ICT in schools and non-formal education in Poland. Challenges of digital literacy development, modernisation of education system and digital inclusion through new media from the perspective of experts from business, education and NGO sectors

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Abstract

The text is an attempt to answer the question of how ICTs are used in the process of learning, teaching and digital inclusion in Poland. The study presents both, advantages and disadvantages of ICT implementation into Polish formal and non-formal education. Based on the data collected, the issue has been characterized from three perspectives: business, education and the third sector. The nature of the complex research problems motivated researchers to sue the qualitative study methods, expert interview technique and structured survey questionnaire as the tool. The data were analyzed using the interpretative paradigm of qualitative research, and presented respondents' experiences of implementing ICT in education. The interviewees had accumulated years of experience in introducing pedagogical innovations in Poland.

Keywords: digital inclusion, digital literacy, school, NGO, business, non-formal education, information society

Introduction

Undoubtedly, the issue of ICT in the context of educational activities has become an important area of pedagogical explorations during the last three decades. With the increasing speed and capacities of the Internet, we can observe rapidly growing number of methodology and scientific publications which refer to the opportunities paradigm in media pedagogy. The growing number of research and technical development have led to the emergence of a new subdiscipline called media education or media pedagogy. Issues related to ICT implementation to learning and teaching are now one of the priority areas of building knowledge about modern education (Potyrała, 2017).

The development of this subdiscipline poses many practical challenges which can be classified as: methodology-related, connected with the development of competencies in the information society or administrative and technical. Methodology issues address the question of introducing electronic devices to the didactic process, thus, increasing the educational added value. This question is of particular importance in the light of numerous commercial and free (e.g. OER) online applications and websites available. This is especially important for teachers of different subjects who search for attractive ICT-based solutions which are at the same time compliant with the official core curriculum. Implementation of software as a teaching tool is connected with the level of digital literacy among all the stakeholders of education system. Many myths grew around this area, for example, of the high level of digital literacy of school students (Pyżalski et al., 2019) and low level of these competencies among the teachers (Tomczyk, 2020). Both groups are heterogeneous, which means diverse styles of using digital media, different levels of vulnerability to e-threats and motivation to use hardware and software resources constructively. It is also worth to refer to the challenge of infrastructural resources. Hardware limitations are less and less important, but there are still schools which do not have broadband Internet connection or use older generation computer laboratories. Due to the above, media, digital and IT education faces many practical challenges. These challenges are global (Tomczyk et al., 2019). Many processes in both, formal (obligatory school system) and non-formal (e.g. courses organized by NGOs) education have not been thoroughly investigated and characterized, also due to the rapid changes taking place in the information society. This text aims at showing how ICT is used, in the three independent educational perspectives: formal education, business and the third sector.

Territory and Polish sample characteristics

The study was conducted in December 2019 in Poland. Three representatives of different areas connected to the education sector were interviewed: a representative of the third sector (a non-governmental organization focusing on media and digital education), a director of a large formal education institution - a school and a business person creating solutions also for schools and universities. The respondents were selected purposefully according to the sampling criteria: they are recognizable among media and IT education teachers and researchers in Poland, they possess significant didactic, research, business or organizational achievements and they possess relevant knowledge about the changes taking place in the Polish education system. Each interview lasted from 30 minutes to 1 hour. The detailed characteristics of the sample is presented below.

The first respondent (R1) is a representative of one of the biggest and most active NGOs focusing on new media education projects. As the president of this organization, she is responsible for organizing teacher trainings, for example in using computers in school. She has been in this position for 8 years and is an experienced teacher (33 years of working in school). She has diploma in primary education and is a qualified teacher of Information Technology at the lower-secondary school level. She also completed her postgraduate study in adult education and specializes in IT teaching methods, also as an academic teacher in this field.

The second interviewed person (R2) was the director of a primary school in Wielkopolska region (mid-size city). The respondent is a chartered teacher with 20 years of professional experience, with post-graduate diploma in IT teaching, trainer in several project related to multimedia education and using ICTs in school. Supervisor of students participating in national IT competitions, initiator of introducing the innovative program Szkoła Zarządzająca Wiedzą (Knowledge-Managing School) and electronic student journal (e-journal) in his school. He has a rich experience in setting up computer laboratories based on the Classmate PC technology. Organiser of cyclic conferences, seminars and workshops for teachers and education authorities, promoting modern technologies in education (three editions in 2010-2012). Awarded with many honors and awards.

The third respondent (R3) manages an IT company which operates in the commercial market since 2009. So far, he has implemented over 120 commercial projects. The respondent is also an experienced manager of scientific staff and a guest lecturer in one of the leading Polish non-public universities. At present, as visiting professor, he delivers lectures on: stra-

tegic management and IT project management but his main job is company management. He is responsible for: strategic management, resource management and IT project management. He is often a keynote speaker in the areas of: equity crowd funding, e-learning interfaces or business models. He has been dealing with ICT in education for over a decade. Given the activity in the third sector oriented towards new technologies, it is even 15 years. His business serves clients also from the education sector, for example by delivering dedicated mobile applications for universities. The respondent gave his consent to reveal the name of the institution he represents: ESCOLA S.A.

Results

Use of ICT in formal and non-formal education in Poland

According to the third sector representative, application of ICT in formal education depends on several significant factors. First, it depends on the level of education, that is, ICT advancement (and thus, digital literacy) level coexists with the metrical age of students. Teacher is the key element in this process. This situation is not homogeneous and depends on the type of school and teacher's educational background. The respondent said that people who are IT oriented are much more active in introducing attractive ways of teaching IT than the ones who teach Information Technology as the addition to their main subject.

"I think Paint laughter. Unfortunately yes, but I would bet on Paint. If we counted all hours, from the lowest grades, that is 4th grade when children have IT and slowly begin to do something there. Of course, teachers in different schools show their students what they themselves can do. The more educated IT teacher, the more they try to teach kids something. But a passive teacher or a teacher who has two hours of IT but mainly teaches sport or something else, primary education or something and has extra IT hours - they will follow curriculum which include Word, Power Point in a conventional way" (R1).

According to the school director, technical resources are the important variable in the process of using ICTs in formal education. Given the present state of development of the information society and the specifics of ICT use, the problem of Internet access becomes the starting point for further analyses. It is Internet availability that determines the use of many popular networked services, including applications to support learning and teaching, websites, blogs, communicators and social media. Changes that take place, cause certain civilizational delay of some formal education units as not all schools have high-speed Internet connection enabling effective use of ICT during all classes.

"During the last decade, this has evolved a lot. What teachers use at school, of course, depends on the concept adopted by the school. I think we all wish that Internet was actually available in schools, [thinking] I mean, that Internet access was at the acceptable level, namely according to consumer needs of the school" (R2).

ICT use differs in terms of access to websites and online resources. Teachers use the advantages of BYOD technology. With popularization of smartphones, they begin to see the potential of these devices. They try to provide students with quick access to knowledge, videos and websites using QR codes. Of course, BYOD approach is not common due to restrictions imposed on students regarding the use of electronic devices in schools.

"They use different applications. Kahoot is very popular now. QR codes are also often used. For example, I have seen the English or IT teacher coding something on YouTube and then handing students QR codes printed on stripes of paper, and they had to decipher what is there" (R1).

An important trend in Central and Eastern Europe are the changes related to the improvement of curricula in the area of algorithmic thinking and computer programming. The example of this approach are transformations of the official curricula. From the first grades of primary school students learn to create algorithmic structures which are transferred to digital space using coding environments adapted to their age.

"At present, coding is the dominating trend in Poland. I can see this development as teachers who follow this trend, learn it and try to teach others. They usually use Scratch or, less often, Baltie" (R1).

Programming has become a noticeable trend at every stage of education. Students begin to learn coding in a way which allows them to combine abstract thinking and concrete-imagery thinking. The example of such activities may be programming of robots or virtual characters. Programming thinking develops as students reach the subsequent stages of education. In Poland, coding is introduced already in the initial stage of education - integrated teaching. Robotics and coding are very popular. Numerous non-formal education offers of courses outside the schools, which involve classes to support the development of commutative, algorithmic thinking confirm this fact. Computer programming has become not only a fashion but also the means of early support of mathematic and abstract thinking.

"Apart from devices we know from the market, like, I don't know, different laptops or tablets, more and more often - due to some fashion but also this formal introduction of coding into the core curriculum - schools use all kinds of programming environments which are used on certain devices but also in the Internet. Then, there are simple solutions which allow teachers to work with the students, there are many of them. Besides these so called software opportunities or environments, all kinds of analogue environments are available to introduce students into the world of algorithmic and coding processes. Also, different robots which can be programmed are used. They enable practical application of the work students do on computers or other devices, physical implementation of their programming ideas. Of course, it all depends on the level of students' development, the stage of education they are at" (R2).

The third respondent addressed a very important issue. In Polish schools, multimedia presentations (created using MS Office applications or free equivalents) are most often used. Transferring educational content into presentations and then showing them on a projector has become a norm. Many schools have interactive boards and multimedia projectors as their standard equipment. In many cases, permanent use of this tool leads to discussions about the effectiveness and soundness of using multimedia presentations as the main didactic means.

"I think this depends greatly on, first: our definition of ICT. Then, what it means "to use". Because when we look at it very simply, then every teacher in Poland uses ICTs in some way. Most often, it will be slides and interactive boards" (R3).

According to the representative of the second sector, particular consideration should be given to applications which facilitate student collaboration. Solutions to support project and group work most often include text editors and file repositories, which enable exchange of ideas or marking valuable content. Perhaps, the respondent emphasizes the significance of this area due the need to strengthen team work and ability to build knowledge while engaging all the students. This area is one of the challenges of modern media pedagogy focused on shared learning, constructivism and soft skill development (such as communication, arguing, sourcing, experience sharing and learning from mistakes).

"Collaboration method such as goggle-boxes. Collective work as students implement different projects. There are many available tools for collective work. I could spend much time listing all popular tools to design, note sharing. For example Eric. Great tool to create notes in books. Also collaborative. I personally think working on a single document is the best. The simplest solution are goggle-boxes which may be used by many students. In this way, as they work on one document, they constant-

ly build new knowledge. And thanks to collaboration, contribution and ideas of everyone are visible" (R3).

Obstacles to introduction of modern ICT-based solutions in Poland

Openness to new solutions is crucial for implementation of ICT-based teaching solutions. According to the respondent who manages a third sector institution, the lack of resistance and ability to respond to new solutions by integrating them into didactic methods used is the key factor. This ability to introduce new solutions is strongly associated with the lifelong learning process. By definition, teachers should be particularly open to innovations, experimenting and entering into the world of learners. According to the TPACK concept, the effectiveness of ICT implementation depends mainly on a teacher who should hold certain attitude to pedagogical experiments and be open to new methods.

"I think there are two main ones. One is internal, it is this inner resistance. Because if someone is open to innovations, there is no problem. Regardless whether it is a teacher, doctor or university professor. If they are open to new things, they will introduce them, take interest in them and look for opportunities to use them in their lives. But is a person is closed, they will constantly look for excuses for not doing anything" (R1).

This respondent thinks that implementation of ICT in education is not easy due to the complex and wider view of the role of media in education. Lack of clear subject and competence boundaries blocks the implementation of devices, websites and applications to support learning and teaching. For many teachers, one of the blocking factors is that digital devices are stereotypically assigned to the IT area.

"And the other factor is more complex, because I think it is system-related. Because if we are to implement ICT in schools, the question is when, during which classes etc. So, the simplest answer is: IT class, right? However, teachers of other subjects are urged to this. But I don't know if it all works well in the end" (R1).

The respondent adds that the core curricula and the digital literacy development concept lack coherence. As already mentioned above, one of the present priorities is the development of algorithmic thinking and programming skills. Unfortunately, there is much freedom in this area in terms of selection of didactic methods, forms and means, as well as big discrepancy in interpreting the core curriculum by the teachers. These limitations result in many inconsistencies in the transfer and spiral development of programming skills.

"Imagine that kids learn coding since the early grades, right? At least in those schools where teachers are already prepared. Because they got tablets and LEGO for coding. So they have learned the first steps. And now, these kids complete their early school education and go to grades 4-6 and have IT classes. And what do they learn? For example, in grades 4-6 they should continue using Scratch, keep on building, creating, designing but this is not always the case" (R1).

The school director rightly mentions the issue of competencies of the prospective and present teachers. As the experienced manager and recruiter of pedagogical staff, he points out to their professional preparation. Training phase is not always logically connected with the tasks performed later in education institutions. Digital literacy of the prospective teachers does not always match the didactic process and requirement regarding operation of applications, hardware or websites as well as pedagogical challenges connected with digital media.

"I need to emphasize the problem of teacher competencies which formally are not trained as they should. When teachers prepare to begin their career, their competencies do not quite match the needs of schools I've just mentioned. That is why, it is very important that teachers are aware it depends on them and that they need to re-calibrate the way they see young people in the educational context" (R2).

The school director also points out to another key issue, namely organisational limitations. Many teachers want to experiment and introduce new technologies but this process gets restricted due to the limited access to proper hardware or Internet connection. The matter of proper equipment is seen as one of the factors hindering ICT implementation. However, we must add that the problem of supplying schools with technology is an ongoing process as devices get old and new solutions appear in the market.

"The first area is the most important and is connected with competencies. And I want to emphasize once again, we have many great educators and we know it. This is beautiful. And we see a duality here. Because many of these aware, active and willing teachers face technological desert in their schools. So, it is something that limits them in their efforts." (R2)

The respondent also mentions the specific digital division in Polish schools. Different formal education institutions have different digital teaching tools. Many directors and teachers face this problem. To eliminate this digital gap, central projects are introduced - ministerial initiatives

focused on equipping schools, providing high-speed Internet connection and improving digital literacy among the teachers.

"On the other hand, there are also teachers who work in well equipped schools and have access to full ICT environment. But behind it, there is something inevitable - this digital division and large-scale projects implemented by the ministry are to resolve it. So, in a while all Polish schools will actually provide equal opportunities in terms of technology. This will take long, but these are the plans. They are actually being realized" (R2).

According to the business sector representative, one of the greatest barriers in using ICT in education is digital literacy of teachers. This respondent said that it is knowledge and skills of the teachers that are usually insufficient. To improve this situation, teachers should avoid trainings which are not adapted to their subjects or, in a wider perspective, to school conditions. The solution might be the exchange of experiences among the teachers. Education based on the transfer of knowledge and skills within the school system eliminates trainings which are not compliant with the core curriculum and actual school conditions.

"However, I think teachers' competencies are the weakest link. Equipment is less and less important but teachers' competencies are, in my opinion, very poor. Teachers still use ICT insufficiently. There are also not many good trainings in this area. And I think that if there are any trainings, they are not adapted to the needs. I think teachers should exchange their experiences. They should collaborate, share their experiences and learn to use valuable tools together" (R3).

Hardware and human potential and ICT-mediated education

Changes resulting from the development of human capital do not happen in isolation from the other social processes. According to the school director, strengthening human and technology capital during the last years has been noticeable. This happens both, through the change of content taught (especially computer classes and IT) and supply of schools with the new hardware. This process is also influenced by the needs of the labor market, as well as by the development and implementation of technologies into vocational education (secondary schools). The respondent said that schools are responsible for updating and modernization of their teaching according to the needs of local community and economy. Since the transformation, this aspect is the greatest challenge of Polish educational system.

"I think not much has changed during these last 10 years in this context. I think that globally, it could still be better. But there are schools, and

this is a very narrow group, where different processes happen parallel, also in the context of other teaching areas, other subjects. Especially when financial opportunities were created for schools to get equipped with various hardware solutions. Another question is whether all these solutions will change at least a little the image of schools and, first of all, will they help to meet the needs of the changing school surrounding. In short, we could say that this is the strong trend resulting from the conditions in the labour market and services market. It all goes towards the Internet of Things and Artificial Intelligence. And schools cannot stay behind. I think school should be students' guide through this world" (R2).

According to this respondent, there is the necessity to re-orient the focus. ICT equipment is crucial but human resources are even more important. Teachers and trainers are among the ones who are the most responsible for the development of formal and non-formal education. These people are education leaders and are responsible for creating optimal learning environments. Teachers are the critical and key element in the ICT and education ecosystem.

"I look at it from a little different perspective. Because I'm sure that devices and ICT environment available in schools are just a tool, a means to achieve the goal set for the school. First of all, in the functional meaning, it is set for the teachers. In fact, focusing on the technology is not that important, we should rather emphasize the meaning of individuals and the environment." (R2)

The above mentioned statement shares some common observations with the one of the business representative. According to him, teachers are the key. However, the respondent points out to the challenges connected with teachers' promotion. Due to the metrical age of Polish teachers and their development in the previous years, the vast majority of this group hold the highest degree of professional promotion. Lack of motivation factors prevents them from introducing innovative, ICT-based solutions. The respondent postulates development and popularization of the lifelong learning idea also among the teaching staff, however he does not provide simple solutions, only a postulate.

"First, without high-speed Internet we will not make it. And second, I think it is hard work to develop the mentality of lifelong learning among the teachers. This is something that would need to be explored, for example through international analyses. In the recent years, we have seen the rapid leap forward in education, the level of teacher training. And they have probably completed hundreds of hours of trainings because everyone wanted to get their promotion a decade ago. But now, it is a little harder because everyone probably already has their diplomas. Statistically, teachers are getting older and I think it is hard to motivate them

to learn. So I think, this is a systemic solution which will facilitate lifelong learning. Unfortunately, I don't have a solution to this, it is a new challenge" (R3).

Role of business in educational sector

The NGO representative thinks that the business sector is oriented on generating revenue. Activity of the second sector representatives in education is less noticeable for the first stages of education and slightly more observable in secondary schools. According to the respondent, this is the result of the simple assumption that businesses are to generate income. Sometimes schools participate in the organized forms of support (like free access to office software for the students) but this is not the rule in all schools.

"Business, according to its very name, has to have a business interest in it. And this is surely more likely in secondary schools and in higher education, where businesses invest and benefit. Businesses will rather look for money in school and school is a good client because it is the state that pays. So I don't really believe that there is a business which would not have an interest to support schools" (R1).

The respondent from the business sector confirms these observations. Commercial sector offers little support for the schools. This is also due to the fact that for schools, voluntary contribution is the priority. The issue of corporate social responsibility is a different matter, as it usually involves activities reaching beyond formal education and implemented by foundations and associations focusing, for example, on prevention (also media prevention).

"There is a great interest in doing business in education. And if you ask whether business supports education pro bono, well, there is not much support here. For sure, it happens occasionally. But I think that education is not an important topic. At present, there is no trend to support education" (R3).

From the perspective of the school director, business sector plays a significant role in modernization of educational institutions. This is particularly relevant for institutions which offer programming and education equipment. Presentation of the offer and the opportunity to use ICT in schools facilitates implementation of new didactic means or forms of work. Without knowledge about hardware and software, gained for example during methodic conferences, teachers may have problems finding out about the latest technological solutions. Very often, representatives

of the commercial industry participate in educational events (teacher conferences, seminars) where they present their latest products.

"Without business which offers solutions, we would never had, never have spoken, we would never... or at least not today, we would be stuck where we are. We as the school, but I think education in general. Shortly speaking, it is thanks to certain initiatives which enabled businesses to show what they have to offer. This is, of course, quite radical but I believe this was the main motor of these changes" (R2).

In the light of the statements of the third respondent, we may notice that the educational sector is attractive for business only. This is due to the purchasing potential of schools. Formal education units are attractive business partners because of their number, purchasing potential and the need to be constantly modernized.

"I think education business is powerful. As I was taking part in different conferences, whether it was Oslo, Cracow or Lumen'y, I have noticed that education sector buys and will buy lots of hardware and software. Always. These purchases contribute to a great share in Polish GDP. Polish schools may not be very rich but they are plenty. It is mass purchase for both, K12 education and university education" (R3).

The same respondent adds, that the last decade has been the breakthrough for education industry and business. Both, supply and demand have been growing. The attitude of the stakeholders towards ICT implementation in both, schools and universities, also changes. The development of the ICT industry, including adaptation of the offer to the needs of schools, drives the interest of education sectors representatives in new hardware and applications.

"While ten years ago, I thought buying innovative ICTs for universities is a fancy, now I say universities (I'm not saying all of them) have matured to buy advanced, world-class tools. As for the Polish market, or K12 area, there are plenty of educational toys. We keep discovering new things available on the market" (R3).

Polish education system, both higher and formal, uses the opportunities provided by the structural funds. Many modernization projects base on the central, ministry programs which aim at the development of digital literacy and supplying schools with digital devices. In the opinion of the business representative, universities now introduce more and more advanced IT systems to support not only their didactic processes but also administration and the quality of learning. European funds are one of the many noticeably stimulators of ICT implementation in schools.

"It is a good time for academic education because there is a lot of money from different EU grants. We can see for some time that universities have been in much better condition. I can see they buy LMSes. They buy some pro-quality systems. This has never been before" (R3).

ICT and education innovations in Poland

More and more often, practical efforts combine innovations and final changes in the curricula. In many cases, innovations involve preparation of teachers to use new didactic methods, forms and means. The issues mentioned in the previous sections regarding algorithmizing, computing thinking or robotics translate into the educational projects addressed to teachers. The representative of an NGO mentions an interesting example. Referring to her words, it is worth to point out that pedagogical innovations are very often implemented through one-time trainings in the trainer-teacher setting, outside the real teaching and learning environment. In the example mentioned, trainers introduce innovations together with students and teachers. Thus, the teachers naturally participate in transferring the core curriculum into practice.

"Together with Humanitas University we implement the project Eksperci Programowania (Coding Experts). In this project, early school teachers learn how to teach algorithmic thinking. There is a Ministry program called Digital Poland. This is a very innovative project. We developed different new work methods ourselves. And during the trainings we not only educate the early school and pre-school teachers using different types of tools, games, plays, robots. Including Scratch and Balti. The workshops should be led in a way so the female teachers, because they are mainly ladies, did not get discouraged that they cannot build and program robots but that they would finally decide it is actually fun. And the project is good because it involves not only stationary trainings - our trainers come to classes and co-lead the lessons with the teachers" (R1).

Learning and teaching may be interdisciplinary when interdisciplinary education paths are taken into account. Digital literacy is not a separate field so ICT-related content may be integrated in other, separate disciplines (different subjects/courses) too. Combining content and focus on practical application is not the dominating approach in Polish education. Such activities are classified as innovative. In addition, creating projects aimed at social change is highly rated by methodology experts and positively received in the context of the principles of social pedagogy. An example of this type of activities connected with global challenges was mentioned briefly by the school director.

"The example is a flagship project which we carried out with two other schools in our city and five other schools in Poland. The project is called Code for Green. It is interesting because in this project students, starting from the seventh, eighth grade and consequently, in the secondary school develop their competencies in coding, algorithms, prototyping, experimenting. They use the new skills to change their local natural environment in the first place. The project is deeply grounded in ecology and promotes changing and improving the environment students live in. After 18 months of the project, we can see how engaging it is for the students and how great effect it brings" (R2).

Polish education services market is very innovative. This is confirmed by some very popular solutions used not only in Poland but also abroad. The level of innovation in the project is proven by the fact that some webpages are used not only locally, but broadly. Innovative approach manifests itself through different applications of ICTs. Polish solutions for ICT-based learning and teaching have global application in the areas of: e-learning, print, robotics, mobile applications, leisure activity or learning support. Many businesses have their English speaking departments and branches outside Poland. The third respondent summarized it as follows:

"Nuadu - pretty cool e-learning platform. They also have financing team. Then, Learnetic which also have many successes in international markets. Then, PCG Academia which is, for example, very active in Oceania. And very successful. Also in Germany. Wide-scale use of printers in education by Skyware Company. Another example is Bikeo by Andrzej Grzybowski. Robotics, that is Foton Company. Black Bot has also successes internationally. In my opinion, Brainly that is Zadane.pl in Polish, is worth keeping eye on. Do you know what it's about? It is a platform to do homework, you know? Because it is a company that has, I guess, out of top ten educational websites, they have four. So it's like American Brainly, British Brainly, German Brainly. For sure, they are one of the top ten most often visited educational websites in the world and have around a billion unique users" (R3).

Supporting development of ICT-related skills among people responsible for learning and digital inclusion

The first respondent points out to a very important assumption. Many trainings to improve digital literacy among trainers and teachers are one-time events. It means that pedagogues take part in an intense training in their school or vocational training centre and then go to work where they are not always successfully implement what they have learned. This situation could be resolved thanks to methods suggested by the NGO representative.

"Teachers often go to a training, get trained and have to put it into practice in their classes. Usually, it all ends with the training. It is difficult without support. On the one hand, support is disciplining and motivating, on the other hand, it gives the sense of security that if someone fails at something, there is another person who will help" (R1).

Too many training offers in the Polish teacher lifelong education market result in different quality trainings. Teachers very often pay attention to the relevance of content and usefulness of trainings to improve the quality of their teaching. Unfortunately, Polish vocational training market is not regulated in this regard, so there are examples of low quality courses. Verification and certification of teacher training centers becomes a challenge.

"Going to a training, teachers always look not only at the quality of the training, the content, what kind of knowledge and skills do trainers present but also how do they learn the training, what methods are used. It is important for them. So I think trainers cannot be random persons" (R1).

The school director's perspective is clearly focused on the idea of support. Implementation of ICT into learning and teaching and strengthening digital literacy is hindered if the school lacks clear vision of development. Without the contribution of the school management whose role is to create conditions stimulating implementation of the new solutions, it is impossible to ensure optimal solutions. The respondent mentions another factor, namely teachers' self-reflection regarding their professional development.

"This comes from the full awareness of teachers, based on their willingness to improve. Second, I can see two roles here. Of the teachers but also of the school or school environment in general to support such efforts and create conditions. This is the role of the school management, director, to create conditions for daily, or as frequent as possible, access to solutions which teachers can implement, yes. Because one may have many great ideas and try to introduce them, but we need the right conditions to do it" (R2).

The school director suggest the same solution to the problem of low quality of the trainings, as the one posed by the first respondent. Knowledge accumulated by the teaching staff could be the means. It is teachers who have wide experience which may be the starting point for educational courses for them. In this case, shared learning has its equivalents in the Polish non-formal education system. There are informal communities like SuperbelfrzyPL or closed self-learning groups in social media. Many of these activities focused on strengthening digital literacy and improv-

ing the didactic process are performed by using ICTs, especially VOD transmissions, discussion forums, discussions in SNS, online tutorials and guides.

"Shared learning of teachers in the school environment where they work. Sharing experiences and insights. And I think training teachers somewhere out there is not exactly a good idea. We can say that more and more often it is from home or school, because webinars have become so common like real meetings, perhaps even more. This is also a method to learn about good practices. And the strength of these meetings should be the fact that these are people who have something to offer in the context of the ideas and certain recipes how to do it. Because we need to remember about certain resistance against new things, innovations which we may not fully understand. That is why I think that this engagement that comes simply from the passion for teaching should be supported with self-development and, first of all, collaboration between the teachers. And I think this is the key - the daily improvement, I mean teachers improvement" (R2).

The perspectives of the school director and the representative of an education unit are coherent. Both respondents emphasize the importance of exchanging the experiences among the professionals. Imposing curricula does not always meet its own assumptions. One can list several more or less effective central project implemented in the last few years. Many of them were based on creating teaching content integrators as e-learning platforms or e-book series.

"The Ministry of Education should rather encourage people to share good examples. The Ministry did exactly the opposite last year, they said: Oh, let's buy them a new textbook platform. I really think teachers don't need a new textbook platform. The times are different. They can find a lot on their own" (R3).

The same respondent refers to the statement of the previous interviewee, highlighting that exchange of experience, especially good practices, is the key to supporting ICT literacy. This is one of the proven solutions, not only in the area of acquiring and improving digital literacy but also other, "analogue" areas.

"I strongly believe that if education is to improve, we must stop creating these huge LMSes. All these resource buying projects. And simply start teaching these people good examples. Show them best practice. They really don't need anything else" (R3).

The last respondent points out to the important fact of permanent change. During the recent years, Polish formal education system has undergone many fundamental changes. These transformations included liquidation of the lower-secondary schools addressed to adolescents in favor of longer primary education. With these changes, teaching content got restructured, which resulted in new student and teacher textbooks being created. Every change means the necessity to update the existing knowledge by the subject teachers and school management.

"In education everything is constantly turned upside down. There is a new core curriculum and one has to create new lesson plans. This is something which frustrates me. I think it is very ineffective way of working. What does that teach you? Instead of searching and thinking, take a ready-made template. But this is not about forcing people to use one and only right project which will change in a minute anyway." (R3)

Open education resources and work with disfavored groups

Usage of Open Education Resources (OER) within the Polish education system is the area which has not been fully explored. There are many examples of successful use of teaching content available and indexed in popular search engines. Teachers themselves also create their own repositories of links which they then share with others. Polish online resources include many websites with class scenarios, books, exercises and video materials. One of the most popular resources is a library of several dozen of textbooks available for free and created within the Human Capital Operational Program 2007-2013 and Knowledge Education Development Operational Program 2014-2020. There are also many discussion forums or microsites with the lists of useful OER. The second respondent confirms that teachers contribute to the creation of this type of online resources:

"Commercial part of the resources and services available - this is a very important element. Knowing where to look for open resources is a common practice. The choice of certain environment, tool or information source is usually individual preference. I can only say that about two years ago, we had an open lesson project for the teachers in our school, during which teachers developed education materials in pairs. They addressed certain educational cases at different levels, for different subject courses. The result of this quite tedious and long, but based mainly on open resources work was twelve publications which appeared in a commercial repository but in an open channel. And at some stage, they were competing with similar publications from the US, we have evidence for it" (R2).

Open character of education resources is dual. According to the business representative, all education resources must be published in an open access mode because they are created for public money. On the other hand, it seems natural that free access to materials developed by commercial entities is blocked. According to the third respondent, open access to resources is a remedy for domination of business institutions and a necessary solution. And then, there is classification and segregation of OER and their effective use by teachers and trainers.

"I will tell you that my opinion about open education resources is very clear. If something is made for public money there shouldn't even be a question whether it should be an open resource. It's not a surprise that businesses do not want to create open resources. It is hard to expect that, for example Black Bot will release its LMS on an open license when they earn milliards of dollars on it. So, I think that in 2019, there shouldn't even be a discussion whether resources should be open or not. And this is a way to challenge the domination of big corporations at least a little" (R3).

Creators of OER often forget about positioning the resources for people with disabilities. This element is very often missing. Another problem is OER description in the context of copyrights related to the use of materials as educational activities may have different character. Using OER in formal education may be interpreted in one way and differently by the representatives of the commercial sector (like private training institutions). The following statement is a valuable postulate regarding OER classification and creation of repositories and files given physical limitations of all the Internet users.

"The question about value is rather the question about availability. I mean, if we think about public resources in particular. For me, resources which are publicly available and are created for public money should be fully accessible. Both in legal and technical sense" (R3).

Supporting ICT use in learning and social integration in Poland in the light of government actions

One of the primary issues related to ICT use in learning and teaching is financing. Securing the budget is the first element in thinking about digital inclusion. Like other European countries, Poland uses funds form the European Union budget. They are granted within programs aiming at developing human capital, strengthening coherence, reducing social divisions or modernization of education systems. As rightly pointed by the representative of the third sector, there are some bottom-up and free activities but they are not enough to meet all education needs.

"There is a lot of it, mainly funding initiatives from the EU funds. They all include financial support. Every project needs to be funded. There are some free activities but that is not it. And imagine that, for example, you want to do something voluntary, well, you will not do it full-time but in your free time. But if you want to have professionals, you have to have budgets and money, and then account for it. So there are mainly regional, EFS projects where schools are supported and financed by project managing institutions" (R1).

According to the same person, there are big differences in education projects and government efforts, depending on the location. The NGO representative says that in small towns and villages the financial needs are diagnosed much more effectively than in large urban areas. It is worth mentioning that education in Poland can be financed from different sources. The main one is the supervisory entity (most often, local government) but schools also receive support within central projects implemented by the Ministry of National Education and education authorities. Support is also very often provided by the local government organizations which implement projects addressed to education sector.

"It works best in small towns because in a small place there is one, two schools. And they usually all know one another in the local community. And when the school director talks to the mayor and says they need something and a project needs to be implemented, they agree on something together and do it together. In big cities it does not look that good because usually, there is a unit within the leading entity, which is in some city halls, manages the project. And this unit sends information to school directors and the directors ask their teachers what do they need and then they quickly write a project" (R1).

Important questions and conclusions regarding the support were posed by the school director. First, he notices the changes resulting from different channels of support. He also adds that one needs to be aware that having a project, that needs intellectual (methodic) and technical support, is not the final stage. Adaptation of the support to the goals of the institution and conditions related with the teaching staff in a given institution seems much more important.

"If you ask how these programs contributed to the change, of course the impact is noticeable. Nevertheless, I would not consider it globally. I would look at the changes locally. Because every school should have, it would be good if they had, their own concept how to use this new equipment according to their specifics. Yes, competencies and needs of the teachers. That's why I am far from generalizing because every school should have their own recipe for successful realization of education objectives" (R2).

The same respondent then lists different types of centrally financed programs. According to him, two initiatives involving hardware supply deserve a closer look. One was providing schools with access to high-speed Internet and educational resources. The other involved buying interactive digital boards and implementation of educational software. The respondent emphasized that how much these projects stimulated the increased use of ICT depends on the previous activities introduced in a given school. Some schools have been focusing on improving their teaching methods for years and such projects were only complementary.

"For years we were beneficiaries of a pilot project called Digital School. I will not hide that opportunity to take part... random opportunity because we were randomly chosen as the project beneficiaries and were able to equip the school. This was a right moment. Because we had something we were simply missing while implementing previous activities related to education, teacher support and competence development. We were able to equip the teachers then. Another big project, every director knows is Active Board. I think this is the project which has helped many schools or has given them green light to act. But for the schools which had already been advanced in ICT implementation or has some experience with it, it was complementary" (R2).

Functioning of every school in the information society is based on the access to high-speed Internet. Due to administrational, financial and technical limitations, until 2019 not all Polish schools had such access. The solution is a central, governmental project to provide all schools with this crucial support. Some schools, most often those located outside large cities, stay behind. The third respondent points out that in many schools such projects do not matter much because broadband, stable connections which enable creation of high-speed school intranets and Wi-Fi for the students have already been provided few years ago. Such projects are the base on which other ICT-based solutions can be created.

"And we have the national education network project of which I am a fan. Because it is something beautiful to realize, such a big initiative. Very needed, I think, and much too late introduced to Polish education system. Nevertheless, very much needed project of connecting all schools in Poland to standard, secure Internet. I might just add that in our city, we reached the target level four years ago. We already have our own context related to these services so for us not much will change. But there are plenty of schools for which this means opening to the world and a real change (I don't want to say evolution) in the context of the quality of using digital services. But we are talking about something which, as I have already mentioned, should be the standard and still isn't in many places and in many schools" (R2).

The last respondent also refers to the National Education Network project (OSE, Ogólnopolska Sieć Edukacyjna). This project involves not only access to high-speed, stable Internet but also securing the school networks. Strengthening security includes filtering the content sent via the school networks. It is an important task which goes beyond the standard services of Internet Service Providers (ISP).

"You know what, the answer depends on which agency and when. Surely, there are better and worse moments. OSE is definitely a good project. As I mentioned, among these I'm familiar with. I don't know if it is well implemented. But for sure, it is a good program" (R3).

Discussion

Use of ICT in formal and non-formal education in Poland is an interesting problem which is addressed at different levels of narratives among the teaching staff and scientific analyses of media pedagogy experts (Plebańska & Halska, 2017; Plebańska, 2018). In each of these narratives teachers play the important role as the key persons responsible for ICT implementation into learning and teaching. Preparation of teachers to the process of equipping schools in IT solutions brings about many challenges (Tomczyk et al., 2019). ICT-based education technology raises many discussions, especially regarding the challenges of expanding the curricula with new areas like coding, domination of some didactic means like multimedia presentations, or rarely used methods of team work (Stosic, 2015; Novković Cvetković, 2018). The areas of challenges are presented in Table 1.

Table 1. Use of ICT in formal and non-formal education in Poland

Teacher as the key person
IT teachers do not always teach ICT as their primary subject.
Sociodemographic characteristics of teachers determine the way ICT is used.
Low quality hardware and Internet connections in some schools
BYOD - as insufficiently developed approach
Algorithmic and coding thinking as priority activities
Multimedia presentations are used most often.
Multimedia presentations more and more often cause resistance and lead to discussion.
Using tools to support team work as a challenge

According to the respondents, one the most common obstacles to ICT implementation is the lack of openness to innovations among the teachers. This is a serious accusation, oftentimes without real grounds. Early education teachers in particular (Gałecka et al., 2017) experiment, introduce new didactic methods, forms and tools into the integrated teaching curricula. Ability to implement innovations is one of the universal competencies of pedagogues, which should be trained by the prospective teachers (Plaskura, 2019). The human factor is also connected with low digital literacy among the teachers (Tomczyk, 2020). This factor is often associated with insufficient methodic support and assigning IT courses (computer classes) to teachers for whom this subject is only additional (Kosiba, 2012; Pyżalski, 2010). The most common obstacles are presented in Table 2.

Table 2. Obstacles to introduction of modern ICT-based solutions in Poland

Openness to innovations, lifelong learning
Experimenting, ability to introduce new didactic means and forms of work
Stereotypical classifying IT-related activities as separate subject
Different interpretations of the core curriculum
Lack of proper preparation among the prospective teachers
Ageing equipment, upgrade of hardware in schools
Low level of digital literacy among teachers
Lack of adequate support for teachers

Teachers are considered one of the professional groups constantly improving their competencies. Their profession requires ongoing updates of knowledge, competencies, skills and in some situations, change of habits (Szpemruch, 2013). Teacher competencies development is a universal and global challenge. Teachers are one of the key links in the didactic process. The respondents pointed out that school transformation is impossible without the participation of the pedagogues. Thus, human capital becomes critical for the introduced changes (Konieczna-Kucharska, 2012; Kędzierska & Potyrała, 2015). The detailed list of human capital development indicators is presented in Table 3.

Table 3. Hardware and human potential and ICT-mediated education

Constant development of human and hardware potential
Transformations and modernisation of Polish schools
Human resources more important than technology resources
Teachers as critical, key element
Lack of motivating factors

The participation of business in educational activities is still insufficiently explored. On the one hand, we know that commercial institutions aim at generating revenue, on the other hand, it is schools that use these commercial solutions and prepare future employees. The respondents point out that this division is logical and clear. Nevertheless, contribution of the commercial sector is particularly important in the aspect of school modernization, for example through implementation of technological innovations or modernization of vocational training curricula or student internships. For more information see table number 4. (Gondek, & Makarewicz, 2016).

Table 4. Role of business in educational sector

By definition, business sector is oriented towards generating revenue.
Low level of support offered to schools.
Business sector plays significant role in school modernisation.
Schools are attractive customer for the business sector.
Supply of and demand for commercial ICT and educational solutions is growing.
Internal funds are used to purchase new hardware and applications.

Innovative education is one of the major arguments when it comes to implementation of different new solutions. Usually, innovation means changes in the curricula and the system, introduced as the response to civilizational challenges. Innovations can be introduced externally and by creative and experimenting teachers (see Table 5). Innovations and ICT are the areas which change dynamically due to the transformations of the information society (Ziemba, 2019; Wątróbski et al., 2019).

Table 5. ICT and education innovations in Poland

Changes in the core curriculum force innovations.
Innovations are often introduced to schools by external entities.
Activities in favour of social change (practice) are highly valued.
Integrating ICT into interdisciplinary education.
Polish businesses become global players in terms of innovations and education.

Supporting the development of ICT-related skills among people responsible for learning and digital inclusion process is one of the components of lifelong learning (Szarota, 2019; Starčič et al., 2007). Based on the material collected, we have noticed that there is the need for critical evaluation of professional improvement of teachers in Poland as the quality of some training forms and the training content are sometimes inadequate to the needs. Also, the intense development of support communities among the teachers has been observed. Informal groups focused on improving methodical competencies and digital literacy are not a new phenomenon. This trend, however, should be further explored as part of the future research into the cyberspace phenomena. Table 6 summarises the challenges faced by the teachers in the area of self-development.

Table 6. Support of development of ICT-related skills among people responsible for learning and digital inclusion

Lack of regular support, mainly single meetings
Different quality of courses to improve digital literacy of teachers
Teachers' self-reflection about developing own competencies
School mission should be coherent with the idea of development support.
Knowledge sharing and learning teacher communities as new trend
Changes in education system force teachers to acquire new knowledge and skills

Open education resources are one of the main source of interesting scenarios or teaching tools for the teachers. Many outcomes of the projects financed from the public sources are disseminated as OER. Unfortunately, despite the availability of many files, videos, exercises and scenarios, the respondents notice lack of standards for positioning and creating the repositories. Resources are very often inaccessible for people with disabilities (Plichta, 2017; Młynarczyk-Karabin, 2019). We can also observe that teachers engage in creating and sharing their own didactic materials. Such efforts should be supported and presented as good example. The challenges are summarized in table 7.

Table 7. Open education resources and work with disfavored groups

It is popular but insufficiently explored solution.
Teachers contribute to OER development.
Central programmes are based on OER technology.
Resources created using public money should be available as OER.
OER is the answer to domination of business institutions.
OER should be available to all Internet users.
Files need to be classified.

Supporting ICT use in learning and social integration in Poland in the light of government actions is the phenomenon which has developed in the EU during recent years. This is thanks to many financing sources. Human capital development and reduction of digital divide (Hofman & Tomczyk, 2012; Tomczyk, 2018) are some of the top priorities related to removing social divisions created as a result of intense development of the information society. Most of these initiatives are based on regular programmes financed from the European Union funds. According to the respondents, some deserve special distinction. At the same time, there is still room for improvement in this area, for example regarding incomplete diagnoses which should include local conditions (including goals and needs of institutions). As for good practices, we must mention activities of Polish institutions towards digital inclusion such as: Universities of the Third Age, Senior Clubs, informal societies which complement the central programmes and are the answer to the needs of small local communities - summary presented in table 8 (Mackowicz & Wnek-Gozdek, 2016; Mackowicz & Wnek-Gozdek, 2019).

Table 8. Supporting ICT use in learning and social integration in Poland in the light of government actions

Providing financial support from EU budgets
Non-cyclic bottom-up initiatives
Diagnosis as the key element of systemic ICT implementation and digital inclusion
Setting goals of institutions vs local needs
ICT implementation is very diverse process.
OSE (National Education Network) as one of the leading projects.

The presented results do not enable generalization of opinions for several reasons. First, due to the character of the study which was qualitative. Second, due to the limited sample consisting of only three persons. Third, the problem of ICT, education and inclusion is differently interpreted depending in the respondents' profession and their perspective resulting from the represented sector. However, the results presented herein, give some general view of the situation, which may prove helpful during designing quantitative research (to measure the scale of phenomena) and comparative studies. We also postulate to conduct similar and more in-depth interviews in a saturated sample. The results presented may be also valuable for the stakeholders who try to understand the ICT-related changes which turn out to be global in the context of such key education factors as: teacher, modernization of education system, improvement of curricula.

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