MOBILE EDUCATION – CIVILISATIONAL CHALLENGE OF EDUCATION IN XXI CENTURY

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Abstract

The chapter pays attention to the changes caused by the development of mobile devices and applications and their contribution to the education of the future. It also presents the results of questionnaires distributed among practicing teachers as well as students – the teachers of the future. The purpose of this study was to establish the degree to which today’s teachers use the information and communication technology (ICT), which are they accustomed to and which are being used by students.

Key words: m-learning, information and communication technology (ICT), mobile community, mobile devices, smartphone, tablet, education of the future

If Your Kids Are Awake, They’re Probably Online.
„New York Times”

1. Introduction

Mobility is currently a leading idea for all of the producers in the area of information and telecommunication technologies (ICT). All of the newest technical devices should be as mobile as possible, but at the same time, they should make the life of a typical person easier. A big technological advancement caused an easy access to advanced and cheap mobile devices as well as wireless systems. Almost everyone is currently an owner of some mobile device, for example a phone. It has an irreversible and viable impact on everyday life, making it much easier and more effective.

A sudden development of electronic media and mobile devices, as well as resulting dynamic expansion of information and communication technologies (ICT), revolutionised almost all spheres of human life. However, even though today’s society is surrendered to continual transformation in order to accustom to economic, societal and cultural changes, Polish education is still based on the old methods. This is exactly why changes to the process of educating and teaching have to be introduced in line with XXI century. Modern education requires an adaptation to the demands of the environment, including all the new trends such as an increase in mobility.

In current times, where the development of mobile devices plays an important role, it is worth spotting an education potential in those. Possibly m-learning is the future of teaching and learning. In the meantime, an increasing problem in the educational organisation are the lacks in knowledge and insufficient abilities of teachers in the areas of using and applying

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information and communication technology (ICT) tools during classes in schools and elsewhere.

This is why it is important for modern teachers to spot the abilities of modern technologies in supporting education and for them to gain appropriate abilities in those areas. It is even more crucial because students these days are people who are growing up in a symbiosis with the virtual world.

2. Mobile devices and trends

In the last few years, we can observe a dynamic development of mobile technology towards so called smartphones. Ability to access the Internet using a mobile device regardless of the place and time changed the way that Internet users behave. The recent explosion of popularity of smartphones and tablets revolutionised the way we communicate with each other and how we use the Internet, not just at work or at school but also in private life.

More and more people, especially in the group of so-called ‘digital natives’ (people who were born between 1985 and 1998), cannot imagine not being able to check the information on the Internet, contact their friends via Facebook, or check their emails using the device that is part of their everyday life, the mobile phone.

Thanks to the dynamic development of mobile Internet, it is now also possible to open the e-commerce market towards a completely new solutions and services. Polish banks now often offer their clients an ability to manage their finances via the phone. Mobile service providers offer mobile payments based on different solutions, which in the future will be probably replaced by a unified payments system.

It is also worth noticing that the pace of the changes caused by the development of mobile devices and applications as well as the transmission of data using the mobile network is faster than previously forecast. Evidence in support of that are the statements made by the analysts of the top organisations during the LTE World Summit conference that took place in mid May 2011.

A potential influence of mobile devices on society is much higher than the traditional computerisation was. The growth in popularity of mobile Internet is taking place a few times faster than the first phase of the development of access to the Internet on PC computers. Just last year, more mobile devices have been sold than the stationary ones. According to Cisco estimations, a leading producer of the equipment used to build networks – in 2011 about 600 Petabytes of data has been sent via mobile networks all over the world, and according to the prognosis of the same company, one smartphone in 2015 will consume on average 1.3 GB of data a month, which is several times more than in 2011 [7]. It is those devices together with modems allowing users to access mobile Internet on their laptops, and rapidly rising video transmission that will be the major force behind growing data transmission.

Mobile devices have so far created the biggest surge of creativity, while at the same time brought a lot of new opportunities, including those in entertainment. A growing use of

\[^1\] Mark Prensky, an American researcher of media is the author of the terms ‘digital natives and digital immigrants’. In his article ‘Digital Natives, Digital Immigrants’ from 2001, he used those terms for the first time to show the differences between generations.
share of Internet website being accessed via mobile devices is increased by the popularity of smartphones and tablets, while at the same time, changing habits of Internet users – the way they use the Internet, show that the next few years will be highly influenced by mobile technologies. Mobile access to the Internet takes the use of Internet into a completely new dimension.

According to the conducted studies, people in Poland are discovering new advantages of smartphones. According to the Gemius report, 16% of users of the Internet purchased something online using a mobile device at least once. However, smartphones are useful not only when shopping online, but also in traditional shopping. An example of that is a company Listonic that prepared an innovative project – a mobile shopping list that is synced in the cloud [9]. Using any device (a computer, a mobile phone or a tablet), it is a shopping adviser; while for the cooperating companies it is a new distribution channel for sales and marketing. An example of this and similar applications, which are growing in numbers, confirm that the future of information technology belongs to mobile devices and applications.

At the same time, it is worth noticing, that different age groups have different preferences in relation to the use of mobile technologies. Younger generation, so-called digital natives, who grew up in the world of new technologies and for whom Internet services are as obvious as using any other home appliance, are ‘immersed’ in those services, they are the ones who most often visit mobile services with music, video clips and social networks. They see the world through technology. Very often, the lack of access to the Internet equals a frustration and being separated from their environment. The older generations, on the other hand, so-called ‘digital immigrants’, even though very often possess the competences and abilities to access the Internet, they feel a bit alien in this world and they use mobile Internet in the same way as they would the traditional one. People from that generation see the Internet only as a way to achieve their goals. They usually visit websites with current information, business sites, maps and use e-mails.

Despite what services it offers, mobile access to the Internet is becoming more and more popular with its users. The reasons behind it are its ease of use, cheaper prices of mobile devices as well as the increase in the speed of service and transfer of data. According to the polls, because of those reasons, the sales of mobile phones in the next few years will systematically increase. The major forces behind this are smartphones and mobile phones. The sale of tablets will also increase.

Obviously, any device without appropriate software is not very useful. It is the same case with smartphones, which if not for the applications that they offer, would be just regular mobile phones, while tablets are just devices for checking e-mails, surfing the Internet and reading e-books. The applications are the ones who change them into devices used for the entertainment or equipment used in work and business. Applications are not just entertainment, games and social networks or information portals, but also an opportunity to offer a wide variety of services.

Gartner Company estimates that by 2014, 90% of organisations will offer business applications on private devices for their employees – mostly on tablets [11]. And even though this trend is not so evident in Poland just yet, this situation is rapidly changing and the potential for tablets on Polish market is increasing gradually. This is why premises like this should not be ignored, especially if they are backed up with statistical data.
So far, most of the typical users were using notebooks, satellite navigation or e-book only devices, while tablets integrate all those functions into a single device. This is causing the market to extend into new consumer and business sectors. It is also why it is worth, from within the business uses of mobile technologies, to appreciate their potential in education. More so, because new trends in employment, apart from educating and developing the youth in their perception of their physical abilities, also emphasise their continual development and gaining their qualification as well as preparing them to creative and mobile existence in accordance with dynamically changing job market.

3. Educational potential of mobile devices

Mobile media are developing extremely fast. Information and communication technology (ICT) device market is growing year on year. The number of users of such devices is growing too. At the same time, more and more application are being developed and they allow users to complete more tasks ‘on the go’. Mobile devices are becoming an integral part of our lives. Among their functions, they also allow access to a varied range of education and courses, educational games and application supporting, for example foreign language learning. They allow plugging into the Internet anywhere and anytime, wherever we are. We always have access to the information. At the same time, we do not have to just remain a passive recipients of the Internet, but we can become the creators of its content, providing pictures, videos of hyperlinks to some interesting websites. In addition, in case of social networks (Web 2.0) we have the full liberty to create its appearance, content and as a result we experience a new category of network communication: indirect, direct and active [2]. All of this is a result of better accessibility than in previous years as well as the development of the technology and the speed of networks.

According to W. Gogołka, education is one of the most expressive illustrations of the uses of above-mentioned categories of network communication, especially the active communication. This types of communication ‘constitutes an exemplary form of social practice which is based on active interaction during the information exchange. It can be successfully used by teachers, students, but also parents or employers – all actors in the process of gaining knowledge [2]. And while e-abilities are now often the decisive factors in the promotions across the industries, unfortunately, the existing education systems stay behind.

A competency that is a mark of time and without which we could not imagine the building of the knowledge society is the ability of using the information and communication technology (ICT) devices. Today, it is not only the knowledge of, but even more an efficiency in using media that is important. In the meantime, there is an obvious discrepancy between the demand for teachers with the ICT abilities and an actual competences of current teachers. Contemporary education is a place of generation differences. According to M. Filiciak, the education is trying to adjust to the style of life of young people, but is still much behind. It acts individualistically. Instead of evening the opportunities, it emphasise the differences. According to him, education should be open to new media and have an active role in their use [1].

An important source of information for people looking for reliable advice about how to plan the use of new technologies in teaching is The Horizon Report prepared yearly by the international consortia for the educational system. It is one of the few works, which is
relevant to the changes in education at the global level. It constitutes a rich source of information for Polish teachers as well. It provides a competent and accurate forecast, which is based on research and is relevant to trends and technologies that in the next few years will start entering our educational market.

The current edition of the report stressed the development of the following technologies in the next few years:

- ‘Mobile Apps, Tablet Computing (One Year or Less);
- Game-Based Learning, Learning Analytics (Two to Three Years);
- Gesture-Based Computing, Internet of Things (Four to Five Years).

Among the main trends and their role within education, it mentioned:

- Blended learning via online programs, hybrid learning and collaborative models are taking hold
- Working and Learning are anytime, anywhere activities
- Cloud computing is becoming more common and IT decentralised
- Classroom learning is becoming more active and challenge based
- Student work is becoming more collaborative as work and learning organisations are moving to collaborative and collective models of work’[5].

The Polish education system cannot be out of context in relation to global trends. Polish education is facing new challenges, including the preparation of students for both personal and professional life – both the realistic and virtual. The influence of technology on our lives is increasingly growing, which is why their role and significance in the process of education has a principle contribution.

W Kołodziejczyk and M. Polak, in their report ‘How is education going to change? The challenges for Polish education and students’, prepared for the Civilian Institute was an attempt to look at the possible future based on currently existing data and analysis with an outlook on the global trends in education [8].

In the summary presenting the challenges to the education of the future, the authors included:

‘Information education and the use of information and communication technology (ICT) in Polish school should stop being an experiment and become a main trend, which is integrated within the educational core. It is time to stop locking the computer rooms in schools, the nonsense of forbidding using mobile phones, smartphones and any other mobile devices, as well as WiFi being reserved only for the head teacher and other selected teachers. The changes should happen first of all at the level of the practice of teaching and it should include all subjects taught. It is crucial to provide a fast Internet networks in schools, which would be easily assessable, wirelessly both by students and teachers’ [8].

It seems then, that the problem is not a lack of access to new technologies or WiFi networks, it is a lack of idea about how such tools should be integrated within classes in schools.

It is important for the teachers to appreciate the abilities of new technologies to support the education, development, communication and cooperation. The publication ‘Mobile Education, M-learning, (r)evolution in teaching’, prepared as part of ‘My Education’ project („Moj@ Education”, 2011) could be a hint here, as well as a guide. It can be found at eustyle.pl portal and it is mostly directed towards the teachers [10].

This project proves that even without big financial expenses, new technologies can be an ally in education.
Some recommendations included in the publication are presented below.

Some of the basic recommendations for teachers include:

- Creating abilities in students to efficiently search for and assess the quality of information based on, for example, a comparison of information from different sources (using the WebQuest method);
- Allowing students to choose the form of submitting their assignments: written in hand, printed after preparation in a text editor or online documents published or shared via the Internet;
- Using electronic documents as part of education;
- Accepting a rule, that in a modern learning, the process of creating is not less important than the product, because it allows students to be creative and active and permits a debate over the created knowledge;
- Teachers’ presence on the Internet;
- Students should not be persuaded that using a computer is harmful, since they are often encouraged to read a book (physical activity is healthy and there is more physical activity likely to happen while using a mobile device rather than reading a book);
- An avoidance of favouring one type of device or software, instead, using an open for general use and if possible multi-platform software;
- Encouraging and motivating students to a very sensible personal activity outside of classes – a healthy one (fresh air and physical activity) as well as educationally valuable, thanks to the use of mobile devices.

The authors of above-mentioned publication are stressing than any new inventions do not rule out the ones existing already, but only strengthen current media. One of the examples is television, which did not force out the cinema, as well as a mobile phone (smartphone), which will not replace the television. Such devices exist next to each other, mutually supplementing each other and creating different potentials.

However, the access to the new equipment, software or the Internet is not enough. New information tools – information technologies - will not bring about the expected changes, unless they are supported by a new methodology. It is not enough to replace traditional black boards in classes with interactive ones and replace stationary computers with notebooks, or television with smartphones. All of this requires changes to the whole organisation of educational process, which would include traits and preferences of the students, which are much different to the preferences of teachers – digital immigrants. L. Hojnacki in his article ‘M-Learning generation – new challenges for education’ [4] compared some of those traits and preferences for both generations (table 1).

The results of ‘My Education’ („Moj@ Edukacja”) competition, advice which tools should be used for the process of teaching-learning, so that students can learn easier, more efficiently and with the use of varied multimedia. They show that active teachers and creative students, even without big financial expenses and without waiting for computer rooms in schools to have the most modern equipment, are capable of showing that new technologies can be allies in the process of education. The main theme of the first edition of this competition was ‘Show us how you like to learn’. Over 200 teachers and students from all over the country proposed over 90 educational tools. Among the submitted solutions, the most popular ones where websites, presentations, films, audiobooks and blogs [6].
Currently in teaching, because of the variety and the huge choice of equipment available, as well as the variety of possible solutions, it is worth using the methods of working in groups which are based on collaboration and planning. Another good idea is to use the solutions that organise and synchronise data between different devices, for example the ones using the cloud. A lot of services offering the cloud abilities, for example Google Docs or iCloud, allow the use of a huge variety of functions that can support the educational requirements of schools.

Table 1. A comparison of some of the traits and preferences typical for the two generations [4]

<table>
<thead>
<tr>
<th>TRAITS AND PREFERENCES</th>
<th>TEACHERS DIGITAL IMMIGRANTS</th>
<th>STUDENTS DIGITAL NATIVES</th>
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</thead>
<tbody>
<tr>
<td>Experience problems with understanding the virtual surface that can be seen through a window being moved above it.</td>
<td>Have the ability to imagine and understand the virtual surface that can be seen through a window being moved above it.</td>
<td>Experience problems with understanding long and complicated text.</td>
</tr>
<tr>
<td>Have the ability to imagine and understand the content of a long, lineal text read from a book.</td>
<td>Have a better understanding of printed text.</td>
<td>Easily read on a small screen.</td>
</tr>
<tr>
<td>Value text more than vision and sound.</td>
<td>Prefer lineal thinking and parallel processing of information.</td>
<td>Value vision and sound more than text.</td>
</tr>
<tr>
<td>Prefer patience, regularity and expectation of cumulated results.</td>
<td>Prefer a free (hyper textual and hyper media) access as well as parallel processing of information.</td>
<td>Prefer accidental and short-term learning; experimentation, multitasking and expect quick results.</td>
</tr>
<tr>
<td>Use only basic, standard function of mobile devices much like the traditional ones. They do not trust new technologies.</td>
<td>They discover all functions of devices and come up with new applications. They trust new technologies and have a creative approach. They treat their devices in a personal manner.</td>
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*Mobile Education, M-learning, (r)evolution of studying [10] could be a good source of information and practical tips for teachers who are worried about introducing new information technologies in their teaching. It is a comprehensive guide for both teachers and students. It includes ideas and hints about the abilities of using the mobile information technologies for transferring knowledge and skills, development, communication and coop-
eration. It points to an impressive potential of the Internet as well as mobile devices and multimedia.

4. The use of ICT by teachers

Nowadays, when in most of the European countries the pace of implementation of information and communication technologies (ICT) in education is satisfactory, an important challenge is the effective utilisation of those tools in Polish education.

The development of competences in the range of ICT is one of the priorities of the European strategy – ‘Education and Training 2020’. The conclusions from that document include the main aims and challenges for the future cooperation of European countries in the areas of education and training in the next few years.

They include:
- learning throughout the whole life and the mobility for the purpose of education;
- improvement of the quality and the results of education and its effective offering;
- the promotion of just and active citizen stance;
- an increase of innovation and creativity at all levels of education.

The purpose of the education is to optimally use the innovative techniques of teaching and learning which are based on the information and communication technologies (ICT).

Teachers are key in strengthening and creation of a new digital environment in schools.

This is why it is important for schools to employ well educated teachers who can implement information technologies into education in a way that enables a transformation of the old paradigm of education into a new one.

If information and communication technologies (ICT) are to be efficient as educational tools, it is worth analysing which of those novel tools are being used by teachers at the moment.

The results of the questionnaire taken among the teachers of primary, middle as well as secondary schools are shown below. The results also include the responses of a group of students from education courses based around ICT, who will become teachers in the future.

The analysis includes 60 respondents (45 female and 15 male). It has been conducted in 2011.

The purpose of the study was to check to what extend teachers use the information and communication technologies (ICT), which are being used by their students in everyday life. A questionnaire has been used – a test of a modern teacher, prepared by Bob Harrison who is a consultant to the British New Educational Technologies Agency.

The questionnaire included 15 questions, for each, when giving a confirmative answer, a respondent can give a maximum of 10 points. As a result the top score is 150 points. However, even a score above 100 points proves that a person will manage as a teacher and digital citizen of XXI century. If a respondent got from 50 to 100 points, it means that he is on the right track, but has to fill his gaps in knowledge with popular ICT tools in order to keep a good rapport with young generations. Finally, respondents who got 50 points or less, should be weary that in the near future they will not be able to develop a good rapport with younger generation and introduce a necessary changes in the organisation of their teaching which would be an answer to the needs of modern education.
Age brackets of the subjects were varied (Fig. 1), similar to their professional degree. The biggest group tested were certified teachers (Fig. 2).

The subjects consisted of: 17 teachers from primary schools (Fig. 3), 19 from secondary schools (Fig. 4) and 14 from upper secondary schools (Fig. 5). The number of points gained by the subjects, are represented on figures 3 to 6.
As evident from the results (Fig. 3), none of the subjects from primary schools gained a satisfactory number of 100 points. Over 50% of subjects from this group should fill the gaps in their knowledge and abilities in using ICT. The rest do not understand and do not use information technology tools.

The results were even worse for the group of middle school teachers (Fig. 4). Only 32% of subjects fit into the brackets of 50-100 points, which means that there is a serious need to fill the gaps in their knowledge of novel information and communication technology (ICT).
tools. The rest obtained a very weak results. 11% of subjects in that group ended with a score of 0, which shows that they do not possess any knowledge of ICT.

Fig. 5. The number of points obtained by the teachers of secondary schools

The results for the group of teachers from secondary schools were more optimistic (Fig. 5). About 30% of subjects gained 100 points or more, which shows that they possess sufficient technological knowledge worthy of XXI century. The remaining 70% of subjects, after filling some of the gaps in their knowledge about some of the abilities and solution of ICT will be able to face the requirements of modern education. They have gained enough points (within the range of 50-100).

Fig. 6. The number of points obtained by students – future teachers
At the same time, it is worth mentioning that the best results were obtained by the students – future teachers (Fig. 6). None of them gained fewer than 50 points.

It is also worth mentioning, that among the subject, the biggest percentage claimed to use Wikipedia in their teaching, as well as Skyping and previewing and watching YouTube films. The smallest percentage of subjects already created a personalised Google page (iGoogle), use Twitter or a similar tools or portal for microblogging, recorded and published their own film on YouTube or are the owners of their own websites. Not many of them use mobile devices for surfing the Internet either.

In the meantime, it is natural for students to exist in the environment of overloaded and easily accessible information, as well as global instant communication. For the modern students, the kids of digital age, it is natural to use the modern technological tools. This is why in the next few years, teachers will have to remodel their teaching methods, in order to get accustomed to the new – mobile technologies. Even more because the results of the studies are not optimistic and point to the huge gaps in knowledge and abilities of teacher in relation to ICT.

1. Conclusions

The miniatuization of communication devices, which is going hand in hand with their growing efficiency and multifunctionality is a process that has dominated XXI century and helped realise the vision of the education of the future. The changes that are taking place in the information society with the adaptation of the development of information technology tools have a huge influence on education processes and show the growing potential of mobile devices, educational games and artificial intelligence.

It is important to already prepare for the education of the future with the use of novel tools, which will soon revolutionise the process of teaching and learning. This process will require changes in the mentality of the current generations of teachers, who most often use the traditional, old-school methods of teaching because of the gaps in their knowledge of ICT.

6. References