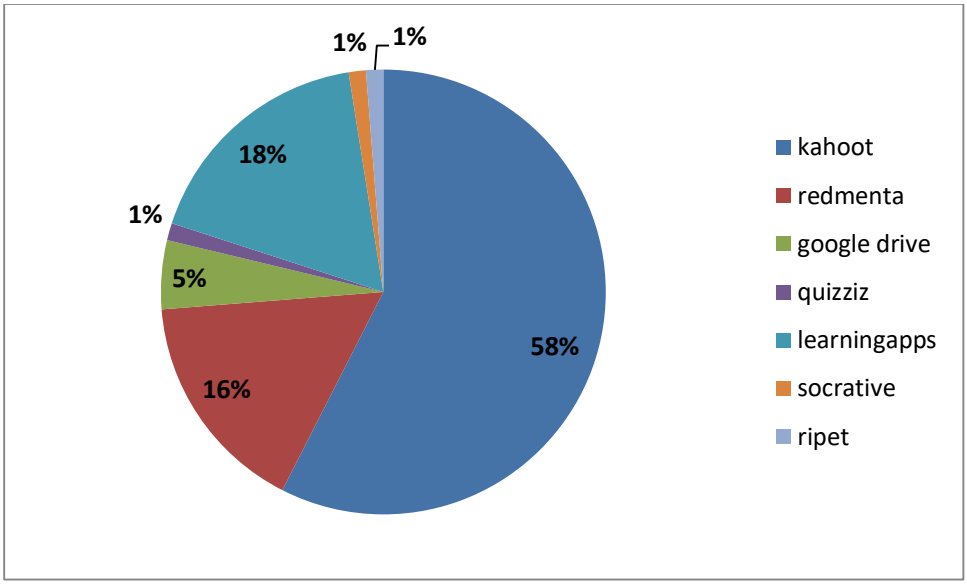

Figure 2. The distribution of the types of interactive student assignments to be used in pedagogical practice, source: author's own image

It can be concluded that most students relied on the Swedish kahoot digital quiz preparation program, followed by the learningapps used by 18% and the redmenta with a 16% user figure. Furthermore, 5% of the sample used the google drive for preparing their assignment.

Summary

Utilizing the domestic and international trends along with almost 20 years of experience as a teacher and instructor in higher education while taking empirical feedback received from students into consideration, I explored the application of the device system of digital culture via interactive methodology and technology. As the instructor of the course titled Modern technologies in education I introduced several Web 2.0-based interactive schemes to students involved in vocational training programs. Furthermore, students were given an opportunity to test these approaches in vocational training schools as well. Current research results underline that students both at the university and secondary school level welcomed this option (Benedek, 2019; Orosz; 2018).

Our mid and long-term goals include the extension and intensification of ICT-based methodological renewal supported by digital pedagogy and ICT-assisted digital skill development efforts. We expect that the application of best practices and methods will result in the increase of student satisfaction and improved academic performance.

An analysis of today's learning environments from an instruction technology angle coupled with an inquiry into the ways of learning and the respective learning devices in the digital world reveals that an ideally equipped classroom meeting the requirements of the 21st century should have the following instruction and information technology tools:

- desktop or laptop suitable for running multimedia software
- web camera
- microphone, sound system

- smartboard
- voting system
- document camera
- digital slate
- interactive table
- digital camera
- digital video camera
- mobile phone
- scanner
- printer
- projector
- wireless applications
- simulation systems
- class sound system
- e-book reader
- tablet
- wide bandwith-based data transmission system suitable for communication and information search on Internet [5].

The mere availability of the abovementioned equipment does not guarantee the effectiveness of the teaching and learning process as the given educational environment and instruction technology background must be coupled with modern and adequate instruction methods and work formats.

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Dénes ZARKA

Online collaboration practice for active learning in the visual age

The rationale of Vocal project

The diversity of the European educational culture, languages, legislation, and territorial fragmentation suggest, that educational organizations in Europe need to network and collaborate to achieve inclusive education and training services in terms of:

- diversification of learners
- the opening up of education
- the preparedness to merge international and intercultural learner groups
- provision of learning services for work-based learners

European (C)VET and higher education institutions should be digitally competent to meet these challenges and provide quality learning services, with a special focus on digitally and pedagogically competent teachers and trainers.

EC "Work-based learning in Europe" policy document (2013)

An articulated reaction to this problem set was a policy document about work-based learning. This document contains two important aspects:

- to identify the need to increase opening up in educational practices to increase:
  - integrated work-based learning activities
  - effective and quality learning examples ***on open, inclusive, user-friendly environments***
- teachers claim – they are challenged when embedding digital, social and intercultural competences in the curriculum, especially if the ***curriculum is digitalised, developed online and are aimed at diverse target groups***.

Collaboration and visual age?

What is the link between digitalisation, collaboration and visual learning? To answer that, we have to answer the following questions:

What do we need for effective online collaboration? The following three aspects are evidently among the answers:

- Splitting up our concentration between different channels, like Computer system status, different parallel application messages, and the data flow of the collaborative software.
- It is also a challenge for most of us, to find orientation in a virtual environment. Finding quick orientation in time and space (on-screen) is even more demanding. If there are several chat boxes, for example, one on the computer desktop, one in FB messenger, one in the webinar room, it is not evident where to click: to read and answer the message. It is also a challenge to have a local and a remote document (shared screen) and find (visually) quickly a written expression that is discussed orally during the meeting.
- When a group of colleagues are in the deep discussion, it is always a challenge to identify the collaborators quickly, e.g. to match the voice with the person if the camera is not switched on.

A well designed visual environment can help us. Good pictograms, moving, blinking, “dancing” icons may dramatically speed up our orientation in the virtual environment.

Tools used for online collaboration

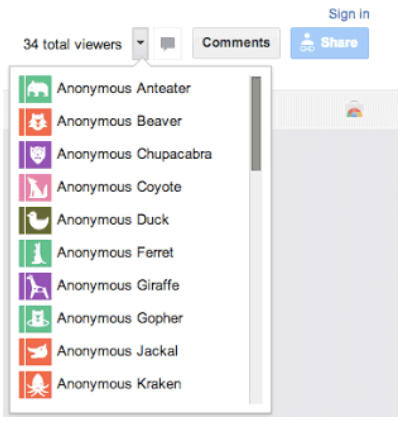
The vocal project was designed to use MOODLE as a central collaboration tool, therefore most of the tools used in the project were Moodle basic tools, but some tools were linked out to experience Open educational practice as well. Apart from Moodle, project partners used the following applications:

- written collaboration – Google docs, wiki
- oral collaboration – Skype, Messenger
- video collaboration – BBB (Big Blue Button), AC Pro (Adobe Connect Pro)
- complex collaboration – Online workshop (Moodle)

Written online collaboration

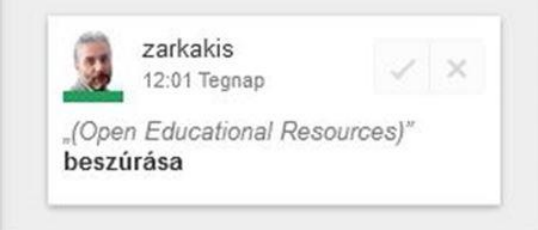
Let us observe further the written on-line collaboration. The following visual challenges can be listed as an example:

- Identification of authors/users on-line. That case arrives when multiple editors work on an on-line document simultaneously. It is not self-explanatory, who exactly is/was writing/editing a given part of the text. Solution: profile picture, or avatar for anonymous users.



- Identification of different text types. That is the task of visually represent the different author text parts, and to organise a quick reference to the author/user. Solution: Coloured text parts.
- Identification of tools to be used. This is a less problematic, but still important visual problem: The representation of the text editing tools so that most of the authors/users understand it without going through a tutorial before using the collaborative tool. Solution: A text editing icon standard, that is well known in all text editors

- Easy to use the system of tracking. This is a longitudinal problem of tracking the different text versions and comments as time goes by. Even a smaller collaborative author group may generate multiple layers of the shared document, and it is not easy to visually help to track those layers. Solution: The introduction of marginal notes to each modification, attached to a close text part.



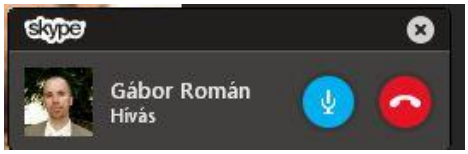
Oral online collaboration

Next common collaboration type is an oral collaboration, where we also have some challenges when we use skype, messenger, or other tools.

- The visual orientation of the main oral call features. This type of communication is originated from telephone calls in telephone (telecom) industry. Solution: Easy to understand pictograms, for the pure oral call, video call, and group call:

- The visual orientation of text call features (chat). During the conversation, it is possible to use different alternative channels of communication or to use other functions of the application. During the "main" communication, those parts are hidden. Solution: Function icons change their shape to signal: something has changed "behind". (Example: the smiley with orange point show a hidden incoming chat text.)

- The visual orientation of the calling process. The calling process in case of classic telephone equipment was easy, either we took the phone, dialled, and were waiting for the ringing (or engaged) tone, or our equipment rang with an easily separable tone. Now in case of an application that is partly substituting this communication have to visually and orally simulate this process, so that the users are aware of the fact that they are "really" calling someone, and to realise if the call was successful, and the other party is on-line or the call failed for different reasons (patching also the reason). It is also important to know exactly if the user is called. (Bearing in mind that many multimedia applications may be in use). Solution: Use of an extra calling panel that is visible on the desktop and following the calling process visually as well.



- The visual orientation of identification of calling and active parties. In case of oral online communication conference calls are much more frequently used as in case of traditional telephone systems, where it was made with a so-called “bridge”. Technically it is still possible and easy to use. However, an important problem occurs (and occurred earlier for those who already used traditional teleconference systems), namely the fact that users do not recognise the actively speaking party from their voice (tone). The traditional answer to this problem was that users were moderated, and had the right to speak only in case of explicit invitation to speak by the moderator. Solution in computer systems:
- a cascade (first come first serve) walkie-talkie mode by allowing only one microphone to be active.
- a visual representation of all parties that are on-line with avatar or picture, and an emphasized frame on behalf of the active speaker (in case of multiple active microphones looping may occur).

Conclusion

In this paper, we discussed the visual elements of on-line collaboration based on the experience of VOCAL project. We could explain in detail, and give evidence, that to smoothly use on-line collaborative applications for virtual group work, it is essential that well-designed visualisation support the process. In other words: to learn on-line collaboration with given tools a visual learning process is also essential. The real learning efforts and the needs for this visual learning should be researched further in the future.

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Monika DUKIC -– Júlia MECSÉRI

The High 5! disability awareness program and its impact on its participants

Introduction

With the spread of the approach of inclusion, the majority of children with special educational needs (SEN) are educated in majority institutions, with their typically developing classmates. Inclusion provides an opportunity for equal access, both in the general curriculum and in social interactions, thereby creating a higher expectation for children with SEN. Interactions and learning processes between children help not only the development of theoretical knowledge, but also the development of social skills that can play a role in shaping the strengths and needs of individuals (Maich & Belcher, 2012). An inclusive educational environment has the ability to influence attitudes towards children with SEN in a positive direction (Rillotta & Nettelbeck, 2007). However, most of the typically developing students lack proper knowledge and most of the time are not adequately prepared to receive their disabled peers, and therefore they are less accepting, understanding and empathetic than they could possibly be. This may later have consequences such as the development of negative attitudes -or the predisposition of them, the saturation negative emotions, hostility and even bullying in the classroom environment (Williamson, 2014).

Disability awareness programs affect the entire school environment and are also important at the level of individuals, as this allows students to become better citizens in our society (Lindsay & McPherson, 2011). Incorporating the understanding of disability into education has long-term benefits for students, as it provides them with tools that will enable them to understand and embrace elements of diversity in the world. Shaping attitudes with such programs is an effective way of supporting the elimination of judgement and favoring the tolerance of differences and the development of positive attitudes towards students with SEN (Gasser, Malti & Buholzer, 2013).

Attitudes always apply to a socially constructed object (an idea, object, person, process, event, etc.) created by a society, but stand out as an individual state of mind. Attitudes are socially defined even when a person recognizes them as part of his or her personal world (Csepeli, 2001). Therefor this also implies that most attitudes are formed through learning. When people get to know an attitude object, they build the cognitive representation of the object. This representation includes cognitive, affective, and behavioral information about the subject (Smith, 1993).

- The cognitive component is the individual's assessment of an attitude, how he/she judges and what knowledge he or she has about it (these can be facts and misconceptions).
- The affective component contains the emotional reaction to the attitude object or the emotions, and the emotions triggered by the object itself. Most of the researchers focus on this component when analyzing attitudes.
- The behavioral component involves verbal or non-verbal interaction of attitudinal spell that is manifested in action or observable response (Jain, 2014).

Our attitudes reflect our judgment about our knowledge, feelings and experiences. An attitude object consists of prior information about the given object, but it can be said that not all information weighs in equally in developing or forming a certain attitude. For example, important information that is relevant to our personal needs, goals, and motivations is usually overriding the unimportant ones. At

the same time, negative information is more important than positive, since its consequences can potentially pose a greater threat to us. Apart from this, our decisions regarding attitudes are dominated by accessible (easily recallable) and outlining (awareness-raising) information. Claypool, Mackie and Smith (2016) say that when forming our attitudes, we gather all the accessible information we have and put them together. If the majority of the important, overwhelming and accessible information is positive, we will create a favorable attitude, however if the information is mostly negative, our attitude will be negative as well. When an attitude is created that summarizes the essential information about an attitude object, this becomes part of our mental representation. The relationship between an object and its attitude becomes stronger and stronger if we think about it repeatedly. By doing so, we will be sure about our attitudes, they will be easily accessible to us and hereinafter it will be relatively difficult to change them (Smith, 1993).

In the context of social integration of people with disabilities, an opinion has been intensified over the years that considers inclusion to the mainstream education system as a solution for children with SEN. Article 24 of the United Nations Convention on the Rights of Persons with Disabilities states that State parties recognize the right to education for people with disabilities. This will ensure inclusive education at all levels of the system and the possibility of lifelong learning. Its main purpose is to promote the development of children with disabilities to unfold their capabilities, self-esteem, talents, and creativity. It is therefore necessary for members of the community to have as much information, personal experience, and understanding as possible about people with disabilities. Nowadays inclusive education is the focus of social inclusion for people with disabilities. The most important question is: how can we manage that (Kőpatakiné, Mayer & Singer, 2006)? Inclusive education plays an important role in tackling disability stereotypes and can help to create a long-term, positive attitude of students in order to contribute to a more inclusive society. (Beckett, 2009 id. Moore & Nettelbeck, 2013). Numerous studies have reported that placing a student with disabilities in an inclusive environment is by itself not sufficient to promote a positive attitude among his/her peers (McDougall, DeWit, King, Miller, & Killip, 2004 id. Moore & Nettelbeck, 2013). In addition to several factors, parents and teachers play an important role in shaping and modeling attitudes (Aiden & McCarthy, 2014). In order to shape the attitudes of children, they need to be aware of, and find out about the issues of disability itself. It is important that disability-related knowledge transfer leads the children towards positive attitude. Disability awareness programs play a key role in drawing attention to disability and long-term acceptance of people with disabilities. Versatile, well-structured and well-run programs can positively influence children's attitudes (Ison, McIntyre, Rothery, Smithers-Sheedy, Goldsmith, Parsonage & Foy, 2010).

In 2017, with the financial support of the National Lottery Company of Hungary and with the professional help of the Council of Disabled People's Organizations (FESZT) and the ELTE Bárczi Gusztáv Faculty of Special Education, the Salva Vita Foundation announced a national tender named 'High 5!' for primary and high school students. The idea originally comes from Spain.

The common mission of the European Disability Forum (EDF – an umbrella organization for the EU member disability organizations) and European Lotteries Association (EL) is to promote the social integration of people with disabilities in Europe. This intention was announced in a cooperation agreement in Madrid 2011 at the headquarters of the National Organization of Spanish Blind People (ONCE, member of both organizations), and was confirmed in 2014. They intend to contribute the integration of people with disabilities in the following four areas: employment, sponsorship, sharing of best practices and awareness-raising. As a part of awareness-raising a proposal named 'Concurso ONCE'1 for school-aged children has been announced since 1984 by ONCE. The purpose of the proposal is to allow children to meet with disability in their early age, and to form their attitude to become open-minded, accepting, responsibly thinking and prepared members of a diverse society. Additionally, the program contributes to forming adults' attitudes (parents' and teachers') who also take part in this awareness-raising indirectly.

[1] https://www.concursoescolaronce.es/?lang=en

The Spanish announce the application in five categories each year, for 8-10 year old students; 10-12 year old students; 12-16 year old students; students over 16 years and for children with special educational needs. Since the beginning, more than 5,5 million students, 41.000 schools and 120.000 teachers participated in the program.

High 5! – disability awareness program for children

According to the applied practice of ONCE, 10-18 year old students in school groups can participate in this program managed by a mentoring teacher. There are no different age categories, both primary and high school students can apply but management of a mentoring teacher is required.

The application requires a preliminary program plan which includes the unique idea of the applicant group for a low-budget, short-term program together with disabled people. One of the main points of the tender is to share the personal experience of the applicant groups through the interaction with others as a good example and good practice. The ideal program plan is an ingenious, low-budget program which is feasible (short-term) and is a pleasant activity for both parties.

There are mentors and experts who can join the programs and give assistance if it is needed by the applicant group. During the implementation, applicants have to provide documentation with photos/videos/written materials about the awareness program, which can help the professional jury to evaluate and decide who will be among the winners. During 2017 there were 50 disability awareness programs realized and the best ten school groups won 1300 Euros each. A wide range of programs were implemented last year, such as: one-week camping with disabled children, presentation of different professions (decorator, carpenter, mason) in practice, dance performance, preparation of a home page for blind people, wheelchair basketball championship etc.

The applications were evaluated by the following criteria: how creative the idea of the awareness program is; how fun and interactive it is for both parties; is provided information accessible; the way of documentation – does it reflect the mood of the program; what was the message of the program. (www.adjegyotost.hu)

The prizes were handed over to the winning classes at an award ceremony, where the children could also take part in awareness-rising programs. A surprise prize was also given to a lucky group: a visit to Spain where they had the chance to meet the ONCE organization.

Materials and methods

More than 75 schools from different areas of Hungary applied to the tender submitted by the Salva Vita Foundation, from which the professional jury found 50 draft plans adequate to be implemented. In order to collect information, the tenderers decided to use the questionnaire method. It was important to choose a method that allowed gaining information simultaneously from more people, and was not time-consuming. The sample was based on the students and teachers out of 26 schools – elementary and high schools – who participated in the tender. The data collection was structured along a predetermined questionnaire, on a paper basis, which consisted mostly of open-end questions in both IN and OUT surveys. There was a total of four types of questionnaires, two for the students and two for the teachers. In each group one (IN) was to be filled out before the awareness program was implemented and one (OUT) after. The questions are shown in 1. table.

The questionnaires were built around three main factors, so they focused primarily on the mapping of prior knowledge, emotions and experiences about disability, while questions of personal experience and personal opinion were also built into the surveys. In determining attitudes towards people with

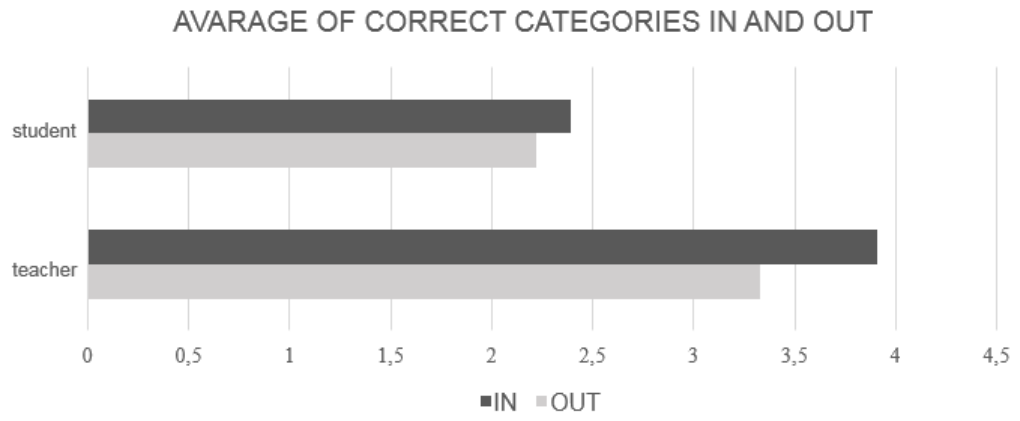
disabilities, the most important questions were the ones about emotion and motivation. Social attitudes are built up in a hierarchical system which are structured by emotions.

Results

We have to highlight the limitations of the validity of the results, as there are no matching sample numbers for IN and OUT surveys, so the conclusions can only be interpreted within certain limits. Nevertheless, due to the relatively large number (n = 535) of the samples, we attempted to get an overall picture of the effect of disability awareness programs. The IN survey for teachers was filled out 36 times while OUT 40 times. The IN survey for students was filled out 244 times while OUT was filled out 215 times.

The first question of the survey was to identify which disability groups were known to the participants. According to today's conceptualization in Hungary, these may be: intellectual disability, learning disability, hearing impairment, visual impairment, physical disability, autism spectrum disorder, speech disability. A new conceptual category has emerged in recent years as psychosocial disability, which is currently most commonly used by professionals. On this basis, the maximum number of disability groups is 8, so the diagrams were depicted accordingly.

1. diagram Average of correctly named categories



The first diagram shows the average number of disability groups correctly named by teachers and students based on the results of IN and OUT. As stated in the IN survey, teachers named 3.91, rounding up to 4 categories, while the students named 2.39, so rounding down they could name two categories correctly. The difference can be substantive according to the knowledge and experience of the adults in relation to students. The first diagram also shows the outcomes of the OUT survey, which displays worse average values for both teachers and students than in the IN. Here the teachers named 3.33 rounded to 3 categories, while the students likewise named 2.22 rounded to 2 categories again. If we don't round the results, lower values are shown in the OUT than in the IN surveys, as indicated in the first diagram. Two-sample t-tests were used to compare the two groups (teacher IN with student IN and teacher OUT with student OUT). And based on statistical calculations, it can be concluded that there is a significant difference between the two results in both of the groups compared.

Comparison of IN and OUT questionnaires for using the correct term of disability groups before and after the awareness program is only possible within certain limits. Since the 'n' of the two questionnaires are not the same, they can not be compared to each other. In spite of this we attempted the statistical analysis as shown in 2. Table, as the sample is relatively large (n = 535).

2. diagram The average of the correctly named categories by the whole sample included in the study

As show on the 2. diagram in the case of IN, the average of the disability groups named jointly by teachers and students is 2.59, while in the OUT the same value is lower, 2.35. Compared to the maximum value of 8, both results are significantly low. From the students' answers it stands out that there was a difference in the most often mentioned categories between primary school and high school students. In the input questionnaires, primary school students most often identified physical disability (46 cases) and visual impairment (44), while for high school students it was 'mental retardation' (81). As these children become older, they typically mock each other with abusive phrases which can be linked to intellectual disability. This may be the reason why high school students named that category more than their younger companions. In the output questionnaires, the term 'mental retardation' often named by high school students decreased, but not sufficiently (70).

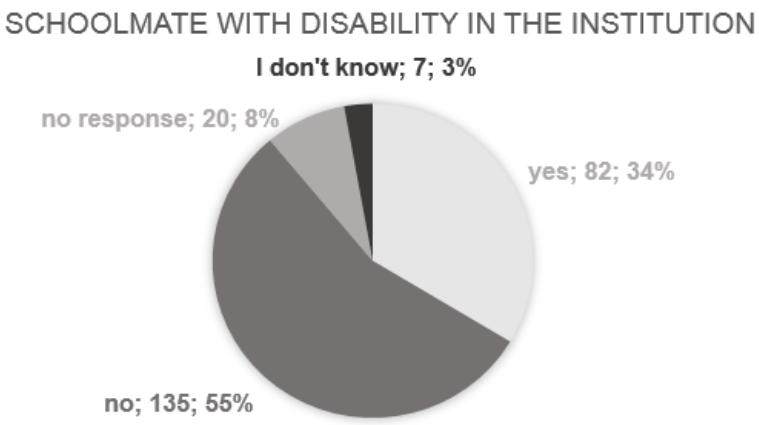
All in all, studying the answers in the surveys it can be said that both the students and the teachers often use medicalized concepts when defining disability categories. This was present earlier in the medical model of disability, which is an outdated approach due to the paradigm shift in the 1980s. The following names were common among the answers: 'Alzheimer's disease, schizophrenia, epilepsy, Parkinson's disease, allergy'.

In addition to the ones mentioned above, the following questions were used to map students' knowledge about disability '2. Describe how many people belong to the disability groups you know in Hungary!' and '6. What do you think, what kind of support is required by a person with disability? Please name them!'. There were very way-out responses to disability groups regarding numeric occurrences in Hungary. There were mostly blank questionnaires, but otherwise the completed answers rarely approached reality. This may be because for many students a person with disability appears in their minds as a fictitious individual (until they meet one, or hear any information about one). Therefore it is difficult for the students to associate real, numerical data with it. For the 6th question, the students generally described generalities such as 'help; care; provision,' but there were also frequent answers about financial support like 'work; money.' 'They need donations.' The other most commonly mentioned form of support was 'psychological support' like 'spiritual help, like love and acceptance.' In the output questionnaire the students were asked again: '11. Describe how you can help a person with disability.' In the answers to that question there appeared a new point of view from the students: 'I will ask them, how can I help?' 'I learned how to accompany blind people, if it's needed I can help properly.' 'In what do they need my help.' At the same time, the "spiritual aspect' (psychological) continued to play a prominent role in responses: 'I'll pay attention and listen to them.' 'Acceptance is very important, it's a great help for them.' In addition, responses to the practical things needed for everyday life appeared such as: 'I will help in crossing the pedestrian way, if necessary.' 'I can help with running errands.' 'Accompany them to a physician.'

Question Nr.5. of the IN questionnaires for students regarding whether a child with a disability is present in their institution. They were also required to write down the type of disability of their schoolmate. Hong, Kwon and Jeon (2014) found that the development of children's attitudes towards disability is positively influenced by the experience of personal encounter with people with disabilities, regardless of their structure.

The following 3. Table summarizes the average of the correct description of disability categories, depending on the answers to the 5th question.

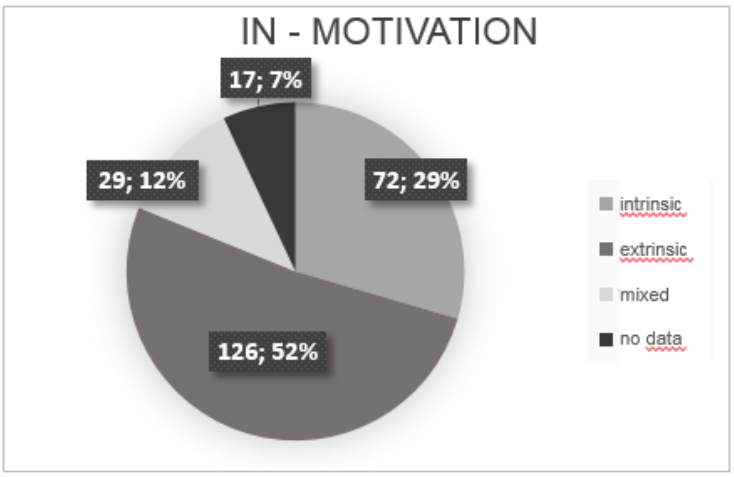
3. diagram The presence of a child with disability in the institution according to the students



Statistically there is a significant difference between the two answers, which means that if a child with disability is present in a given institution, the respondents could name more disability categories correctly.

The 9th question of IN survey for students was '9. Why did you decide to take part in the awareness program?', tries to reveal the motivation of children for the application to the program.

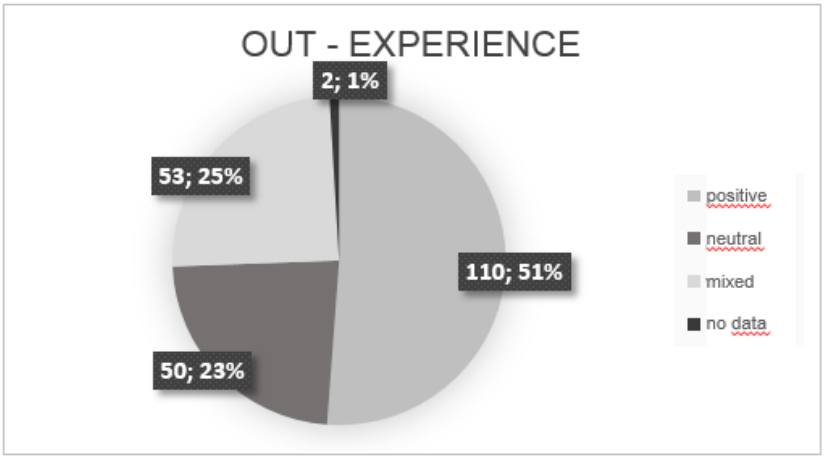
4. diagram Types of motivation of students to participate in the program



The answers to the question were analyzed and divided into three categories based on the content, according to intrinsic, extrinsic and mixed motivations. There were no answers to this question in 17 cases, but the 4th diagram also shows that more than half of the students (126) had extrinsic motivational factors to participate in the program. They mainly named material ("I want to win money.'; 'It would be good to win because of the prize.') or social rewards ('The others said it would be good.'; 'At the request of my classmate.'; '). In 72 cases the motivation was clearly intrinsic ('I want

to get acquainted with people with disabilities.'; 'I wonder who the disabled are.'; 'I wonder how they live their everyday lives.'). In addition, there were 29 answers in which both types of motivation could be found. For comparison to these results, question 14. of the OUT questionnaire for students was 'What was the best experience for you in the program?'. By analyzing the answers, we gained information about how the children felt, what their opinion was and what attitudes they had after completing the program.

5. diagram Experience of participation in the program



When analyzing the answers to the 14th question, four categories have been created (positive, negative, neutral or mixed + and -). Based on these, students' answers were categorized. Student's responses in 110 cases – so more than 50% – were fully positive about spending time together with people with disabilities. Besides that, there were 50 mixed responses, which, also lags far behind the ratio of neutral responses, i.e. 53 cases. It is clear that the positive experience is predominant compared to merely neutral experiences. It is important to mention that there was no answer which contained only negative experience, this is why it's not mentioned on the pie chart.

Discussion

As mentioned before, all the results that have been shown in this study have to be interpreted within certain limitations, they are nor representative nor valid. Further research requires using a standardized questionnaire (for example CATCH attitude scale or MAS attitude scale) to obtain valid and reliable results, since it is very important to monitor the effect of an "intervention'.

Evaluation of the results and the questionnaires conclude that the concepts of disability groups have not been sufficiently clarified neither among students nor among teachers. There can be several reasons for this. During the program, a mentor (who has been previously prepared on disability issues) and an expert (one or more persons with disability) were assigned to each school team. The mentor's job was the professional mentorship while the expert(s) participated in the program. It is possible that the efficiency of the prepared mentors was not proper or they could not pass the knowledge sufficiently on to their team. It is also questionable what form the knowledge about disability was delivered in(frontal education, interactive tasks), as this might also affect the attachment of the new knowledge. In addition, even the composition of the questionnaire could have caused problems for the participants. The question 'What sort of disability groups do you know?' may suggest that the participant should name those disability groups that have been more widely acquainted during the program. Within the framework of the disability awareness program, it would have been necessary to familiarize with the correct terminology. At the same time, the knowledge of the students in the study

- as a result of the encounter with people with disabilities - increased thanks to the awareness programs. Regarding the given support, they gained more precise skills and knowledge about disabled people and how to help them.

The personal relationship between different groups (typically developing children and children with disability) can facilitate the overcoming of stereotypes and reduce hostility (Barr & Bracchitta, 2008). In their research, Hunt and Hunt (2000) found that those who are related to people with disabilities have a more favorable attitude towards them. They also found that positive attitudes towards people with disabilities occur during personal contact, because it causes individuals to access information that does not strengthen their prior stereotypes. The study revealed that the children asked were more aware of disability if there was even a minimal personal relationship with a disabled schoolmate or anyone who is living with disability.

As we could see from the diagrams, the existence of a prize has greatly contributed to the high proportion of extrinsic motivation types. Research shows that the effect of rewarding does not clearly increase the expected behavior, so in our case, the money-making itself will not necessarily lead to a more positive attitude towards disability. The rewarding system is well-structured if its information aspect is dominant (Kim, 1998). Most of the children were well-pleased with the awareness programs and the contact with people with disabilities.

Regarding the motivation, it can be concluded that preliminary extrinsic willingness to participate in the awareness-raising program, as seen in the study, did not result in a negative or predominantly neutral attitude towards children with disabilities. The most important of all the results perhaps is that the children had a good time and will mostly have positive experiences with people with disabilities and this can contribute to a more positive attitude towards this topic, so the awareness-rising programs reached their desired goals. Smart (2008) found that attitudes towards people with disabilities are shaped in positive direction, when there is a connection with them, as a result information is obtained which eliminates stereotypes, and also if this connection is personal, intimate and rewarding for both parties (Barr & Brachitta, 2015). Based on research by Pettigrew and Tropp (2008), it can be said that building relationships in a structured environment and with institutional support further increases the likelihood of positive attitude forming. For example, Meyer, Gouvier, Duke and Advokat (2001) reported that students had a more favorable attitude towards people with disability if they had the opportunity to co-operate with them within a project. The “High 5!’ program intended explicitly to serve this purpose, providing a connection between people with disabilities, students and their teachers in majority institutions. Not only at the level of education and knowledge transfer but also at an up close level, where they can have a real experience from which each participant can benefit according to their capabilities.

Disclosure statement
No potential conflict of interest was reported by the authors.

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Appendices

Tables

1. Table: Question of the input and output surveys

TEACHER	STUDENT
IN 1. What sort of disability groups do you know? 2. Which disability group is closest to you? Why? 3. Where can you meet people with disabilities most frequently? 4. Have you ever been in touch with a disabled person? 5. Have you ever had a student with disability? 6. In your opinion, what kind of knowledge do you have in this topic? (Please rate your knowledge of disabilities on a scale of 1-10) 7. In which area would you like to enrich your knowledge? 8. Do you have a special qualification in the area? If you have, what sort of? 9. Do you think that something will change in you during the program? If the answer is yes, what do you expect? 10. Do you think that something will change in your students during the program? If the answer is yes, what will change? 11. If you have any other comments or remarks, please write it down!	**IN** 1. What sort of disability groups do you know? Please name them! 2. Describe how many people belong to the disability groups known by you in Hungary! 3. Where can you meet people with disability most frequently during your weekdays? 4. Have you been in touch at least once with a person with disability in the previous month? underline: yes-no 5. Have you ever had a schoolmate or more schoolmates with disability? If the answer is yes, please write down, which disability group they fall under! 6. What do you think, what kind of support is required by a person with disability? Please name them! 7. What do you expect from the programme ~~to~~ which will be implemented by your team? 8. How will you help the implementation of your program? 9. Why did you decide to take part in the awareness program?
OUT 12. What sort of disability groups do you know? 13. Which disability group is closest to you? Why? 14. Where can you meet people with disabilities most frequently? 15. Have you ever been in touch with a disabled person?	**OUT** 10. What sort of disability groups do you know? Please name them! 11. Describe how you can help to a person with disability!

16. Have you ever had a student with disability? 17. In your opinion, what kind of knowledge do you have in this topic? (Please rate your knowledge of disabilities on a scale of 1-10) 18. Did your knowledge extend because of the awareness programme? 19. Did anything change in you because of the awareness programme? 20. Did something change in your students because of the awareness programme? 21. Please write down your comments and remarks about the programme here. 22. In your opinion, what are the strengths of *High 5!* project? 23. What would you do differently in the future? 24. Have you got enough help during the project? 25. Do you think this project is an adequate tool for forming a disability-related attitude?	12. In your opinion, what has changed in you're a) knowledge, b) attitude during the High 5! program? 13. How did you contribute to the implementation of your program? 14. What was the best experience for you in the program? 15. What would you change in the future regarding to the program?

2. Table Mean and standard deviation of correctly named categories in all four of the surveys

p<0,05	n	mean	+/- SD
teacher - IN	36	3,91	1,05
student - IN	244	2,39	1,52
teacher - OUT	40	3,33	1,24
student - OUT	215	2,22	1,35

3. Table Mean and standard deviation of correctly named categories by students if yes=there is a disabled schoolmate, no=there is no disabled schoolmate in the institution

p<0,05	n	mean	+/- SD
yes	82	2,92	1,3
no	135	2,07	1,54

András BENEDEK

Review: *Online – The history, theory and phenomena of internet communication and the media (*Zoltán Szűts)

Wolters Kluwer, Budapest, *2018, 478 p.*

Online – short, striking and meaningful address! The sub-title, however, is much more complex: the history, theory and phenomena of internet communication and the media. All this in an offline, printed form in massive hardcover, with 961 traditional foot notes and many electronic references. With a photo on the cover page showing a stable steel structure (either a bridge or a dome) – indicating the importance of the essential structural interconnections of systems. A multisense "steel network" that, beyond its own stability, also demonstrates a bit of constancy in a continuously changing scope.

For that matter, and this is a subjective remark, a personal impression: there are two types of books that are really popular these days: direct-indirect biographies of considerable length (from Churchill through Kissinger's autobiography titled Diplomacy to Michelle Obama) – owing to their extent; these books offer something to read for a long time as well as a special picture of the certain era and personality. The other type is short stories, accepting an easy style, offering distraction from the world of swift days and roaring nights.

In terms of the content of the work/volume/book, Online deals with one of the important phenomenon history of the latest century, and in terms of its type or genre it diverts from those mentioned above; it mainly offers orientation or intellectual impulses for the reader by providing, often wiki-like, descriptions of thoughts connected to some interrelations and associative titles or, and this proved more interesting for me, essayistic reflections and the introduction and elaboration of the author's opinion.

However, the way the pleasingly widening professional and partly boulevard publicity, that has intensively promoted the book during the previous weeks, reacts to the book is paradoxical; it casts light upon the tendencies of the mid 2010s in terms of the specialities of online and offline presence and communication. This book is fresh; it does not only introduce development historical continuity with several interesting details and authentic references, but by asserting the latest professional aspects, it also casts light upon some phenomena hiding serious dilemmas: the nature of fake news, the contradictious feature of some of the new phenomena in internet communication, the more and more awkward character of security in the narrow and the wider sense for both the user and the author and the today puzzling jumble of cyber war. Although the author keeps emphasizing his freeness of politics, he considers the politically sensitive topics, "technologies" and application methods that are apt to manipulate pubic sentiment and opinions, in some cases meaning a serious challenge even for the so called democratic elections. Interestingly, the topic dealt with by the media in the most sensitive way is the phenomenon we could call, with some simplification, the Facebook-fright, the growing distrust that leads us when looking at the manipulative dangers of community media.

Although the interrelations are very complex, I am examining a more peaceful field: I wish to investigate the impact and future opportunities of online culture in terms of education through this book. The venue provides a frame for this (we are talking at the Teacher Training Centre of the BME) as well as the latest phase of the author's personal life path, which has been tied to teacher training and, to an increasing extent, to BME and vocational teacher training. To me this means an organizational context and an atmosphere that is always open to new technologies, thus the application of internet communication in teacher training, as well. We have another actuality, and it makes the purpose of the initiation clear; our academic research group (with the polysemous name Open Educational Content Research Group) deals with a topic – vocational education, the modernization of its content and the development of the students' motivation – in terms of which traditional pedagogical structures are now definitely unapt, therefore the new solutions are intended to connect the possibilities offered by online, interactive and collaborative teaching and learning to the change of practice and the innovations in its content and methodology.

Some chapter titles that raise really interesting thoughts from the aspect of education development are:

- Online existence – virtual reality / Interactivity
- Secondary written literature, with special respect to the extension of visual opportunities – digital photography, image creation, editing and sharing
- The parallels of the Gutenberg galaxy and the world wide web
- You have the right to know
- New image turns

Today's generations, especially the very young, are absolutely open to comic books and short, micro content-like messages. Receiving these is much easier than reading and understanding monstrous and rigorous texts. Our research group deals with the issue of learning content development in a special field of education. In vocational training, relevant knowledge is changing fast, and it is very difficult to make the learning material keep up with this pace both in quantity and quality. But it is an even more serious problem that a considerable part of the students in vocational training are disadvantaged, or cumulatively disadvantaged, and their motivation to learn is of a critically low level. Well, in these cases the main challenge is how we can transmit the learning content in a more up-to-date form, interestingly, in a way diverting from the traditional methods so that the activity level will not decrease during their studies but improve. It is not by chance that the discussion we are having now has been initiated by our research group that realized the importance of image learning and interactive-collaborative teaching and learning. The pedagogical construction scope of the online world offers great possibilities for devoted development activities, therefore, the new communication technologies and phenomena that this book deals with are of outstanding importance for us.

Although the narrow cultural elite may be irritated by this simplification, highlighting the essence, giving a clear definition of the structures and the notions forming them into systems and revealing the existence and importance of relations is really important, especially in terms of the learning materials. It is probably not by chance that the originally new part of the National Core Curriculum, which has been revised five times since 1995, is striving to implement a more intense integration of the digital culture and that the debates of the latest months have affected exactly this endeavour the most deeply. In this respect, the encyclopaedic projection of the book is extremely valuable since it provides us with an essential summary through the history of the forming of the notions and the description of the core elements. At the same time, it is important to place all this into context, and in this respect the chapters, forming smaller independent thematic units, are apt to give an explanation of the wider segments of the conceptual network. For today's human being, who is served by but also exposed to enormous floods of information, it is a real challenge that however motivated, interested and hard-working (s)he is, in case (s)he is not given support in systemization, (s)he may easily come to have only

mosaic knowledge. His/her education, even vocational education, will not become a coherent whole. Or to put it clearer: (s)he will know interesting stories but will not get the essence of the whole narrative. The book 'Online', taking after the conventional forms in its title and content, opens a symbolic window on the world we have to wander in, in which the relation of the part and the whole is a conceptual challenge; through the everyday use of keyboards and touch screens the content read may help us a lot to face this challenge: it inspires us as well as warns, in terms of opportunities and dangers, as well.

Here are some concrete references that make the aspects of education and teacher training sensible:

From a pedagogical point of view, the third chapter of the second part, which deals with online presence, is outstandingly interesting. The theoretical background is directly connected to education science when referring to the thoughts by the teacher-media researcher Sándor Forgó. The "shift" towards the notion of virtual reality, however, can rather be understood from the aspect of the aesthete; it leaves open several questions that interest the reader from a pedagogical point of view. I mention this fact with a special respect to the concept of interactivity since the researches implemented by our department pay special attention to the methodological application of interactive-collaborative technologies; concerning these, and supposing we have the biggest bandwidth, we search for the opportunities of improving the learning efficiency of the human-machine interaction by expanding the relation system of traditional human interactions into a new dimension. No doubt that in relation to the analyzation of the problem of online speed and the issue of virtual reality the problems of the disappearance of authenticity and steadiness indicate the future possibilities from the aspect of education; thus, like in a special open work, referring to Umberto Eco, it will be the reader's task to consider the interrelations…

One chapter of the second part deals with the parallels of the Gutenberg galaxy and the era of the world wide web. These parallels are thought-provoking; the coexistence of past and the future, which is typical of today's education, let's just think of the century-long development of the genre of school books, from Comenius until our days. The new technologies are present at schools, students have them in their pockets, they are continuously using them – in many cases at a higher level than that of the infrastructure provided by the institution. Despite this fact, there has no valid and accepted response been formed to the aspect and presence of "my media" on behalf of pedagogy. The educational system and pedagogy are making allegoric endeavours, the basic curriculum and framework curriculum structures are changing, however, quantitative objectives, hardware fetish and the world of the more and more closed and centralized software, serving the hope of safe operation, do not necessarily put everyone's heart in a flutter, neither warrants activity and especially local innovation.

Finally, I would like to refer to a striking moment, apt to be offered as a game for the reader's fantasy. This is the last chapter, number X, that also refers to the game show with a high popularity index that meant so much for so many in the past and may go on like this in the future. But in a more abstract way, I can refer to the series titled X-Files that started a quarter of century ago and partly played in the world of esotery. The essence of this, again, is that complex stories are not finished or closed. Referring to Umberto Eco again, the Online is an open book for the reader, it urges us to think the topics further and draws our attention to the diversification of the connection of hypertexts. Thus, although the closing part seems to be the Roman X at first sight, in fact it points to the future, it is thinking further and writing further.

Well, I wish you joyful reading, perhaps not the whole at once but in parts, by interesting episodes to get intellectual impulses that might help many of us in getting to know new books, new programs, new apps and new application cultures.