Study on the use of mobile devices in schools: the case of Romania

Estudo sobre o uso de dispositivos móveis nas escolas: o caso da Roménia

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Abstract

The current dynamics of society is relevant also for the educational systems. The integration of mobile devices in education, as a bridge between inside and outside educational activities, is not fully exploited. This paper will present a brief study regarding the mobile devices and ICT in Romanian educational system, and an analysis about teachers' skills and disponibility, to move to the next step of mobile-integrated educational system, the gap between the potential of the method BYOD/the schools' mobile devices, the practice of teaching using them, and the needs of students for their skills development, regarding of long life learning.

Keywords: mobile learnig, digital competences, pedagogical innovation scenarios

Resumo

A atual dinâmica da sociedade também é relevante para os sistemas educacionais. A integração de dispositivos móveis na educação, como uma ponte entre atividades educacionais internas e externas, não é totalmente explorada. Este artigo apresentará um breve estudo sobre os dispositivos móveis e as TIC no sistema educacional da Romênia e uma análise sobre as competências e disponibilidade dos professores, para passar para o próximo passo do sistema educacional integrado móvel, o fosso entre o potencial do método BYOD / os dispositivos móveis das escolas, a prática de ensinar a utilizá-los e as necessidades dos alunos para o desenvolvimento das suas competência, numa perspetiva de aprendizagem ao longo da vida.

Palavras-chave: mobile learnig, competências digitais, cenários de inovação pedagógica

Overview of Romanian pre-university education system

Romania, like the other countries in Eastern Europe, had many and important changes in educational system, after the '90s. These changes were imperative, required by the participants in the educational system, but also by the civil society. Changes have occurred quickly and at an alert pace. In the Romanian Constitution of 1991[1], art. 32 assumes the right to learn. According to this article, private education, university autonomy and freedom of religious education are reintroduced. At the same time, art. 72, point m) provides that general regulations for education are subject to organic laws. It is a recognition of the importance of the education system in society.

Changes to the education system were a laborious process that had ups and downs. Between 1990 and 1995, they were exclusive to the Ministry of Education under its various names and organizations. Since 1992, the Ministry of National Education has had to revise the curriculum and eliminate the strongly ideological orientation of school curricula. An all-encompassing reform was required, requiring a systematic review. Although it was intended to be an answer to all these requests, the Education Law drafted in 1995 (Law 84/1985) represented only a step forward. In 1997 the Teaching Staff Statute is approved by the Parliament (Law 128/1997). The multiple legislative changes in the education system due to both the Parliament and the Government or the Ministry of Education determined the next year to be full of uncertainties, the biggest weakness of the system. Therefore, at least at the conceptual level, the Consensus by which all parties signed the Education Pact in 2008 was considered a great success. It was conceived that education is a factor of progress, being considered national priority.

The current Law on Education (Law 1/2011) benefited from fewer legislative changes. For this reason, it is considered as more predictable. At the same time, it includes the Teaching Staff Statute. The last amendment is given by Government Emergency Ordinance, no. 2/2017.

Since 2016, the Student Statute has been elaborated and adopted by Order of the Minister of National Education.

In Romania, education is a service of public interest and is carried out under the terms of the National Educational Law in Romanian, as well as in the languages of national minorities and in international languages. Compulsory general education is of 11 grades and includes primary education, secondary education and the first two years of upper secondary education. High school education should become mandatory by 2020 at the latest. The obligation to attend compulsory education of 11 classes, in the form of frequency, ends at the age of 18 years. Compulsory education and pre-school education organised by the state is free for everyone.

Pre-school education is organized in nurseries and, where appropriate, in kindergartens and day centres. The age of children must be between 3 and 6 years, in exceptional cases 7 years. It is recommended that at least the last year of kindergarten be attended by each child.

Each preschool group is educated by a teacher for preschool education.

Primary education comprises the preparatory class and grades 1 to 4. The preparatory class includes children who have reached the age of 6 until the start of the school year. Each class has normally one teacher for primary education. He can be assisted by other teachers, for special areas - sports, foreign language, and religion. There are no grades, only qualifiers.

Lower secondary education or gymnasium is a component of general compulsory education and focuses on eight key competence areas that determine the learners' training profile to familiarize them with a multidisciplinary and transdisciplinary approach to knowledge. Secondary or lower secondary education comprises grades 5-8. Graduates of secondary education acquire the graduation diploma. Starting with grade 5, students are evaluated with grades from 1 to 10. In order to move into the next class, a student must obtain the average for each discipline at least 5, and at least 6 for behaviour.

After graduating from the 8th grade, students have a National Assessment Examination. The average of these tests, together with the average of grades 5 to 8, determines the admission grade, which allows them to attend the lower secondary school or arts and crafts school. The share of the national average in the calculation of the admission fee has changed over the years, between 25% and 80%. The admission is done in descending order of these grades, according to the students' preferences and taking into account the number of available places for each school and specialization.

Upon completion of the gymnasium, students can continue their studies at a high-school / third level of study, or at professional school.

High-school education is centred on developing and diversifying key competences and building specific competencies according to career path, profile, specialization or qualification. The first two classes are included in the compulsory education, and the last two are post compulsory.

It includes the following branches and profiles: the theoretical branch, with the humanist and real profiles; Technological line, technical profiles, services, natural resources and environmental protection; Vocational branch, with military, theological, sports, artistic and pedagogical profiles.

These pathways are designed to help the student in choosing future affairs by affinity.

Vocational education or professional school is an initial training course organized for qualifications established by the Ministry of Education, according to the National Qualifications Register, according to labour market needs identified by strategic planning documents for the regional, county and local training offer.

Vocational education has the following forms of organization:

Practical training sessions lasting 720 hours, organized after the completion of the 10th grade of high school;

Professional education, lasting at least 3 years, organized after the completion of the 8th grade as part of the upper secondary education.

Both high-school and vocational school ends with competences certifications exams. In addition, students wishing to continue to study at a faculty or certain post-secondary schools must also pass a National Exams of Baccalaureate, according with their specialisation.

In academic year 2015-2016, in 7009 schools, from which 709 are private schools, 3 107 414 students were enrolled in pre university education, 3 020 974 of which in public schools and 86 440 in private schools, with 210 494 teachers, from which 4403 working in private schools, and 22 815 auxiliary educational staff [3, p.303-335]. Private education is better developed at pre-primary education than for the others levels. Students have the same rights, they benefit on the same funding from public budget, no matter the school they follow.

Integration of ICT in Romanian' schools

The basics of integrating computer technology in Romanian education date back to the 1970s. By the Decision of the Council of Ministers no. 739 of June 21, 1971, the first five high schools with a computer profile, originally called the High schools for Automatic Data Processing (LPAD), were established.

If at the beginning, in the first two decades, the ICT study in schools referred mostly to development of hardware and its maintenance, after the '90s were introduced, first as non-compulsory, elements of programming. It is relevant for the structure of modernisation of the ICT in schools, that the first teachers were former students that graduated economic studies, more than informatics or mathematics.

Another feature of the Romanian school in terms of ICT is that it has developed the necessary allocation and training of teachers, with the first pedagogical notions to support this study. That is why the first ICT language studied were FORTRAN and COBOL, which were specific for economic analysis.

The first major ICT revolution became possible in the same time with the introduction of PC's based on Windows platform. In 1994 there was a first attempt to organise classes for informatics at the 5th class, based on a new languages, C and Pascal. Since then, there have been many investments aimed at integrating technology into education. Also, special efforts were made to develop teachers' digital skills, in order to use the computers at schools. However, schools have to "overcome the gap between ICT potential and effective implementation" (Ainley et al, 2002).

According to the 2011 National Education Act, the use of Information and Communication Technologies (ICTs) is recommended to teachers that works in kindergartens and primary schools, and it is a mandatory task for all teachers working in secondary schools. Teachers have to use ICT not only during computer science classes, but also as an instrument to develop other subjects. If we can suppose that for computer science teachers, the use of technology presents no challenges, for the rest of the teachers, ICT might be difficult. Teachers need to have their own equipment and to know how to use different ICT devices and ICT applications. But they must also have access to such equipment in class too. Without adequate access and without a certain framework for the

ICT use across subjects, curriculum changes will not emerge and school's role will not change (Fluck, 2001).

One of the first programs (2001) that supported the teaching process in secondary education through the use of modern technologies was SEI (Computer Based Educational System), initiated by the Ministry of Education, Research and Innovation. The process of creating, developing, implementing and using ICT in the Educational system was supported by a series of programs developed by different companies in partnership with the Ministry of National Education. Among the best known, with a major share in this kind of programs, we mention: Siveco, 2003 - AeL4 (Advanced Learning) - a complex portal offering learning and teaching tools, assessment, content and educational management; the Intel®Teach Program, 2007, in partnership with Intel - Teacher Training Program; Learning in the Knowledge Society; Softwin, 2003 - INTUITEXT - proposes modern and complete learning solutions adapted to the needs of pupils aged between 8 and 15; Center for Innovation in Education, 2006 (TEHNE) - 1 educated - develops e-learning programs and projects, ICT in education, curricular development, education for democratic citizenship, lifelong learning and in-service teacher training; Timsoft, 2001 - eLearnTS, IntraTS, eTestTS - online courses, hosting / development of online courses / workshops, eLearning consulting and blogging, development of integrated eLearning systems; SIIIR platform - collects and presents detailed information on the full network of units in the national education system.

In line with curricular developments, Romania has drawn up framework plans on education cycles. In this context, although ICT is in the common trunk for high school and vocational school, it is the first time that it is introduced, with the same rank, to secondary school, starting with the next school year.

It is worth mentioning that, starting with 2016, with the adoption by the Ministry of National Education of the Student Statute, it is officially allowed to students, in all Romanian schools, to use mobile devices for educational purposes.

Brief presentation of Colegiul Tehnic „Edmond Nicolau" Focșani

The school was founded in 1972 with two classes of vocational school, technical profile –mechanics, as a double-subordinate school (under the patronage of IDMS), in order to provide skilled labour for enterprises in the South-East development region of Romania. The first name was "The Professional School Group, beside the Enterprise of Tools and Hydraulic Elements from Focșani". With continuous development, in 2014 Technical College "Edmond Nicolau" Focsani became the second school in the Vrancea County, by number of students.

With 1,140 students, aged between 14 and 20 years, enrolled in high school and vocational school, 83 teachers (teachers, engineers and vocational instructors) and a number of auxiliary teaching staff, the school prepares students currently in the electronic and automation, electrical, electromechanical, mechanical fields and two classes for each year of study with specialization mathematics and computer science. Although the location of the school is in the main municipality of the county, our students come mostly from surrounding area. The families' social environment is precarious, with material possibilities being reduced. The educational level of the parents is medium and below the environment, which is associated with major behavioural and educational problems of the pupils. A significant number of students receive financial support from the state. In recent years there has been an increase in the number of students who dropped out the school, which is a real cultural and educational challenge. From the school's statistics, 70.73% of all pupils came from the rural area, ie more than double the urban ones. Those with the lowest incomes receive government grants under the program "Money for school". Students from vocational school have scholarships.

Schools' teachers are mostly holders, which facilitates to fully assume a mission, and to establish of the main objectives, which can be achieved easier. Majority of teachers have passed the national exams to obtain academic degrees in school's education (51 of them obtained first didactic degree – the highest, 11 of them second didactic degree). Some of the teachers and engineers attended postgraduate courses, 5 teachers are PhD and 2 teachers are PhD students. Since 2004, 16 teachers participated in training in European Union countries, obtaining European grants by Lifelong Learning Programme: Comenius and Grundtvig Mobility in school education for staff, for adult education or Erasmus+ staff mobility. The majority of the personnel participated in learning activities for staff, in ICT, or have first or second specialty ICT. The last two Erasmus+ KA1 staff mobility involved 12 teachers, mostly on using tablets or other mobile devices in education.

ICT, e-learning and m-learning in Colegiul Tehnic „Edmond Nicolau" Focșani

Our school is involved in a comprehensive process of modernization, traditional education is becoming more and more replaced by digital media education. Web 2.0 tools are used in specific classrooms equipped with Wi-Fi connection or to communicate with students and parents. 21st Century Skills are a priority of teaching in our school, entrepreneurship, equality and tolerance representing our goals. The students' specialties that are studied in our school have ICT in the core curriculum. The students from high school, no matter the specialty that they are prepared in, have also different courses related with ICT, theoretical ones for those who are on mathematics-informatics, or related to their domains, like CAD. Unfortunately, even we have a lot of courses that involve the use of PC's or mobile devices, we have only 4 labs special equipped. With the efforts of some teachers, and the involvement of school staff and students, there are 8 different labs that have Wi-Fi connection, which can be used by teachers and students together.

The passion of teachers and the availability of school leadership has led to the use of mobile devices by students for some classes or other educational activities

in the school. It was a great boldness to us, given that we assumed the responsibility of not respecting *ad litteram* national school regulations, valid at the time. Encouraged by these results, and by changes in the Students' Statute, or the School's Internal Regulations, we will invest in the development of new facilities that allow more students to access real-time web resources from school space.

Technological innovation is the integrator objective, as a result our school is the county centre of excellence in robotics. In the last three years, a team of robotics centre of excellence represented our country at the World Robotics Olympiad.

Research on the use of mobile technologies in Romanian' schools

If we want to speak about the use of mobile technologies in schools, we must also take into account the significance of an ICT culture of schools (Lim et al., 2003). This is related to a significant amount of investment in ICT, both at the infrastructure level and in the training. That depend on the educational politics, both on national level and at school level. The data offered by the National Institute of Statistics [3], or by studies of the Romanian Ministry of Education [2], can be a good start to understand the actual level of the infrastructure for ICT in schools.

Romanian bibliography has only a few studies based on scientific research done for master and PhD thesis, or for scientific institution, accessible online. There are possibly more, but in the 13 Open Romanian Repository (see http://roar.eprints.org/) we didn't found such studies. In spite of that, there are few Universities that offer a free access to such thesis, as well as websites dedicated to some scientific events, related to ICT in education, in particular to the use of mobile devices or mobile technologies in schools.

With the exception of the Open Repository, the databases consulted were those of the doctoral schools, as well as the electronic archive of the National Library of Romania. The main problem we faced is the open access to the electronic copy for PhD or master's theses, or their arguments. We also conducted a search through general search engine Google. The terms that we used in our survey were "mobile learning", "mobile phone/tablets in education/schools", "m-learning", "mobile devices in education/schools", "modern ICT technologies used"

Searching relevant papers about the use of mobile devices in Romanian schools, we found two kind of documents: few PhD thesis and scientific articles, published in professional online reviews or in the volumes with articles presented to different international conferences.

PhD Theses

The search in different PhD schools 'archives gave us two thesis, related to this research area:
a.   Livia Ştefan – E-Learning Systems Based on Advanced Technologies in 3D Virtual Spaces, The Politehnical University of Bucharest, Faculty of Computer Science, Graphic Department 2015

The thesis aims to "contribute to the stimulation of the assimilation and practical use of these technologies in Romanian education in general, and in particular, to the creation of educational resources in virtual 3D online environments that are viable alternatives to the traditional education system and Learning in 2D environments". The statistical studies that are described in this paper are based on "Learning Analytics (LA), which refers to the use of a significant amount of data for statistical analysis, predictive modelling, in order to discover useful information about a process." Ante-experiment interviews as well as post-experimental surveys were also used.
b.   Constantina Maria Catalano - Blog - Virtual Space for Academic Learning Collaborative, Supported by Computer, University Babeș-Bolyai Cluj Napoca, Faculty of Psychology and Science of Education , Doctoral School "Education, Reflection, Development"

The thesis is based on the idea that Computer-supported collaborative learning (CSCL) as a branch of learning science, is concerned with the study of how people can learn together with computers (G. Stahl, T. Koschmann and D. Suthers, 2006). The term „computer" is there generic, referring to any device that perform a mobile connexion through internet. Another aspect described was collaborative writing, where reference is made to the blog as an instrumental resource that is part of the arsenal of the proposed interactive teaching strategy. The study group consisted of 349 students, 269 attending all stages, representing 76%. The research has been conducted over four years, resulting in 63 working groups and 69 articles published on the educational blog created for this purpose. There were used statistical analyses, based on pre-surveys, auto-evaluations and post surveys, and testimonials of participants. We can conclude that were two kind of analyses, objective and subjective (or emotional, in the author's perspective).

Other studies

More results we found searching scientific articles, published in specialised reviews, or presented at International Conferences having the focus on modern teaching. The main publications that we survey were: The Romanian Journal of Information Technology and Automatic Control (RRIA); Journal of Educational Science & Psychology; International Conference on Virtual Learning (ICVL); International Scientific Conference eLearning and Software for Education – eLSE.

The main results of studies related to the use of mobile devices in Romanian' schools

The analysis of the scientific papers on the use of mobile learning technologies, recovered and analysed for this article in the Romanian literature, denotes two aspects that need to be taken into consideration. The topic is of great relevance and interest, although systematic studies are based on the premise that the acceptance of these mobile technologies by everyone interested in education is self-evident.

Most of these studies support the idea that mobile devices are useful in education, in and out of school, although not explicitly expressed. As long as software solutions are presented for different learning situations, it goes without saying that these solutions must be used on computers and / or mobile devices.

The first PhD thesis aims to deepen the knowledge of the actual Virtual Reality (VR) technologies in all its forms, and in particular in online 3D virtual world implementations, to synthesize and evaluate them from the perspective of educational and exploitative use Modern learning paradigms (experiential, participative, collaborative but also individual). A secondary objective is to contribute to the stimulation of assimilation and practical use of these technologies in Romanian education. Both subjects are presented as a new dimension of the paradigm learning / hybrid teaching (blended learning).

As a development of the thesis, the same author made a study, following the implementation of a project which performed with the purpose of helping rural communities to identify their cultural heritage and to transmit it to the young generation by means of modern IT technologies, including web 2.0. Mobile-learning paradigm, in combination with web 2.0 technologies, was the support for a distributed and low-cost platform for communication and collaboration. A distributed learning community was created around an artistically and technical content, involving also an AR application. Social media was the tools for analysing the efficiency of the experiment.

Also, social media was a tool for engaging the undergraduate students and making them more aware of the learning process.

The main conclusion of this thesis is that if generally used as a means of capturing and sharing of content and user experiences, through systematic use and maintaining the quality of the information, social media can lead to knowledge creation.

The second thesis present another type of work that can be done using mobile devices. According to the author, the blog was a space where one could expose one's thoughts, as a simple diary that can be read by others. The modern concept about blogging is that it evolved towards a workplace or a learning space. The main purpose of the author was "to prove that the blog is not only an area that supports collaborative group learning, but it can also have as an end result helping others as support for learning - all the content is available to anyone interested in accessing it." The study was based on a large number of students, from which more than 70% ended the experiment. The time-lapse for the study was also relevant, from our point of view. We can say, based on these two facet that the conclusion of the thesis has a great probability to be extended to a large population of learners and trainers.

A limitation of the proposed strategy is given by the need to use the computer for the full realization of the proposed tasks, in the context of collaborative learning supported by the computer, or a mobile device. This limit has two reasons: some students did not have their own device (the study was addressed to a population of students who mostly live in rural areas, some have limited, under-average material income) or have no fixed Internet connection. The second aspect is related to poorly developed technical skills due to lack of exercises. We want to mention that there are important not only the skills of students, but of the tutor too, which can be another good reason for collaborative working.

From a different perspective, relative to the effectiveness of the proposed approach, electronic device use is a strong point because it helps to develop technical skills, provides flexibility in time and space for any collaborative activity. That is why we can say that the weak point of this approach from a technical point of view can turn the threat into a challenge.

Studies found in scientific journals or presented at the Scientific Conferences presented above are largely the result of personal experiences or theoretical studies.

In very few cases studies are carried out on samples of learners or trainers, which undergo a statistical analysis. In the latter case, most refer to the use of online questionnaires to address the identification of the skill level of a sample of students or teachers, their perception of the need to use mobile devices in education, the technical endowment they have at home, or at school, or the expectations they have in participating in the experiment presented in the study.

However, these articles have ideas that we think useful in shaping the perception of the use of mobile devices in education, not only in school but especially in the training of pupils (and not only) of needed skills for Long Life Learning. That is why we used the terms „learners" and „trainers", because mobile devices are useful not only in formal education, but outside it.

Concluding remarks

Mobile devices are an integral part not only of those who can be called "digital natives", but also of the generations that precede them. Our study concluded that, besides the advantages and disadvantages of using these devices in school, we also need to understand their role in expanding school boundaries. Techniques used in schools can form the basis of different educational platforms accessible to people with different types of prior training. Since learning is a process of transmitting and acquiring skills and knowledge, from those who have it at a higher level, to those who have a lower level of learning, teaching is also a way of transmitting knowledge from students to trainers.

The rapid development of mobile learning, wireless communications, and the increased demand for wireless mobile devices, especially mobile phones, has made it possible to direct e-learning researchers from m-learning to promising easy ways and convenient for learning. A distinctive feature of m-learning is the mobility. M-learning is a new concept, a complementary form of learning, which has the role of helping us in the process of learning and professional qualification through adaptive time-based solutions. M-learning technology requires a distance education system that should include a system of access to training materials and services from various mobile devices as well as the availability of web

services. It should be noted that the efficiency of mobile devices in asynchronous learning is not very well presented in the selected studies. If we want to adapt the learning process to particular situations, then this is an aspect to be considered.

The mobile devices are useful if we understand its significance and benefits. M-learning software includes mobile applications designed specifically for educational purposes as well as those designed for other types of uses, but which can be adapted for educational purposes. They are helpful but do not completely replace classical lessons, but only constitute an extension of classical education, a method of gaining access to any data at any time and in any place. But we must take into account that the lesson format needs to be designed to be accessed and used on any mobile device, regardless of the size of the mobile device.

The Romanian scientific community is interested in the theoretical and practical aspects of the transition from eLearning, based more on computers to m-learning. Although many of the eLearning features can be taken over or adapted, there are new issues that are being considered. However, we believe that some research directions are required, which should provide solid data and arguments.

Only a careful and applied research on the necessary teacher training from an ICT perspective combined with pedagogical aspects can lead to a change in the academic education model.

We hope that the interest in this theme, demonstrated by the multitude of scientific events and articles presented within them, will lead to a reorientation of educational policies, based on studies at society and school level. In this way we can meet the students' wishes for the use of mobile devices, while also enabling them to develop new skills that are useful in the broad sense of learning processes.

A demonstration in this regard is given by the participation of our school students in the Erasmus + Blic & Clic project, whose workloads have forced the use of completely different mobile devices from the way they are normally used in classrooms.

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National Institute of Statistics - http://www.insse.ro/cms/en

ROAD, Directory of Open Access Scholarly Resources - http://road.issn.org/en

eLSE, International Scientific Conference, eLearning and Software for Education - http://www.elseconference.eu/