



Mobile devices in instruction, the options of iPad in pedagogical innovation

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Abstract:

The presentation outlines Apple's educational policy, focusing on the following aspects of innovation:

- Development of 21st century skills;
- Curriculum development based on the integration of a wide range of mobile infrastructure;
- Informative assessment that supports continuous development of skills and abilities through ICT-supported methodologies;
- Social and emotional connection within digital culture;
- Creativity and innovation as integral aspects of educational development;
- 24/7 access to educational resources;

The presentation will illustrate the educational model realised with the help of Apple technology, Challenge Based Learning (CBL) through an overview of results of the Apple Classrooms of Tomorrow – Today, ACOT), an innovation project launched in 2008 and realised in hundreds of secondary schools worldwide. This model uses a learning environment based on mobile computing, just-in-time learning, self-authored textbooks by teachers produced through the iBooks Author software and projects by students planned and executed with the help of educational software applications designed for iPads. The presentation will show CBL adapted for the iPad experiment in Eger:

- creation of an ACOT environment complete with 1:1 accessibility to iPads by teachers and students, collaborative tools and 7/24 accessibility to learning content;
- tasks selected to foster strategic thinking;
- social issues integrated in the curriculum through local and global case studies;
- interdisciplinary approach to arts and science subjects;
- development of 21st Century skills;
- extensive use of Web 2.0 technologies for teaching and learning;
- continuous documentation of the teaching and learning process through developing discipline-based and interdisciplinary knowledge building communities.

1. Introduction

It is beyond doubt that the 21st century is the age of mobile communication. The combination of information technology and telecommunication facilitated the integration of heretofore personal communication devices into one tool. The respective technologies fundamentally changed our lifestyle, communication, entertainment, and consumption habits and social relations as well.

While these developments should be welcomed, one must ask the question: how can such technologies be integrated into everyday culture? What is more important: the device, its possession, or the technological arsenal and innovation provided by these apparatus? Or can we appreciate the enormous content and knowledge we gain access to along with operating the data base culture? (Manovich 2009). Last but not least, we



have to ponder the issue of utilizing the technology-provided benefits in education, or the application of the advantages provided by the data base culture in our own micro and macro world.

2. Facts and results on the mobile and tablet market

2.1. Facts related to the mobile phone market

Before answering the abovementioned questions we provide a survey of the role of mobile communication and related industries in the global economic arena.

According to data provided by the International Telecommunication Union as of May 2014 7 billion people have mobile phones worldwide, in other words 95.5% of the global population has a mobile phone account.¹

According to researchers of the American IDC informatics and telecommunication research institute² in 2013 the sale of mobile phones surpassed the 1 billion set mark.

Last year more than 1 billion, that is 1009.6 million smart phones were sold worldwide, surpassing 2012 sales figures of 725.3 million by 39.2%.

In 2013 Android increased its market share from 69% in 2012 to 78.6% as 1,5 times as much Android-equipped smart phones were sold in 2013 than in 2012.

Also in 2013 sales of sets with Apple iOS operation system increased by 12.9% compared to the previous year.

Sales of the Windows Phone operation system basically doubled rising to 33.4 million from 17.5 million of the previous year amounting to a 3.3% market share as compared to the previous year's 2.4%.

2.2. Tablet sales figures

According to the annual market research data of Gartner³ tablets became a real mass consumption item in 2013. Compared to 2012 figures with the sale of 116 348 000 to 195 435 000 the market share of tablets increased by 60%.

Data provided by Gartner show that lower price tablets with smaller displays ruled the market last year. The growth of the tablet market was due to the purchases of first time buyers leading to the dominance of the Android.

The respective study shows that in the third quarter of the last business year (2013) PC sales dropped by 8.6% although during the given period approximately 80.3 million personal computers were sold worldwide including computers used for office, instruction, and other business use. While at first sight such data appears encouraging, the authors point out that these are the lowest PC sales figures posted since 2008. While the demand towards PCs tends to subside, IOS and Android tablets appear to dominate the market, especially in case of machines for general and educational use⁴.

A researcher at Gartner, Mikako Kitagawa argues that both the mature and young consumer generations shift their preference from personal computers to tablets. The first phase of this consumer transition involved the younger buyers who favoured the increasingly affordable iOS and Android equipped tablets, later found useful as an accessory device for older consumers as well.

3. Mobile communication in schools

Said data suggest a trend determined by the respective technological developments especially the improvements of the operational systems as the main factors behind the exponential growth of the mobile and tablet market.

¹ The International Telecommunication Union <http://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2014-e.pdf>

² International Data Corporation <http://www.idc.com/>

³ Gartner, Inc. is the world's leading information technology research and advisory company. <http://www.gartner.com/newsroom/id/2674215>

⁴ <http://www.gartner.com/document/2672716>.



A greater difference can be experienced regarding Internet access, e-mail traffic, the downloading of applications, or listening to music, while on-line registration to different sites is still in the beginning stage. Thus the question emerges: how can such devices be used in education?

3.1. Mobile use related results in Hungary

The use of mobile devices for educational purpose has not really reached its full potential in Hungary, however almost three quarters of households possess broadband internet access, which supercedes the European Union (Lengyelne, 2016, p. 67). While most students come to school with smart phones or sets with web connections, the quantity and quality of digitalized texts and other educational devices lag behind the respective options. A research project performed in Csongrád County⁵ focused on the school or learning related use of mobile phones by young people in a university town.

The current generation of secondary school students and those attending higher education institutions is extremely open to the use of such devices mostly for their own purpose. Said research focused on a heretofore unexamined area, the educational use of mobile devices. Considering the positive effect indicated by the OECD between the quantity of ICT use and the mathematical result of the PISA survey (Lengyelne, 2013 p. 4) and taking into consideration efforts at digitalizing cultural content and educational materials exclusively developed and optimised for mobile devices such aspirations would fundamentally change the contemporary educational paradigm along with students' relation to the educational materials.

Any educational use can only be successful if the demands and skills of students are harmonised with the instructional goals in the context of an appropriate familiarity with the respective mobile technology background.

The survey was carried out by the Digital Culture and Theories Research Group of the Faculty of Humanities at Szeged University and the Southern Plains Division of the Hungarian Telecom Company. The survey aimed at exploring the relationship between the targeted student groups and mobile devices they were familiar with and wished or planned to use.

4. Mobile phones are not sufficient for solving homework problems, but can be very helpful

While 35% of smart mobile phone owners use it for reading, only 12% use the set for the compiling or editing of texts.

It was revealed that 19% of students use their mobile phones for preparing homework. However, in case of supplementary mobile use in searching for data during fulfilling homework tasks in a traditional manner with pen or pencil the rate of smart phone use is 41%.

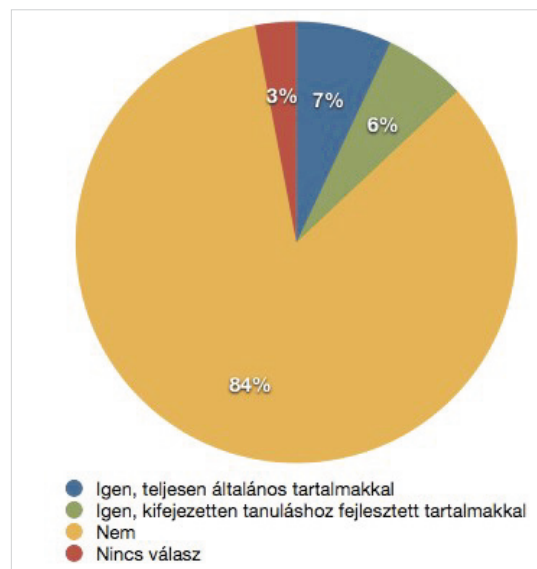
5. Educational institutions: social media services yes, mobile services not yet

Mobile solutions are virtually non-existent either in secondary schools or in higher education. 84% of all respondents have not seen mobile phones, tablets, or e-book readers used by teachers. (A Pew Research survey⁶ showed that this rate is exactly the opposite in the United States as 73% of teachers use the options provided by mobile technology.) 13% of the students confirmed their access to textual content optimised for mobile device, 7% to general, 6% to that of designed especially to interface.

⁵ Media research performed in Csongrád County (2013. April 04) http://hvg.hu/tudomany/20130404_csomoku_csongrad_megyei_mobilkutatas

⁶ Pew Research Internet projects Cell Phone Activities 2013 <http://www.pewinternet.org/2013/09/19/cell-phone-activities-2013/>





Yes, fully general content

Yes, content developed especially for educational purposes

No

No answer

Diagram 1. The use of mobile applications in schools in Hungary in 2013.

The situation is much more encouraging regarding the social media as 32% of schools have their own Facebook page or group and 42% use a social media solution on its webpage. (We believe that in most cases it is a button facilitating information sharing or the fast dissemination of news, an option already familiar from other web sites.) Yet 25% of students have no information whether their school would be open to any form of social media. 6% would not use the social media option, 23% would consider it, and another 25% is definitely open to regular use. Thus these data suggest a specific demand.

6. Is there a need for e-Texts?

Currently, a little bit more than 50% of the institutions provide educational materials in digital form, 26% answered as mostly not, and 18% does not provide any digital texts at all. As institutions express a demand for the availability of their educational materials in digital form we have to examine the level of receptivity of students to such texts.

7% of the respondents indicated using mobile applications developed for educational environments and objectives. 11% would definitely use such texts, while 43% indicated a great likelihood. It is, somewhat surprising that 36% would not use digital educational materials at all.

The answers regarding e-Texts reflected the same trend: 12% already uses such solutions (e-Book), 14% would definitely 43% would willingly turn to such materials, while 28% refuses this approach. The reluctance however is not exclusively due to a negative attitude toward the digital format, but is based on the perceived high costs associated with the acquisition of the devices necessary for their use and processing.

7. e-Texts and hardware should be cost effective as well.

Respondents confirmed one of the main research hypotheses, that is the price consciousness of the Hungarian mobile phone and e-Text market. 36% would like to have access to digital materials free of charge, 21% would prefer a lower price than the printed version, and 11% wished that the price of e-Texts would be lower than that of the cost of copying printed materials. It is surprising that 2% would accept paying a higher price for digital materials, and 12% believe the price of digital and printed materials should be identical.

The respondents confirmed that the main advantages of e-Texts are the fast production and sharing options, easy processing, updating capability along with a lower production cost as compared to traditional printed materials.

In addition to the advantages the survey included the potential drawbacks as well. 12% of the pupils and students felt the use of these texts is difficult, probably primarily due to the respective presentation and processing devices, 18% consider the given price too high. It can be concluded that the opinion and fear of the majority are related to this issue as 54% consider the acquisition of the appropriate device the greatest obstacle.

8. Mobile as a school weapon

The survey asked whether mobile phones were used for cheating during test writing and exams. As it was expected two thirds never turned to mobile cheating options, while 32% confessed to cheating via a mobile device during a written test (no names were given by respondents).

We did not emphasize the moral aspect of the question as the preparation of a mobile cheating device suggested a higher level of use or familiarity as those confessing to cheating have already discovered another aspect of the educational functions of such devices.

9. Education with mobile phones?

While in general it can be concluded that both the instructor-institution and the student side are interested in and open to the use of digital educational materials especially the contents and solutions designed for mobile devices, the costs related to the device and the respective services can influence their adaptation.

It is interesting that presently a gap can be discerned between the availability of current materials offered in a digital form and the existence and use of the related mobile devices. Currently 84% of the content users do not resort to mobile devices either in case of targeted educational materials, or related texts. Furthermore, no breakthrough can be seen among students regarding the educational use of mobile communication. This could be a breakout point promoting a wide spread use of mobiles for education purposes.

Currently educational materials with a non-dedicated platform developed for a wide circle of users offer the best way to include the broadest possible scale of mobile devices in education. Digitalization of primarily written texts and the conversion of the respective materials into a standardized e-format could function as a stepping stone to modern interactive applications provided by the representatives of the business sphere and project grants. The respective institution-provided products can take the form of uniform educational support materials tailored to user needs.

The analysis of the abovementioned research reveals several tasks in promoting the educational use of mobile devices. First the respective experts have to be convinced that the educational use of mobile devices is not a short term trend. While in some countries this fad wave is expected to last only a few years, in the developed world many firms consider not only the devices, but the relevant institutional strategies and concepts potentially impacting all spheres of education. One such firm is the Apple Company whose digital backpack (schoolbag) plays a pioneering role in the educational use of mobile communication devices. In light of current sales data educational practitioners in Hungary should take advantage of the respective trends implying an increasing variety of devices and relevant applications and the rising popularity of mobile communication technology. [Antal, 2009.]

10. The educational strategy of Apple

The Apple Company supports the implementation and development of electronic learning environments not only by the development of novel instruments and devices, but by trend making instruction programs as well. [Ananiadou és Claro, 2009.] Simultaneously to product development the respective school experiments significantly contributed to the promotion of mobile communication assisted learning. In countries well-versed in the use of mobile devices teachers frequently make podcasts⁷ with their iPod. Podcasts are sound recordings complementing the principal study materials in the manner of a radio broadcast. The use of interactive texts and group-based multimedia project tasks are considered regular assignments. [cf. i.e. Carbó and Antolí,

⁷ Any kind of digital content can be downloaded on iPod including sound, video, radio, PDF, e-Pub materials.

2011.] By the help of the iTunes U data base⁸ electronic textbooks including videos, picture collections and 3D models offering highlighting and note taking options can be accessed. Any teacher can prepare a textbook, since no publishers are needed only an Apple computer and a desk publishing software,⁹ and naturally, professional expertise. Furthermore, publication can be facilitated via e-mail. The next figure illustrates the educational principles of Apple.



Figure 1. The instructional principles of Apple (Source: <http://ali.apple.com/acot2/principles/>) Determining learner demands and skills for the 21st century, Relevant and effective course and curriculum structure, Objective and informative performance evaluation, Social and emotional sensitivity towards the student, Supporting creativity and innovation, Wide scale and continuous availability of technology

Let's examine these objectives in detail!

Skills required for successful academic performance in the 21st century have to be determined from the point of view of teachers, learners, and parents. Regardless on the emphasis on independent or personal performance teachers have to provide relevant and usable knowledge within an appropriate temporal framework and via an adequate methodology. Before deciding on the respective teaching methods instructors have to define the learning objectives and respective topics. Consequently, innovation options and adequate conditions have to be provided in order to facilitate the formation of the appropriate learning environment on an everyday basis via the best methodological background for the generations of the future.

1. Determination of a starting level of 21st century skills and aptitudes both for teachers and learners in order to guarantee academic success. Teachers should be able to make relevant decisions regarding the time and method of performance optimisation. The subject of the given teaching effort has to be considered before choosing the respective didactic approach.
2. Students should be provided with opportunities to develop multidisciplinary skills facilitating the development of problem and project-based learning. Curricula must respond to present and future student demands while taking into consideration options provided by Web 2.0 along with the technological achievements to be used in education.
3. The types and system of testing the level of knowledge acquisition have to be reconsidered. All dimensions of independent learning have to be examined in order to control learner performance in a continual manner. A continuous consultation or information exchange among students, teachers, parents, and informatics experts can contribute to the improvement of the respective learning environment.

⁸ <http://www.apple.com/education/ipad/itunes-u/>

⁹ Teachers tend to favour the iBooks publishing software, URL: www.apple.com/ibooks-author



4. Schools have to take into consideration social, labour-market-related, and economic concerns in order to elaborate a novel education culture prioritising innovation and problem solving oriented thinking.
5. Adequate attention must be directed at personal, professional, and parental relations determining the healthy development of students in the family, school and community sphere. Teachers should be familiar with the social environment of all students and a special instructor should monitor the given student's social environment and protect his interests. [Apple 2008.]
6. Since technology plays a fundamental role in the life and work of 21st century people, its role should be equally important in learning as well. Accessibility to information is one of the basic needs of today's students and instructors along with the availability of supporting resources and technologies. The OECD surveys prove that the performance of schools equipped with ICT tools in a better way is higher than the performance of those equipped poorly (Lengyelne 2014, p. 88). The goal of the use of such technologies is not developing familiarity with the given equipment, but the actual content, thinking, creation, research, and the publication of said results, in one word, communication. It is essential that the new technologies should provide help in meeting the challenges of the 21st century independent of space and time. [Apple 2008.]

11. Challenge Based Learning (CBL)

Challenge Based Learning as a pedagogical method is part of a greater cooperation project titled *Apple Classrooms of Tomorrow-Today, ACOT2*¹⁰ launched in 2008. The project focuses on the development of the learning environment of secondary schools as it was proven that traditional teaching and learning strategies are increasingly ineffective for the high school generation of today demanding instant accessibility to information via on-line networks. [Oblinger and Oblinger, 2005.]

Having recognised the criteria for a new learning environment Apple would like to utilize options provided by new technology while promoting a practical and creative approach along with critical thinking in the educational process.

Challenge Based Education as a multidisciplinary pedagogical model encourages students to use modern technology in a school environment, just like in everyday life. CBL prefers collaborative learning, the cooperation of classmates, and the sharing of information with peers and teachers in order to realize mutually set goals.

The main features of the challenge based learning approach:

1. providing a variety of options for the solution of strategic problems,
2. offering local solutions to global problems,
3. awareness of the connection between various disciplines,
4. priority on the development of competences required in the 21st century,
5. support for the application of Web 2.0 technologies,
6. continuous documentation of learning experiences from the problem until the solution,
7. 24-7 availability of technology and content.

Below we provide an overview of digital pedagogy technologies providing assistance in facilitating CBL.

12. The digital backpack or iPad

The educational use of iPad whose numerous entertainment options are well known, has not been fully accepted in Hungarian schools. While digital or intelligent board technologies primarily support a group-based learning experience, the iPad promotes personal learning, note taking, or reading. The Apple Company not only developed this device but created an educational philosophy model, named digital backpack. The term refers to its capability to substitute all printed textbooks and notebooks.

¹⁰ *Apple Classrooms of Tomorrow—Today Learning in the 21st Century* Background Information, April 2008. http://ali.apple.com/acot2/global/files/ACOT2_Background.pdf





Figure 2. The instructional strategy of Apple and the digital backpack (figure by Péter Antal)

The texts and presentations designed to be used by teachers can be easily prepared by the help of this apparatus. The Keynote program available as part of the iWork package enables the user to make presentations similar to that of the Power Point. The other option of the development of educational materials is the freely downloadable iBooks Author program allowing the teacher to prepare high quality digital interactive textbooks without any professional programming background. The completed digital textbooks are accessible to students via the iBooks applications and can be integrated into an iTunes U course. The other foundation of the digital school bag is the approximately 450 000 applications downloadable from the Apple Store including such general purpose programs as calculators, or dictionaries along with subject specific applications.¹¹

While the cost of such equipment would hardly be affordable for a Hungarian family the advantages provided by the apparatus are worthy of note. Accordingly, the price of a scientific calculator is around 10 000 HUF while the software version downloaded from the Apple store is only a fraction, 300 HUF, or a printed English-Hungarian dictionary can be bought for a couple of thousands of forints, but its digital form can be downloaded to an iPad for a few hundred forints. Considering the annual school supply (textbooks, notebooks, exercise books) cost, which is around 20 000 HUF without governmental support, an iPad would provide a return on the investment in 5 years. Naturally, the educational application of mobile communication devices requires the availability of an increasing amount of materials in a digital form. As it was seen earlier the devices and apparatus for the instruction of students embedded in digital culture is available along with adequate pedagogical and methodological support, but the widespread propagation of such devices and the attendant pedagogical and methodological concepts and options in the Hungarian pedagogical community is essential.

13. iTunes U The Apple in higher education

At the beginning of 2012 Apple launched the iTunes U application facilitating the delivery and acquisition of the material of full courses for instructors and learners via iPad, iPhone, and iPod Touch devices¹² respectively. The program enables instructors to compile and manage courses via the use of such components as lectures, homework assignments, textbooks, tests, and course descriptions. The course materials can be made accessible to millions of iOS users via the abovementioned devices. A further advantage is the uniform surface easily manageable by the user allowing the uploading of the given materials into a set template. The iTunes U provides users with iOS-based devices an access to the largest course catalogue of the world. More

¹¹ cf. this application collection: <http://edujen.com/files/2013/02/AISWA-iPad-Image-1-2013-mu8kro.pdf>

¹² Presentation on the topic: http://videorium.hu/hu/recordings/details/2454,Az_Apple_felsooktatasi_strategiaja_es_az_Apple_hasznalata_a_mindennapokban



than 1000 universities registered to the program including such well-known higher education institutions as Cambridge University, University of Berkeley, Harvard University, Oxford University, MIT, and Stanford University. The more than 700 million downloadings indicates the already high popularity of the program in the higher education community.

The courses can be developed by a web-based device, the *iTunes U Course Manager* processing the schedule, the available educational materials, tests, auxiliary materials and other contents. Furthermore, any material or link related to the iBookStore or Apple Store can be integrated into the respective curricula.¹³ The iTunes U provides direct access to new books for learners while summarizing notes prepared in iBooks application in a transparent form. In addition to reading books and viewing presentations, lectures, and task lists students can ask for notification on the release of new educational materials, thereby continuously staying informed regarding the respective course developments.

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¹³ In addition to ready to use educational materials teachers and instructors can upload the following documents for learners: Key-note, Pages, or Numbers files along with books prepared via the iBooks Author application. The iTunes U enables the use of audio and video files, presentations, and texts, pdf files, e-Books, in iBooks or ePub format, iOS applications and links to webpages.

