

The digitalisation of Polish Education

Vision and proposals

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implemented correctly,
will improve education.

The Digitalisation of Polish Education Vision and Proposals

The primary goal of the presence of information and communication technologies in education

The digitalisation of education is an essential and indispensable means to achieve the primary goal of education, namely the development and wellbeing of both students and teachers. It envisages, among others, the development of information and communication technologies (ICT) and the enrichment of content and resources. Successful schools are those that have managed to define their educational style and adhere to it with the help of technologies wherever and whenever needed and justified.

Digital technologies, if implemented correctly, may produce better educational results and may help improve the effectiveness of the educational process. They contribute to the attainment of a satisfactory ratio of the teaching process versus the outlays incurred, both as regards systemic solutions and the individual successes of a student or the job-satisfaction of teachers.

We would like for a graduate of the Polish school to have a number of merits – to have a thorough education, to have a competitive edge on the labour market (both international and domestic), to have the courage to make independent decisions and to succeed in the constantly changing world.

How does broadly defined technology support the comprehensive development of students?

1. It enhances the effectiveness of educational processes – of teaching, learning, and of the development of key social skills and future skills.
2. It unleashes individual creativity at the same time teaching team work.

3. It enhances the paving of individual development paths. It teaches responsibility and encourages students to adopt a creative approach to their personal development. It helps the teacher actively support the student in the research and creative processes.
4. It assures the comprehensive development of students, equalises the social disproportions in terms of education, since irrespective of the place or residence, it offers opportunities for growth for students from disadvantaged homes. This can be achieved via the varied forms of learning and continuing education available online.
5. It ensures access to works of art, historic knowledge, museum resources in a form that is attractive for the young recipient, which is beneficial in teaching the humanities, in patriotic education and civic education. It permits teachers cross geographic and material boundaries.
6. It equalises the development opportunities for students with special educational needs, since with the use of the right technological standards, such as the WCAG 2.0, this group of students is not stigmatised and they can avail themselves of the same educational resources as children enrolled in the regular school programme.
7. The opportunity to use technology streamlines the passage into adulthood and it permits students to get acquainted with the reality of their future professional life. As demonstrated by numerous research, 40-60% of primary school students will have jobs of the future that are unknown today. A wise application of technology allows for the conscious orientation of students into the future.
8. Knowledge is the third most important value in the world beside energy and food. It is knowledge that contemporary economy (knowledge economy) is based on to a significant extent. The use of new technologies in education provides students with unconstrained access to knowledge 24/7. Via the application of relevant methods and tools of working online, students will be able to grow educationally on an ongoing basis thanks to the "knowledge on demand" idea permitting development to take place at any time and place.
9. Digital education develops the competence of students at every level of education from kindergarten to higher education institutions. It stimulates the motivation of children and young adults, ensuring access to the latest scientific discoveries. It allows the promotion of the invariably relevant Polish experiences and the output of research and development activities and our cultural achievements.
10. The appropriate use of technology supports children and young adults in the creation of social capital, it enhances reflection and triggers involvement in civic life.

How can Polish schools be contemporary but true to tradition at the same time?

Irrespective of the structure of the educational system and various alternative educational profiles (in particular, at the level of secondary or vocational instruction), a number of rules that should guide the digitalisation of education can be distinguished.

1. Schools ought to define their educational goals and implement the broadly defined ICT in order to realise these goals faster, more efficiently and effectively. Technology is a tool (and not a goal in itself) that should support all of the defined educational goals. Successful schools are schools that have first identified their educational goal and then implemented technology in the context of this particular goal.
2. Openness to change, the ability to move and relocate and readiness to develop one's competence – are the principles followed by teachers and headmasters of schools that are successfully preparing their students to live in the contemporary world.
3. We would like schools to avail themselves of the best available solutions aiding the educational process. The primary effect of the educational process ought to be topmost quality and effectiveness. It is possible to achieve this via the provision of conditions permitting the unconstrained competition between educational partners and allowing schools to choose from the rich market offer and use selected tools and resources offered both on an open-access and commercial basis.
4. It is also important to develop – following the example of other countries – the technical and organisational standards that all the stakeholders of digital education can adjust to. We recommend that the technical standards ensuring the security and interoperability of systems, applications and educational services be established. Taking into account these general rules, we have analysed the current status of the digitalisation process of schools and we postulate that the necessary changes in the four fundamental fields, namely infrastructure, hardware, resources and competence be introduced.

Infrastructure

Lack of unconstrained Internet access is a significant obstacle restricting the digitalisation of education. The problem, observed in numerous schools, consists in both the lack of access to an appropriate network infrastructure, the so-called last mile, and intra-school networks. These limitations translate into a situation where in many schools the educational resources, methodology and teaching aids that require specific communication connections and networks, are not used at all or their use is considerably limited.

Furthermore, the school authorities do not have the necessary competence to identify the technological needs of their schools and to order services that would respond to the needs of their school communities. There is not enough technical staff who could offer their support to headmasters and teachers. Another serious problem is the absence of centrally and regionally established standards, good practices and recommendations in this area developed by ministries responsible for education and digitalisation.

Following the example of activities undertaken in many other countries within the EU and the OECD, it seems indispensable to develop a strategic programme aimed at furnishing all Polish schools with the adequate top quality network and service infrastructure. This venture could be funded as part of the 2014-2020 perspective structural funds programme. Among others, one solution is to create the National Broadband Educational Network [Krajowa Szerokopasmowa Sieć Edukacyjna (KSSE)] which would ensure the connection of schools with a broadband connection of a defined standard. Such activities ought to be implemented over an extensive period of time and should aim at furnishing Polish schools with a stable, scalable and secure Internet access.

This approach would warrant the implementation of advanced educational services such as, for instance, video conferences, streaming of online educational television, access to virtual educational laboratories, access to commercial and open access digital educational resources, federation services of wireless Internet access, identity management, archiving and long-term data storage services.

The key services addressed at the educational sector ought to be based on cloud computing and support the creation of local virtual social networks. Security services for students and teachers, including: secure access to the Internet (firewall, secure communication (anti virus scanners, anti spyware, anti spam), content filters, VoIP communication are a crucial component of this model. Another important element of the new services ought to be remote management and administration of school networks at the local government level, which would relieve schools from the burden of incurring additional administration costs and the need to hire qualified IT staff. In our opinion, the technical support and a minimum degree of technical competence should be provided to schools at the local government level.

Hardware

The digitalisation of schools calls for appropriate equipment. The fundamental problem in this respect is the absence of a defined equipment standard that is necessary to effect the digitalisation of education. The standards that had been implemented in the

past based on, among others, the concept of a computer lab present in every school, today are perceived as archaic.

The current status of furnishing schools with computer hardware is unsatisfactory (although there is not enough detailed data available on this issue). As a result of the existing investments effected, primarily as part of the Digital School (Cyfrowa Szkoła) pilot programme, only approx. 500 schools in Poland are ready to work in the one to one model.

The assumptions adopted as part of the new financial perspective pertaining to hardware acquisition are, in our opinion, insufficient – these activities will cover fewer than 10% of schools and teachers. We postulate that by the year 2020, access to individual computer hardware be secured for every teacher (a hardware set should include a laptop or tablet for every teacher and a multimedia projector available in every classroom), which is the minimum standard for digitalisation as regards hardware. The programme endorsed by us, namely the "Laptop for every teacher" programme, ought to combine hardware acquisition with activities aimed at raising awareness of both teachers and school headmasters as to the goals and manner of use of ICT in education. This calls for the development of methodological guidelines for the use of computer hardware in teaching.

The additional, higher hardware standards ought to define the furnishing of a dedicated IT lab and the furnishing of a school with hardware as part of the "one to one" model envisaging that each student in the classroom can work directly with ICT hardware. The recommendations of the Ministry of Education pertaining to the implementation of the following activities could serve as the grounds for the development of said standards: "Acquisition of ICT hardware according to the standards set forth in the Digital School government programme" and the "Development of the competence of use of new technologies in the teaching of all subjects".

We postulate that the following universal functional requirements that hardware and software supplied to schools should meet be implemented:

I. Hardware and software for on-site computer labs used e.g. for learning programming or science, and for vocational purposes.

1. It must be state-of-the-art so that schools can use it for at least 4-5 years

In the case of schools, the period of use of devices is generally much longer than in the business sector. Taking into account the dynamic development of technology we should make sure that the hardware and software supplied to schools is the most recent in terms of technological advancement, so that its use

in the educational process is not hindered by their age. We could consider introducing a restriction as regards this issue permitting the selection of only such hardware or software that had been marketed less than two years earlier.

2. It must meet the requirements of special needs students

Regular curriculum schools ought to be prepared to admit students with special needs. Therefore, it is advisable for the hardware and software supplied to schools to be available for use by this group of students as well.

3. It can be remotely managed

Both hardware and software ought to permit being configured and managed remotely and that its functionality can be restricted. This is necessary for the purposes of ensuring the safety of use of technology in the school environment.

II. The hardware and software supplied for use during classes of different subjects both in the classroom and beyond it.

1. It must permit not only the consumption of content but also its creation and editing.

The devices supplied to schools are used as devices to read electronic documents, see images, watch presentations, as well as video materials. The most important aspect of this is offering the opportunity to use the hardware and software supplied to schools for the purposes of students creating their own materials in any format. That is why the devices ought to be equipped with a built-in camera, a microphone, and to offer adequate performance permitting e.g. image editing.

2. It must permit wireless transmission of images

The hardware and software ought to permit the wireless transmission of image and sound from the devices used by the students to projectors or monitors. The transmission may be effected with the use of adapters connected to the monitors or projectors or software operating in the local network dedicated to the management of mobile devices of students, which was included in the recommendations developed by the Ministry of Education for the Digital School programme.

3. It must permit wireless connections with Wi-Fi and/or GSM networks

The hardware used in the schools operates in an environment where it is not possible to provide a cable connection for every student. The hardware supplied ought to be available for use beyond the classroom as well. For this reason the hardware supplied to schools should be compatible with the latest standards of

wireless communication. It is necessary to secure a reliable wireless connection for students and teachers.

4. It must permit working online and offline

During class students use the hardware supplied in an environment where access to the wireless network is secured. However, the option for the hardware to be used beyond the school walls or in situations where access to the network is unavailable or restricted must also be taken into account. That is the reason why the hardware and software ought to be equipped with the option to create and edit content without the need to be connected to the Internet.

5. It must meet the requirements of special needs students

Regular curriculum schools ought to be prepared to admit students with special needs. Therefore, it is advisable for the hardware and software supplied to schools to be available for use by this group of students as well.

6. It must support the learning process via individuation and the opportunity to interact with other devices

The hardware ought to permit the personalisation of settings and the manner of interaction with the user to the greatest extent possible. Also the option of use of applications allowing the adjustment of content and the pace of work to the individual needs of the students should be ensured. In addition, a given device should be compatible with other teaching aids such as sensors, detectors and other measurement devices via communication protocols such as Bluetooth or WiFi, with the security standards fulfilled.

7. It must permit work without access to the source of power for the entire school day

In most schools it is not possible to provide a power supply to the hardware made available to the students. To ensure efficient use of the hardware provided and to permit teaching also beyond the classroom, the devices ought to be capable of running on battery throughout the entire school day.

8. The hardware must be light and handy to be used both in the classroom and beyond it

The devices used in schools need to be light so that it can be used by students beyond the classroom (e.g. Science and Biology field trips, art classes in museums, thematic tours). The hardware ought to be durable, resilient to mechanical damage and properly secured.

9. It must permit remote management

Both hardware and software ought to permit being configured and managed remotely and have its functionality restricted.

Educational resources

Attempts to create a nationwide library of digital educational resources that could be used by teachers have been made for many years now. Unfortunately, the activities undertaken to date have not been successful. This is one of the reasons why digital resources are not yet used in the educational process. The key problem is that these resources are not adapted to the teaching methods employed by teachers. To take full advantage of digital resources, teachers need ideas for lesson plans and inspiration to create curricula with the use of digital educational resources.

The primary goal of the use of digital educational resources is the improvement of the educational achievements of students. In most educational systems, a system of admission or acceptance of digital educational content for use in schools is in place. We believe that such a standard ought to be developed in Poland as well.

Today, we are faced with the challenge of defining the standards of digital educational resources that would determine both their shape and functionality, their technical accessibility and the extent of support and the competence that teachers and student will need to use the resources. In this context, of key importance is also the issue of establishing the relevant platforms where said resources would be available online. Different functionalities and models of use of digital resources affect the infrastructure and hardware requirements. The activities aimed at increasing the competence of teachers should be adjusted to the same as well.

We postulate that technical standards for educational resources including the meta data of resources, an API for educational sites containing the resources and other standards of content exchange and distribution be developed. This would permit to create a dispersed, yet at the same time standardised and uniform environment of online educational resources. The fundamental elements of said environment ought to be established as part of a private-public partnership and ought to be based on open standards and – wherever possible – also on open source software (in particular in the event the infrastructure would be financed with public funds). The environment ought to lay down conditions for the co-existence of commercial and public resources side by side within a single offer. This way the development of top quality open-access educational resources would at the same time support the market of publishers and educational services.

The State ought to develop a clear and sustainable strategy for ensuring schools with adequate digital educational resources envisaging on one hand subsidies towards the

acquisition of such resources by the schools, and on the other, financing the development of open-access educational resources. The funds allocated towards these resources should be awarded in open competitions addressed to a wide audience consisting of educational publishers, NGOs and individual authors. As such the development of open-access educational resources would at the same time support the market of publishers and educational services.

We would also like to draw attention to the fact of accessibility of cultural heritage resources which are in the possession of public institutions such as museums, archives, libraries or state-owned cultural institutions. These collections are often in the public domain or the institutions hold the ensuing copyright. These resources should be available to the public, which would permit their extensive use as part of educational resources. In the case of copyrighted resources, this would call for the development of, for instance, a programme of acquisition of copyright to works demonstrating special educational value. At the same time the dissemination and making available of digital educational resources protected under IP law must be done with the observance of copyright law and any unauthorised distribution methods used by educational institutions ought to be prohibited and condemned.

Providing teachers (students and parents as well) with access to a wide range of digital resources is at the same time an indispensable condition for the efficient digitalisation of schools. We recommend that in order to implement this objective the State should adopt the role of a regulator as regards:

1. The implementation of uniform standards for developing digital educational resources, including a uniform manner of describing the resources (in particular their correlation with the core curriculum) and the relevant formats and data exchange protocols.
2. Laying down the financial conditions supporting the creation of a diversified and competitive offer of digital educational resources by both commercial and non-commercial entities.
3. The operation of a common online platform ensuring access to digital educational resources for all educational institutions – including to resources owned by public institutions such as museums, public media and archives.
4. The support and development of new programmes and new methodology incorporating digital educational resources.

Teacher competences

Apart from the strictly technical teaching skills connected with the use of various devices (interactive boards, laptops, tablets) it is immensely important to raise awareness of teachers of the purposefulness of application of technology in school

instruction, both in the perspective of long-term educational goals, as well as, within the context of a single lesson.

Digital education is aimed at changing the teaching paradigm. Therefore, it ought to endorse a manner of thinking about a learning and teaching process where the student becomes the author of his or her own educational resources wherein the school becomes a learning environment. The adoption of such an approach would permit us to depart from the transmission model of education, still widely present in our schools.

The digital competence of teachers is to be construed more broadly than the ECDL standard (the e-teacher module) popular in Poland. Teachers ought to possess the skills of planning and holding their lessons with account for the level of instruction, subject-specific methodology and the form of instruction (a lesson with the use of multimedia, e-learning, b-learning, m-learning), as well as the competence to use different types of digital educational materials. Another necessary element is the teacher's freedom to work with tools available online, namely software and applications, as well as the ability to design them. Teachers ought to be able to work both in the traditional environment as well as the virtual environment using various types of educational platforms, electronic grade books, etc.

Teachers' digital competence improvement programmes ought to relate to the newly developed general school standard oriented towards open education consisting in:

1. Open technological standards, including an elaborated, publicly-disclosed API;
2. Open approach to creating digital educational resources (interfaces for creating resources by the teacher and student);
3. Open systems, platforms, tools – combining the free and paid market offers (a platform offering links to the digital educational resources available online);
4. Open approach to instruction venues in the context of holding classes beyond the classroom: e.g. in the museum, in the park, during a field trip, etc. with the use of technology (availability of infrastructure, educational resources and mobile hardware).

We postulate that the digital competence of teachers be defined and then developed with respect to the following three areas: subject-matter competence, methodological competence and technological competence.

Subject-matter competence – awareness of the opportunities of teaching a given subject with the use of new technologies.

1. Awareness of the subject-specific electronic digital resources.

2. The use of electronic educational resources in the context of the teaching objectives, the target group and the core curriculum.
3. Planning lessons with the use of new technologies.
4. Designing own electronic educational subject-specific resources.
5. The use of modern instruction methodology for running lessons with the use of new technologies.

Methodological competence – awareness of the needs and opportunities of the aptitude of a contemporary student in the context of use of new technologies in school instruction.

1. Analysis of the school environment in the context of use of new technologies.
2. Design, implementation and evaluation of a traditional lesson with the use of activating teaching methods and new technologies.
3. Design, implementation and evaluation of the process of distance learning.
4. Design, implementation and evaluation of the process of blended learning.
5. Effective communication with students and parents with the use of new technologies.

Technological competence – ability to work with various types of devices, software and Internet skills

1. Use of various types of computers.
2. Use of mobile educational devices.
3. Use of educational software.
4. Use of mobile applications.
5. Use of peripheral devices (e.g. printers, e-test devices, voting systems, measurement devices, projectors, sensors).
6. Use of classroom management systems.
7. Freedom of online presence.

As was said earlier, an important area of competence that needs to be developed is the digital competence of school headmasters. They ought to be able to adapt/convert their school into a "digital school" via developing a transformation strategy and availing themselves of the appropriate: infrastructure, tools and software, as well as triggering the improvement of the digital competence of teachers.

Conclusions

The digitalisation of Polish education calls for a strategic vision where the educational objectives will play a paramount role. Broadband access, state-of-the-art hardware and online resources are only means to an end consisting in the wellbeing of students and

teachers and the quality of education. A systemic approach is indispensable, one that envisages the simultaneous development of the four areas discussed, namely infrastructure, hardware, resources and teacher competence, even if the emphasis is laid on one of these areas only.

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Federacja Stowarzyszeń Nauczycielskich

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