

Survey on e-Learning Implementation in Eastern-Europe Spotlight on Romania

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Abstract — Rapid proliferation of mobile technology and the Internet in Eastern-Europe for the past decade has had a significant impact on information distribution and has facilitated the introduction of novel e-Learning systems and technologies. The rapid growth and use of technology, as well as the ongoing transition towards a knowledge-based society of the workforce, has triggered in Romania the need and pressure to learn continuously. The paper provides an overview on e-Learning developments in Eastern-Europe taking as case-study Romania. As part of the European Union (EU), Romanian's education system is developed and evolves in the context of EU's regulations. However, recent developments in the area of online learning in Eastern Europe, specifically the fast pace of development of these systems in Russia could have a strong impact on regional markets. A comparison with US developments in e-Learning is provided to emphasize common issues in the development and adoption of e-Learning systems.

Keywords – e-Learning; Romania; Eastern Europe; Online Learning; Learning Management Systems.

I. BACKGROUND

E-Learning systems have been deployed in the US for several decades and currently more than one in four students take an online course according to a 2015 survey of online learning [1]. While in Eastern-Europe (EE), online programs are in their infancy, with the advent of high-speed Internet and mobile technology even in remote areas, the potential for rapid growth is tremendous.

An important factor for the implementation of online programs in EE is the reduced cost associated with attending these programs, as well as the time flexibility provided to students and instructors. One can attend these courses from home without additional costs associated with travel, on a flexible schedule that allows keeping a full time job.

Smarter/wider use of technology in teaching is generally seen as a promising way of controlling costs [2]. Higher education is being affected by the “cost disease” [3] since universities have high costs for infrastructure and labor, with reliance on expensive face-to-face provision. The urgent need to boost university productivity in US has been noted by many [4]-[6]. Likewise, productivity is a growing factor for e-Learning adoption in EE as well.

This survey is structured as follows: in Section 2 an

overview of e-Learning initiatives in Europe is provided, particularly highlighting some of the European Commission (EC) initiatives and some initiatives that fall outside EC jurisdiction. Since Russia is a major player in this field in EE, we provide a brief overview of systems employed there. In Section 3 the current state of e-Learning initiatives in Romania are presented, focusing on the seeds of online learning in different areas – from K-12 to industry. Section 4 illustrates the driving force behind e-Learning systems and investigates future trends. A parallel is drawn between e-Learning implementation in EE and US since most “*Dos and Don'ts*” are invariable across continents and cultures. The Conclusion section summarizes the trends and requirements for a successful adoption of e-Learning in Romania.

II. E-LEARNING IN EUROPE – WEST AND EAST

The EC funds online collaborative platforms that bring education and training professionals together. These platforms allow education and training professionals to share ideas and experiences, learn new approaches or techniques from their peers and discuss important challenges faced by their colleagues around Europe. The digital single market - digital economy and society [7] focuses on experimentation with such online platforms.

The Electronic Platform for Adult Learning in Europe [8] is an example of the EC initiative for e-Learning. The platform is a multilingual open membership community for teachers, trainers, researchers, academics, policy makers and anyone else with a professional role in adult learning across Europe. It was launched in 2015 and is Europe's largest adult learning community.

While EC has the funding to bring novel ideas to fruition, a large set of initiatives outside the EC domain have been taking shape in recent years. eTwinning [9] for example, is a platform for staff (teachers, head teachers and librarians), working in a school environment to communicate, collaborate, develop projects and share knowledge using online tools. eTwinning is now part of the Erasmus+ program [10] and, as of September 2016, there were approx. 40,000 teachers, 50,000+ projects and 160,000+ schools participating in this e-Learning community. eTwinning impact on schools as measured through a survey in 2016 has

proven (by an 84% teachers vote) that the platform significantly facilitates and improves the relationship among teachers and students. Moreover, 77% of the teachers surveyed agree that eTwinning has had a moderate to high impact on fostering EU citizenship values in schools.

The conclusions emerging from the eTwinning studies show that innovative schools promoting international collaboration and self-study among the teachers benefit the most from such an online system. eTwinning is now focusing on developing a full cycle of schools and on recruiting teachers for each school level [11].

Another initiative that brings together the main players in the education system in EU: teachers, experts, policy makers, non-governmental associations, etc., is the School Education Gateway [12]. Sponsored through the Erasmus+ Program, it went live on February 2015 and is available in 23 languages.

Shifting the analysis from Western to Eastern Europe, one notices Russia's early efforts into upgrading the education system to cover the growing gap between rural and urban education. Russians have a long history of distance education; since 1920s the government Committee for the Advancement on Self-Education organized a nationwide correspondence education system to cope with the population spread over vast distances (e.g., since 1924 courses were taught in the area of agriculture, engineering, social sciences - through radio broadcasts for remote regions) [13]. Western e-Learning systems needed translation and some required software licensing posing a barrier in their adoption in Russia, hence, the need to develop in-house solutions. Russia is considered a leader in e-Learning systems development in EE with a yearly growth rate of approximately 16% as illustrated in Fig. 1.

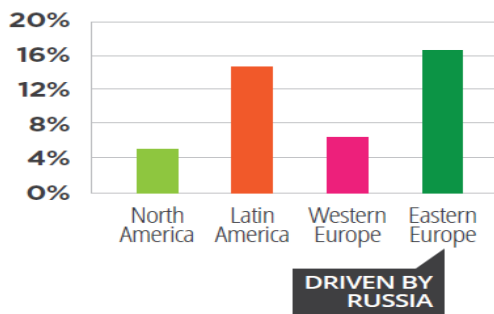


Figure 1. E-Learning growth by region [14]

The avant-garde of e-Learning systems in EE is led by the Russians through the use of software systems like Moodle, Khan Academy and Coursera. Moreover a partnership between Intel and the Volnoe Delo charitable foundation spawn in 2007 the program "Computers for Students". The partnership aims at donating over 1 million laptops at the national level as well as setting up the "11e-learning" program for the K-4 schools in Russia. Of particular interest are the Massive Open On-line Courses promoted by the Moscow-based Digital October Technology Center [15] geared towards self-taught, self-paced learners.

In addition to Russia, a number of EE countries are devoting significant efforts to grow and adopt e-Learning systems specifically in the mobile learning area. Countries like Azerbaijan, Kazakhstan, Moldova and Ukraine lead these efforts as illustrated in Fig. 2.

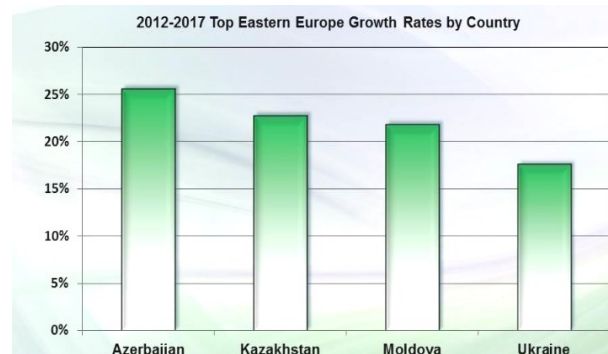


Figure 2. Mobile learning growth in the past 5 years [16]

Russia, like the other EE countries faces many problems in course management systems deployment, including the need to localize content by translating it from English into the local language, a difficult adjustment of online courses to the country's rigid universities' curricula, as well as social acceptance of online learning as an alternative to traditional classrooms.

III. E-LEARNING IN ROMANIA

As a member of the European Union (EU), albeit part of the EE block, Romania is guided by decisions made at the EU level. In this context, in Romania, within the general strategy of the EU's Information and Communication Technologies, the Ministry of Education and Research, has been trying to implement the online assessment, as well as the e-Lessons for various subjects. EU defines e-Learning as "the use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services, as well as remote exchanges and collaboration" [17].

The e-Learning concept was introduced in Romania approximately two decades ago through the Virtual University paradigm, however, the first in-house Java based e-Learning software systems were surfacing in 1999 around major university centers [18].

Since then, the e-Learning concept has been more frequently used in Romania. Currently, all Romanian universities, as well as some governmental and non-governmental organizations use e-Learning platforms with a slow but increasing frequency. The main goal of these platforms is to provide distance education for a growing workforce in the service sector, as well as to re-train Romanian workforce.

The growth of the Romanian IT sector for the past decade has triggered the need for rapid education in a variety of technological areas. The great advantage of the sector is the

presence of a highly skilled workforce that has determined the development of software and services, with an amazing growth rate of approximately 40% since 2000 [19]. Using online courses for training eliminates the need to provide a full classroom setting for employees, greatly reducing the costs for establishing and maintaining an educational space for the Romanian workforce. Moreover, when the learner has control over when the material is being presented, they are better prepared to retain the information instead of feeling rushed or stressed.

In Romania the older segment of the population has been experiencing the Digital Divide [20] and the rural segment the Urban-Rural Divide [21] due to the slow penetration of technology in the first years of the post-revolution era (i.e., 1989). E-Learning technology can alleviate these gaps by allowing people of all ages and trades to learn new skills without the restrictions of a traditional classroom. Young and old alike can use online courses to learn a new skill, help improve their career or just to narrow the Digital Divide gap.

While e-Learning implementation is still lagging behind in Romania, we identified a series of efforts in this direction. The e-Learning trend has not been uniformly adopted in the Romanian university system however, islands of initiatives can be found in other areas. The following sections present these initiatives classified based on their area of application.

A. E-Learning in K-12

There are roughly 80 virtual high schools [22] in 18 different countries in Europe right now, with about 50% being private. Most K-12 initiatives have around 500 students and are targeted towards social inclusion for students outside the bounds of traditional schools. They represent a complete pedagogical spectrum from 100% online through to significant face-to-face interaction [23]. The schools tend to serve: the long-term sick, disabled students, young parents or pregnant young women, travelers, bullied or school-phobic, students with behavior problems, drop-outs, imprisoned youth or the geographically isolated. Other schools serve students with special language needs, expatriates or elite performers.

One of the first e-Learning initiative in Romania [24] is targeted at secondary high school education and it is designed to prepare Romanian children who intend to continue their studies at an American University.

A novel initiative in Romania along the trend set by the EU projects is the Romanian Teachers Online portal iTeach [25]. iTeach is a virtual online environment based on Web 2.0 paradigms, facilitating the collaboration on didactic projects, socio-professional collaborations, learning and experience exchange, as well as familiarization with novel technology for e-Learning. Currently iTeach hosts seven online courses: two DigitalEdu courses – targeted towards teaching educators project based learning use in K-12 schools, as well as online tools for class interaction, an introduction to eTwinning and a module for international collaborations in which theoretical solution and their practical implementation

is pursued. Other courses are targeted at collaboration quality assessment, teaching quality assessment, as well as a course on using digital systems and software tools in education.

A research survey of new technologies in the teaching and learning process at both rural and urban schools conducted by the Center for Development and Innovation [26] shows that the frequency of using the e-Laboratories in the urban area (24.8%) is increased due to the large number of students, comparative to rural areas (19.5%), illustrated in Fig. 3.

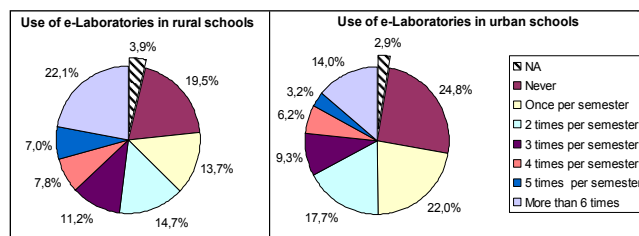


Figure 3. Frequency of using the e-Laboratories

The survey concludes with the need to expand development of e-Learning management systems in Romania at both rural and urban levels.

B. E-Learning in Higher Education

The slow deployment of e-Learning in Romanian universities is mainly due to the rigidity of the curriculum backed by the reluctance of the instructors, professors and academic leaders to support such systems for reasons similar to other countries (e.g., US), summarized as follows.

Resistance to change – Change entails the development of new skills and requires leaders to become learners, generating for some uncomfortable situations. Studies show that in higher education institutes, only 10% to 15% of faculty is open to adopt e-learning tools and techniques. Approximately 70% – 80% constitutes the reluctant majority who has to be convinced that e-Learning rewards would benefit them also [27].

Short-sighted policies – Quality versus Costs – a simplistic view of e-Learning as a medium to increase enrollment and revenue is flawed. A successful implementation entails the right technology, reliability, security of student data, and ease of use for both faculty and students.

Budgetary limitations – Money is a limited resource while technology is a field of moving targets, with many new products and services. Many pathways exist for the successful delivery of e-Learning, with selection and provision depending on factors, such as organization size, mission and priorities. Technology is as good as one's ability to manage and exploit it.

Unqualified decision makers – Administrators in charge often do not really have the background or knowledge of instructional design, compliance, intellectual property and experience to implement online courses. Such issues can be alleviated by selecting a qualified team of professionals with

relevant experience and by being prepared to understand and identify the e-Learning finest practice tools and services that would best differentiate the institution in the marketplace.

An example of such an initiative is the Virtual University of Bucharest [28]. University of Bucharest, the second ranked University in Romania, has introduced e-Learning at the Economic Studies Academy and the National School of Administrative and Political Studies. The first online master program was attempted by the Faculty of Communication and Public Relations in 2004 [29]. A related effort is the Economic Studies Academy that deployed the first online Master program based on case studies from Harvard Business School. Subsets of online learning (e.g., blended learning) are also explored.

The Polytechnic University of Bucharest has several ongoing e-Learning projects, some of them targeted at instructional design, others at developing new methodologies for teaching and most importantly projects devoted to experiential learning.

With the rapid proliferation of networking technology in Romania, another initiative, the Center for Resources, Development, Information and Services, offers an online course dedicated to CISCO network specialization.

There is a new trend for major Romanian Universities to provide online courses. Timisoara Polytechnic for example, provides an online platform, UniCampus, offering a Mobile e-Commerce course and aiming at the development of the first Romanian Massive Open Online course. Such open and free systems resemble international initiatives like Coursera, EdX, FutureLean [30].

A premiere for Eastern Europe, the Online Admission System recently deployed in Romania proposes online management of admission for Universities in Romania. So far five universities have joined the system: Romanian-American University, Technical University for Building Management, Ovidius University of Constanta, Polytechnic University of Timisoara and Technical University "Gheorghe Asachi" from Iasi. Similar platforms were implemented some time ago in Western countries, for example UCAS from 1996 in Britain, Studielinek in Holland and CommonApp in US.

C. E-Learning in Industry

Preferably, every company should have a strategy to set out career development paths and the required training curricula that will enable the personnel to develop the necessary knowledge and skills. These training initiatives should be monitored and managed through a consistent and reliable tracking system that can be stored, consulted and analyzed as required. The system's data will be useful for management reports on productivity and for assessing individuals' career advancement. This system of training management, referred to as a learning management system (LMS), is a key element of an effective professional development plan.

The workforce training/re-training is a major issue in Romania and e-Learning platforms for these tasks are in their

infancy. A survey of the Northern European countries shows that workers in North Europe are four times more willing to be taught by their employers than the workers in the South [31]. A recent survey in Romania [32] answered by a total of 405 students, 904 graduates and 825 employers illustrates a positive view on e-Learning initiatives with the main priority on the increase in quality, the emphasis on practical aspects, and links with the realities of the economy and the labor market.

An example of such an initiative is the Virtual Business University [33]. Its main goal is the advancement of online/distance learning aimed at filling in the workforce market needs. It offers online courses and advice for young entrepreneurs and it is providing theoretical and practical experience to its users. Students are required to attend these courses through comprehensive online interaction tools like discussion forums and chat channels. Upon completion they receive a certificate and the course credits can be used towards a graduate degree if the students decide to pursue a Master program in the area. The Virtual University has built partnerships with various marketing, communication and investment organizations (e.g., Finantate.ro, Markmedia.ro, Comunicare.ro and Comunicareonline.ro).

A similar effort, Timsoft [34] has been focusing on e-Learning for about four years and has offered over twenty online courses in IT, Counselling, Management, Marketing, and e-Training. Other Romanian software houses like Siveco [35] and Softwin have developed the AeL e-Learning system in an effort to facilitate the understanding of educational subjects and increase the efficiency of the learning process. AeL has a user friendly interface and can be easily translated in any language.

Online Academy [36] is an e-Learning portal developed by InsideMedia with the help of experts from the Science and Education Institute and the Association for Excellence in Career. It offers a set of basic courses targeted to lifelong learning. The portal and courses' modular structure facilitates active participation and collaboration among participants.

D. E-Learning in GO and NGOs

Governmental Organizations (GO) in Romania have shown significant interest in e-Learning technologies especially in the context of the e-Government initiatives (e.g., the use of information and communication technologies to improve the activities of the organizations in the public sector). Non-Governmental Organizations (NGOs) in Romania have received in the past decade a significant amount of financial support through EU grants.

The Foundation for the Development of the Civic Society [37] with the financial support of the Trust for Civil Society in Central and Eastern Europe deployed a few years ago an e-Learning platform to: provide technical assistance, information, advertisement and research, to improve the impact of the NGOs in the community; present a comprehensive view of the NGO interests and involvement in other sectors of the society; improve the visibility and

transparency of the NGOs. The goal of the foundation is to enable through the use of e-Learning technologies a strong and influential civil society with responsible citizens that promote the community interests and values.

The results of an assessment survey on the performance of the e-Government is illustrated in Fig. 4.

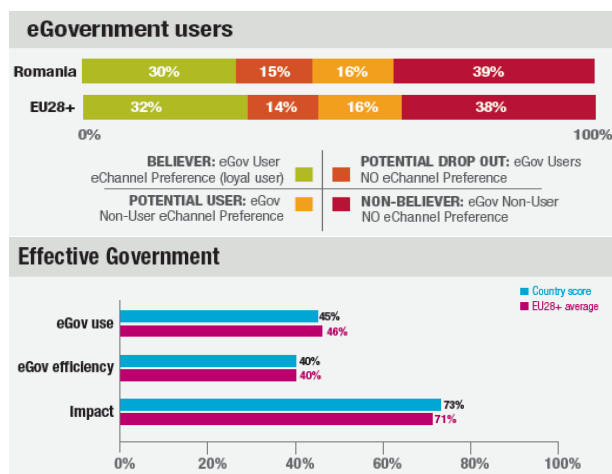


Figure 4. e-Government performance in Romania [38]

The e-Government implementation in Romania is beginning to show positive developments with 30% of the citizens using these services at present.

IV. ALIGNING TO CURRENT AND FUTURE TRENDS

There are many advantages in using an e-Learning system but the efficiency of such a system depends on many factors. Current and future trends are driven by several major aspects as highlighted in the following paragraphs.

A. Continuous Education and Professional Development

When people continue their education, they are growing, becoming more involved and curious, they develop skills that the modern job market requires, and they are cognizant and engaged in the world around them. Continuing education is essential in most areas and disciplines particularly in the technological sector. However, since technology is permeating in all areas and disciplines it triggers automatically the need for continuous learning. From job performance to promotion and advancement, continuous education is acknowledged as of utmost importance, as illustrated in Fig. 5.

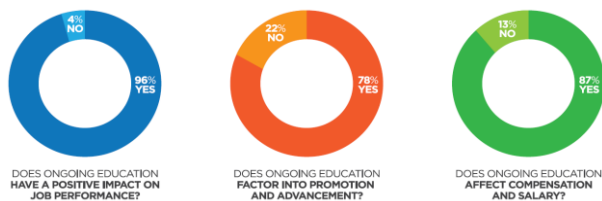


Figure 5. Importance of continuing education [14]

B. Adoption of Mobile Technology

Mobile learning is a revolution in e-Learning. It is defined as “learning across multiple contexts, through social and content interactions, using personal electronic devices” [39]. From the perspective of learning technology, mobile delivery is the second most important priority for development in EU, as illustrated in Fig. 6.

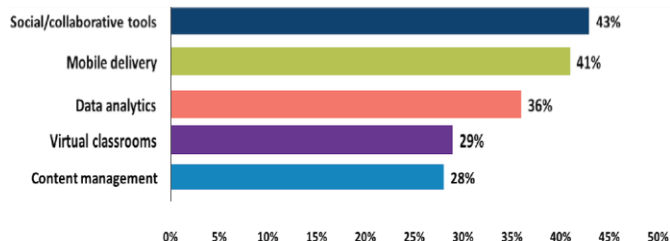


Figure 6. Top 5 learning technology priorities [14]

With the rapid and wide spread of handheld technology, currently there are more than 7 million smartphone users in Romania (i.e., one out of three Romanians is using a smartphone). It is estimated that by 2020 one out of two Romanians will use a smartphone [40]. Hence, the hardware required to deploy mobile learning applications is already available.

C. The Cloud Effect

Cloud-based learning management systems are hosted on the Internet and can be accessed by logging into a service provider's site. Rather than having to install course design and management software, instructional designers can simply use their Internet browsers to upload course content, create new courses, and communicate with learners directly. This is all done through a secure LMS, giving designers the ability to store information on the cloud, which can be remotely accessed by other, approved users.

Major benefits of deploying an e-Learning platform on the Cloud include [41]:

- *Lower startup costs* - there is no software to purchase, no need to devote the time or human resources to installing programs and working out glitches;
- *Enhanced data security* – data is hosted on platforms that are better encrypted and safer to use;
- *Improved accessibility* – better accessibility for both learners and course designers. Learners are able to learn on-the-go, anywhere and anytime, instructional designers can utilize their tablets and any other internet-ready device to upload content and communicate;
- *Faster deployment* – cloud-based eLearning is faster to set up and requires less time to actually deploy. There's no hardware of software involved, so one can have immediate access to the LMS;
- *Cost predictability* – cloud-based LMS offers administrators the ability to choose between plans based on registered users or plans based on activity;

- *Easier to maintain* – cloud-based LMS service providers have IT staff on hand. One does not have to worry about dealing with glitches and other LMS operation issues;
- *More storage space* – all of the data will be uploaded directly to the LMS, releasing space on user devices. Other users, such as collaborators and content creators, will be able to share information with ease, given that it's being stored on a remote (and secure) server;
- *Fully customizable and scalable* - regardless of whether it is a smaller organization or a large corporation, cloud-based LMS offers the best of both worlds in the form of customizability and low cost. Owners can modify and scale their learning cloud-based LMS, providing the best learning experience for their users.

V. COMPARISON WITH US, BLENDED LEARNING

The Gartner Group Research Institute in the United States anticipated that the world's e-Learning sales would grow 14.5% annually from 2006 to 2011 [1]. Campuses will still be active, however, technology will transform the way education is delivered and accessed, and the way value is created by higher education providers. A 4% growth for US is forecasted as related with 16% for Eastern Europe (Fig. 1).

While in US more than 1 in 4 students take an online course, in EE we estimate the current ratio at about 1 in 30. However, when compared to Europe, similar issues plague the e-Learning system deployment. As mentioned in Section III.B, resistance to change, short-sighted policies, budgetary limitations and unqualified decision makers are universal problems in this area. However, another important factor is the maturity of the learner. Fully online programs are meant for those who live far from campus or may have jobs that prevent them from attending campus classes, but at the same time such programs require a mature learner that is self-paced, responsible and motivated. To be successful in a fully online learning environment requires a strong sense of self-directed learning. Of course many strategies exist to promote student engagement (e.g., enable students to monitor their own progress, help students set achievable goals in the course); however, often these strategies fail and sometimes are not correctly implemented due to the lack of expertise in instructional design.

An alternative solution, especially useful for transitioning from a traditional course to an online course is Blended Learning [42]. The term Blended Learning is being used with increasing frequency in academic writing but there is no consensus on its meaning [43]. An alternative term, Hybrid, is defined as being of “mixed character; composed of different elements” [44], and Blended is defined as “an unobtrusive or harmonious part of a greater whole” [45]. Blended Learning has been described as a hybrid instructional approach combining aspects of e-Learning and a traditional classroom environment [46] and defined as courses that deliver material both face-to-face and online and where students interact with instructors both online and face-

to-face. Many colleges in US offer hybrid courses, which combine traditional face-to-face with online instruction. Previous research proves that this combination may promote learner-centered and active learning [47]. A similar trend is foreseen in Europe as well, specifically in Eastern Europe and particularly in Romania where e-Learning systems are still in their infancy.

As an example of this strategy the public University System of Georgia [48] defines the following:

- *Fully online*: All or nearly all the class sessions are delivered via technology (96% to 100% online);
- *Partially online*: Technology is used to deliver more than 50% of class sessions (51% to 95% online);
- *Hybrid*: Technology is used to deliver at least one class session up to 50% of class sessions;
- *Campus/on-site*: No class sessions are replaced by online technology.

Whether fully or partially online, the successful deployment of e-Learning systems in Romania will follow the regional trends and will be strongly influenced by the political decisions in the region. Young Romanian learners seem to be very flexible and motivated specifically in the technology sector. They know that e-Learning enables global learning, breaking the boundaries of local knowledge and they are eager to explore the possibilities.

VI. CONCLUSION

The paper provides an insight into e-Learning technologies and their evolution in Europe. The focus is set on Eastern Europe, particularly on the developments in Romania along several dimensions: e-Learning in high schools, higher education, government, as well as the private sector. Several important factors that influence the adoption and success of e-Learning systems are presented and should be considered by policymakers and educators.

Spawning from the need for continuous education, e-Learning generates advantages for both the young and the mature learner in Romania. Mobile and Cloud technology are fundamental factors for e-Learning growth and provide major benefits not only in terms of content storage and management but also in terms of content presentation and availability.

U.S and East European e-Learning trends show common expectations from faculty, administrators and students, highlighting the need for a gradual and better managed introduction to online teaching. As a first step of this transition, a careful analysis along the main strengths, weaknesses, opportunities and threats of online teaching must be accomplished, and the subset of courses to be taught online must be identified. Online teaching pedagogy courses must be subsequently offered to faculty and students, as well as training describing the features and the use of the LMS of choice. Ultimately a successful implementation of the e-Learning paradigms depends on all the actors involved: administrators, faculty, students and policy makers.

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