CATCHING UP WITH THE EUROPEAN UTILIZATION OF ITC. A BRIEF OVERVIEW AND THE IMPLICATIONS FOR THE EDUCATIONAL SYSTEM

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***Abstract**: Modern education is increasingly characterized by the utilization of digital technologies. ITC does not provide mere support for learning and instruction, but has become a pervasive and integral part of the educational means. Educational ITC reached a level of development and actuality which requires it to be strategically analyzed and planned programmatically at European levels. Romania has formulated specific and clear development goals in e-education. However, empirical data showed that albeit remarkable benefits from e-education, Romania has many challenges to overcome in order to become competitive at the European level.*

***Keywords**: ITC, digital technologies for learning, current trends, virtual communities, massive open online courses.*

Introduction

The utilization of digital technologies in learning has become a common fact. However, their impact on education, in general, and on teaching and learning, in particular, is gaining increasing interest. Because of the on-going and continuous development of ITC (Bates, 2001; Daniel, 2012a) it is difficult to pinpoint accurate landmarks of ITC in education and, even more so, to identify specific effects on education. Besides the interaction effect of a multitude of factors which affect the educational systems, by the time the measurement of effects is complete, the ITC status in education has already changed.

From a curricular perspective, the efficiency of ITC for education requires a systematic and planned integration of technology, throughout the whole educational establishment, as well as commitment and teaching expertise, in order to integrate ITC support in the instructional design (Voogt, 2012). The currently dominant constructivist viewpoint holds that ITC represents a driving force, in which the student is both the initiator and the measurement of change (Daniel, 2012a). The same constructivist paradigm holds that individualized and adapted learning

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not only is facilitated by the use of ITC, but that it is essentially similar with augmented learning (Izmestiev, 2012).

The expression, or name, *online* learning, although rather common these days, is still subject to debate with respect to its precise meaning. In a broader view, it indicates means and methods of instructional contents delivery via the Internet. More specifically, these means and methods may facilitate or bring new avenues of reaching educational resources (e.g., digital files such as handbooks, lecture notes, etc.). Online learning may also refer to a range of Internet-based courses, ranging from 'less-than-formal' types of lectures, such as *massive open online courses*, to rather well-structured online courses, which include thorough assessment and academic certification (Butcher & Wilson-Strydom, 2012).

ITC and Education

Current Trends in Education

Blended learning

The technological developments and their incorporation in education led to the emergence of a new type of *blended* teaching and learning, characterized by personalized access to instruction and changes in the delivery of instruction. Sometimes, *blended learning* is also known as *hybrid learning* (Hosler, 2013), and is intrinsically linked to e-learning, in the sense that various degrees of involvement of digital technologies in education, correspond to various subtypes of blended learning (see Table 1, apud Allen, Seaman, & Garrett, 2007). Various instructional practices are mixed together in blended learning in order to provide a more complete and useful learning experience (IRMA, 2011; Mitchell, 2001). As elearning programmes continue to develop and mature, *blended learning* is becoming the defining trend in elearning. Even more so, currently, elearning appears to be gradually replaced by *blended learning* (Duhaney, 2004).

Table 1:
Blended learning and other educational activities, according to the proportion of online-traditional learning (apud Allen, Seamnan & Garrett, 2007)

Percentage of instructional content	Course Type	Description

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delivered online		
0%	Traditional	No online technologies. Written, printed and oral delivery of contents
1 ÷ 29%	Web-facilitated	Utilization of web technologies to facilitate essential contents for face-to-face delivery. The use of CMSs (content management systems) in order to deliver syllabuses or academic assignments
30÷ 79%	Blended / hybrid	Authentic blending of face-to-face delivery with online delivery of contents. A significant percentage of instructional content is delivered online. Online discussions and debates are common. Face-to-face instructional meetings are also common.
≥ 80 %	Online	Most or all courses are delivered online. Normally, no instructional face-to-face meetings.

Asynchronous learning

One of the most significant changes brought by elearning and strengthened in blended learning is the characteristic of allowing *asynchronicity* in learning or *asynchronous* learning, bringing together advantages of both (Tomei, 2010). More specifically, classical learning activities are integrated with online learning experiences, in a planned and structured way, characterized by pedagogical efficiency (Allen et al., 2007). Asynchronous learning allows the learner to decouple his/her physical presence from the time of delivery of instructional content, and access that particular learning content at a time of his/her choosing, when the learner considers that he/she is ready to engage in learning. As such, asynchronous learning is a significant plus in terms of allowing the learner the comfort of choosing the proper time and gathering the necessary resources for learning, including the interest, location, etc.

Massive open online course

A new trend in today's education is the so called *massive open online courses* (MOOCs). These are special types of online course which are open

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to masses of public, and accommodating a virtually unlimited number of learners. The development of MOOCs was related closely to that of open and distance learning (Uvalić-Trumbić & Daniel, 2012). MOOCs have a rather young history which is most commonly put in relation with the "Connectivism and Connective Knowledge" lecture, a seminal instructional offering put in place by Manitoba University in 2007, although, at the same time, many other educational institutions lectures with MOOC's characteristics (Daniel, 2012b). Because they need to accommodate much more massive cohorts of learners than traditional courses or even elearning courses, MOOCs are subject to several limitation in terms of the instructional design and learning outcomes.

MOOCs have structured into two main types or branches (see Figure 1, bellow), according to their historical development, the *conectivist* branch, and, respectively, the *Stanford* branch (Hill, 2012a). According to Hill (2012b), there are four main challenges to MOOCs development, and these challenges also serve as differentiating elements in the today's MOOCs offerings:

a) Developing revenue models aimed at making the MOOCs system more self-sustainable;

b) Validation of course completion, such as in the form of certificates, diplomas, recommendations and/or credits for other instructional programmes;

c) Creating an adequate experience and a perceived value capable to enhance the completion rate (because rates of completion at around 10% are not uncommon);

d) Adequate enrollment authentication and identity protection for learners;

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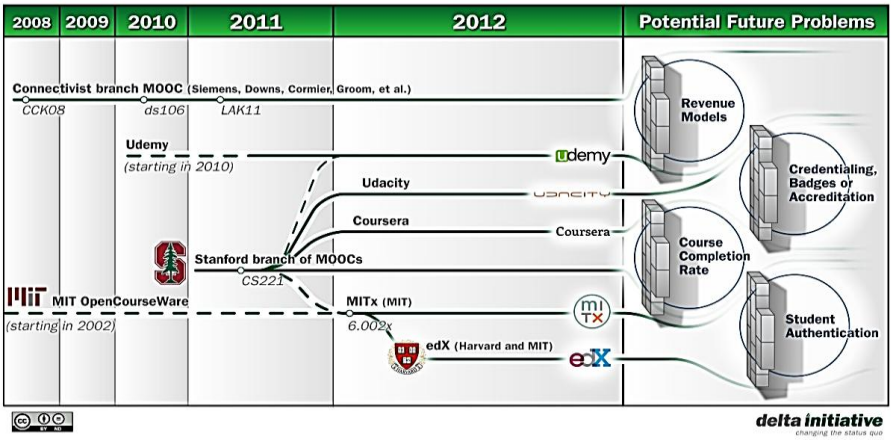


Figure 2: The two main branches of MOOCs (Creative Commons license)

The Importance of ITC for Education and Related Benefits

The utilization of digital technology in education brings concrete advantages to the instructional process. A speedy inclusion of ITC solutions in distance instruction is essential, since distance education facilitates significantly access to various lectures and other forms of instruction, multiplies the temporal and location venues for teaching and learning, and contributes significantly to the financial revenues of the learning establishments (Chaney et al., 2007).

Additionally, the utilization of ITC in education helps reaching the millennium development goals, because of the modernization and increase adequacy of the delivery means for instructional contents (Khan, 2005). In more specific terms, the academic achievement is influenced massively by the learning outcomes, a tenet held strong by the social learning theory and supported repeatedly by empirical data; and, as such, elearning may be criticized because it allows for a certain 'isolation' of the learner. However, it is precisely ITC which have the potential to bring down these barriers of 'isolation' between the instructor and the learner, especially via the incorporation of newer digital technologies.

Blended learning is not only a particular type of elearning but, as current trends appear to indicate, it becomes increasingly more a replacement for 'classical' elearning. As an instructional method, blended learning appears to favor the development of interdisciplinarity (Spiliotopoulos, 2011), and lead to better learning outcomes than traditional or classical, face-to-face learning (Means, Toyama, Murphy, Bakia, & Jones, 2009). At

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least three types of effects can be identified after the implementation of blended/hybrid learning programmes: 1) at the institutional level, on the degree in which the didactic expectations were met by the students' learning outcomes, 2) on the adequacy of the instructional methods to the learners' characteristics, and 3) on the organization of the learning environment (Pennsylvania State University, 2009).

From an institutional viewpoint, the instructors showed a more positive attitude toward the programmes and blended learning was perceived as being more efficient in general. In relation to the adequacy of the learners' characteristics, most students were skilled in using the digital technologies provided for the management of the learning content, 80% reported that online and hybrid methods required them to behave more responsibly and more self-guided in learning, 50% reported enhanced learning, and 50% reported increased perceived complexity of the courses. Finally, regarding the specific outcomes of learning, the most significant reported benefit was the possibility of managing one's own personal study time, better responsibility and clearer understanding of the study programme (Pennsylvania State University, 2009).

Blended learning was not avoided by criticism. One of the most common critics was that asynchronous instruction—i.e., lacking direct and real-time guiding from an instructor—impedes on the *behavioral modelling*, as one of the essential factors of learning. More specifically, the lack of a guided face-to-face instruction reduces, or even eliminates all together, the opportunity to use behavioral modelling efficiently. Behavioral modelling is based on the *social learning theory* developed by (Bandura, 1977), which holds that learning implies four successive stages: 1) attentional resources allocation, 2) information acquisition, 3) behavioral (e.g., motric) replication, and 4) motivation and reinforcement. Behavioral modelling involves practical demonstration and experiences and research showed that it is one of the most efficient forms of instruction (Compeau & Higgins, 1995; Simon, Grover, Teng, & Whitcomb, 1996).

Similarly as for traditional, face-to-face learning, the learning community, the learning contents and outcomes (procedural and semantic knowledge), and the assessment processes represent essential components for an efficient elearning environment (Shamatha, Peressini, & Meymaris, 2004). As such, domain knowledge and professional expertise of the instructors, personal characteristics and the relation with

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students are important factors of influence for the academic performance (Xiao, 2012).

Thorough planning and organizing is crucial for learning success, and thus, it is very important that experts and specialists be consulted and involved throughout the whole instructional design and delivery processes, with the purpose of optimizing the entire instructional system of seminaries, workshops and conferences (Malik & Rahman, 2010). In relation with the role of the instructors, critics argue that, due to the limitations of technology-mediated instruction, regardless of being synchronous or asynchronous, behavioral modelling may not be adequately replicated and may lack the efficiency of a classical or traditional, face-to-face, instructional environment (Chen & Shaw, 2009).

However, research data show that the utilization of digital technologies in learning and instruction enhances the active involvement of the learners in the instructional design and the development of learning materials, adapted the needs and characteristics of the learners. This, in turn, is essential for the effective implementation of the learner-centered instruction. Thus, intrinsically, educational ITC facilitates the development of constructivist learning environment. In this type of environment, better learning outcomes are observed. Such better learning outcomes are made possible by the utilization of previous knowledge and the active construction of knowledge, within complex problem solving processes, and by emphasizing learning by discovery and the learners' control of their own, individual learning processes (Leidner & Jarvenpaa, 1995).

Educational ITC supports also what is known as *collaborative learning*, or, more specifically, the collaboration between learners and between learners and instruction during the instructional and learning processes, including working in groups on common academic projects and assignments, leading teams of colleagues, initiating proposals for learning experiences and activities, etc. The collaborative learning results in enhanced common and individual academic responsibility, positive effects on self-esteem, self-confidence, and ultimately, on the satisfaction with learning as a whole. Moreover, research data also showed that collaborative elearning impacts significantly on bettering the academic performance and motivation, improves peer relations and reduces the negative effect of learning challenges and disabilities (Iqbal, Kousar, & Ajmal, 2011; O'Donnell, 2006).

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Besides contributing to the active involvement in learning and the facilitation of collaborative learning, the utilization of ITC in education allows for enriching the learning contents with multi-media features, such as audio-video elements and even enhanced indexing and searching functionalities, as well as quick access to a vast volume of information (virtually unlimited or limitless from a technological viewpoint). This, according to the cognitive theory of information processing, contributes greatly to content understanding and optimization of learning. Research data showed that non-interactive and linear instruction, only by means of recorded contents, did not provide satisfactory results (Kozma, 1986). On the other hand, utilizing non-linear and interactive instructional materials, which allows the learner to access various instructional sequences and units according to the learner's needs and interests, results in increased engagement in learning and better academic performances (Zhang, Zhou, Briggs, & Nunamaker, 2006). Additionally, the non-linear use of audio-video elements contributes to improved learning (Vural, 2013).

European ITC

Current Status of European ITC

In the European space, one European Union's most significant landmarks in accelerating ITC implementation, in general, and the development of elearning, in particular, was the so called eEurope Action, launched in December of 1999. eEurope was aimed at bringing the benefits of Information Society closer to the European citizen, as part of Lisbon Strategy. eEurope was furthered by the 2005 eEurope Action Plan, which included the increase in numbers of people enrolled in distance learning amongst the envisioned targets (Comission of the European Communities, 2002).

The European multi-yearly programme for eLearning 2004-2006, adopted by the Decision 2318/2003 of the European Parliament and the European Council (2003)—preceding with just a few years Romania adherence to the EU—included objectives aimed at increased e-education for lifelong learning, bettering of European education, enhanced trans-European cooperation between learning communities and building of mechanisms for better educational products and services, as well as the exchange of best practices (European Commission, 2009). The European Commission adopted three key priorities for European education: a) identification and

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utilization of sufficient and sustainable resources for the European universities, b) increasing teaching and research excellence in higher education, and c) opening up universities towards an increasingly larger end-users population, including by means of increasing interest for education (European Commission, 2006).

Currently, the European interest in e-education transcended the initial, 'classical' approach to elearning and its applications to distance learning. Nowadays, millions of people are enrolled as students in MOOCs and benefit from a vast array of constructivist and colaborative pedagogical models (Mor & Koskinen, 2013). Concrete and significant actions were taken at European level, including strategic, logistic, and organizational instruments such as *Open Education Europa* (2015), a specific set of action within EU's *Opening Up Education* initiative (European Commission & Directorate-General for Education and Culture, 2014), as well as financial support instruments, which aim to improve the quality and cost-efficiency of teaching and learning in Europe via MOOCs, such as CORDIS' Elearning, Communication and Open-data: Massive Mobile, Ubiquitous and Open Learning programme (CORDIS, 2015) or the ECO programme (Elearning Communication Open-Data, 2015).

Landmarks in Romanian Development of e-Education

At national level, Romania's 2007-2013 National Reference Strategic Framework (Ministry of Economy and Finance, 2007), designated elearning development as a strategic goal within the national competitiveness policies. Specifically, in relation with the efficient development and utilization of human resources, the National Reference Strategic Framework held that, because the ITC is the core of a modern education system, integrated elearning solutions are to be supported and the development of adequate professional expertise is to be encouraged.

Romania's assumed objectives for the development of elearning, in relation with the European context, include the adequate adjustment of the organizational environments, infrastructure and partnerships, as well as the optimization and adjustment of pedagogic, curricular and specific professional qualification of the didactic personnel. However, the 8th Country Report regarding the Information Society placed Romania as the least progressive country amongst the other 27 EU member states at the date of the Report, with respect to participation in lifelong learning (Iordăchescu, Scutelnicu, Iordăchescu, & Ariton, 2003). The same

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Country Report stated other specific educational needs, such as shifting the emphasis from a classical, face-to-face, instructor-guided type of instruction, to a more collaborative and consensual learning contract between instructor and learner.

Despite the above-mentioned and other similar assumed goals, the European *Key Data on Learning and Innovation through ICT at School in Europe* Report (Eurydice, 2011) observed massive disparities between the EU countries with respect to the development of e-education, and Romania is showed to have made less-than-commendable progresses with respect to many of these disparities. There is fewer available data for higher education as compared to secondary and primary education; however, the observed trends paint a suggestive picture. For instance, with respect to innovative teaching methods, for ISCED levels 1, 2 and 3, Romania offers only recommendations, but lacks effective support for e-education, extended critical perspectives formation and project-based learning, personalized/adapted learning, learner-centered instruction and for research and critical thinking for scientific analysis. Concrete and real support was identified in terms of existence of hardware infrastructure in common learning places. Nevertheless, the same hardware does not equip learning spaces in the same proportion as the western European countries. Romania promotes the utilization of a range of ITC equipment for teaching, such as personal computers, video projectors, DVDs, video players and TVs, but a downside is recorded in terms of multimedia applications, communication software, as well as a lack for specific recommendations and support for tutoring software.

The institutional and system perspective which results from the above data adds to the effects brought by the increase in complexity and dynamics of the labor market and by the increasing market demand for personalized and competence-based instruction. According to EUROSTAT (2013b), in 2012, only 21% of Romanians had completed tertiary education, a compared to the European mean of 35.8%, which placed Romania in the 26th place amongst the then-27 member states. Moreover, in 2011, only 9.2% of the 18-24 years old young adults with active employment were enrolled in post-secondary education, whereas the EU mean was 35.8%. The figures for tertiary education were not much better, also; in 2011, only 4.9% of the population age 18-64 were enrolled in a level 5 or 6 formal education programme (based on ISCED 97), as compared with the European mean of 7.4%, which placed

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Romania on the 20th place amongst the then-27 member states (EUROSTAT, 2012).
On a more positive note, after 2007, a positive trend could be identified in Romanians aged 16-74 which graduated from a post-secondary instruction, and which use the Internet to pursue an online course: 4% during 2008-2011, as compared to a 4% EU mean (EUROSTAT, 2013a). The same interest in education could be observed for students, of which 77% were using the Internet in search of educational offers, as compared to the European mean of 65%. These figures showed a significant interest in Romanians for educational services, in general, and for elearning, in particular.

Conclusions and Discussions

The above overview, albeit brief and by no means exhaustive, shows empirical evidence as well as theoretically grounded support for the presence of ITC in education, its effects and benefits, as well as indicative data for the current trends in education, the current status of European education and the programmatic and strategic goals in the European Union and in Romania. For the time being, it is difficult if not unfeasible to pinpoint accurately the impact of digital technologies on learning and instruction, due to the on-going changes that occur both at the technological level, and in terms of strategic orientation of the educational establishment. The field of elearning is still characterized by the relative novelty of online learning, especially that of massive open online courses, and by the differences in certification and validation of these types of instruction, whereas the empirical evidence comes from a relatively young body of specific and dedicated research.
The future of blended learning and the concrete shape of the upcoming dominant trends is still in debate. For instance, the Sloane Consortium identified a decrease in the number of those who consider blended learning as more promising than online (from 46% in 2003, to 38% in 2004). Even more so, the presence of technology in education, as well as in any other area of life, appears to have be increasing daily (Daniel, 2012a). As such, a more appropriate question may not be *if the education will utilize technology*, but rather *how soon face-to-face academic interactions will be replaced by online academic interaction*.
However, at least until the status of digital technology is developed and mature enough to compensate for the behavioral modelling available in

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the 'classical' instruction, blended learning appears to be the most risk-free and cautious approach in terms of an accepted and validated instructional design. Moreover, as data from the European educational statistics show, Romania still lags behind in terms of educational software and human expertise. As such, elearning actions should not dismiss entirely the incorporation of face-to-face instruction, albeit the seductive arguments brought by the 'true' online learning.

Three main reasons or key points can be formulated in relation to the need to adapt Romanian education to the international trends, in general, and to European trends and strategic actions, in particular. First, at a policy or strategic level of analysis, the European Union promotes a development of e-education that is global and united, or homogeneous, multi-level and trans-European; however, Romania was shown in official reports as lagging behind in many development indices. Second, from a pedagogic or didactic standpoint, the modern distance education requires an accelerated learner-centered instruction, which, in specific and concrete terms, implies including active, collaborative, adapted/personalized instructional designs and methods, which can be significantly improved by blended learning. Again, with respect to this second key dimension, Romanian pedagogical establishment has to work towards being competitive. Thirdly, from a more pragmatic perspective, concerning the required resources, the infrastructure for a competitive elearning as well as the networking capabilities with similar establishments, are crucial. Past experiences in the absorption of European funds left a lot to desire in terms of competitiveness and efficiency. This lack of competitiveness in the utilization of European funds affects the educational establishments as well, and adds to the chronic sub-financing of the Romanian educational system, while the labor market demands increasingly more concrete and targeted specializations and qualifications.

The future of Romanian elearning cannot be decided at the level of individual educational institutions. These entities may apply for financing, may develop specific and circumstantial partnerships, albeit build on existing networks. However, only with their particular resources, based only on their individual expertise, and without a clear, sustained and strategic support from a more national level, the risks of lagging behind the European and international developments is ever more present.

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