TRENDS IN DIGITAL EDUCATION

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Abstract: One of the biggest trends in Learning Management System is gamification that engages users in solving problems. Open source allows for reduced set-up costs and easy customization of software. The social networks boom is based on the frequent use of e-portals and information sharing. Blended programs integrate various learning interventions such as classroom sessions, webinars, self-study, coaching, assessments, and social learning. The adaptive learning through a diagnostic, role selector, and other tools can ensure a targeted experience.
The growing number of Massive Open Online Courses (MOOC) is seen in the growing business interest of this kind of scientific activity. The open badge structure collaborates with MOOCs and permits achievement skills which may help with future careers and education. API (Application Programming Interface) integration is the allowance and processes to give programs access to connect and communicate with other programs. All the abovementioned technology immersed society needs tools for analyzing the increasing quantities of data to improve student learning and to enhance academic operation in more and more personalized learning.

Keywords: *digital education, Learning Management System, educational continuum.*

eLEARNING LEVELS

Information Technology gives more and more possibilities to be used in education. There are new and interesting kinds of faculty-to-student and student-to-student interactions that engage and involve learners in the eLearning process. Interactions have everything to do with the actual design of the eLearning project to bring about the desired performance change. These interactions are instructional and include multiple choice quizzes, tests, eLearning scenarios, simulations, animation videos etc. In this way the learners can deepen their understanding of the subject matter through experimentation, dealing with unpredicted circumstances, or even learning from their mistakes (Blunt, 2014).

The eLearning courses can be classified according to the level of interactivity. Levels of interactivity delineate mechanical complexity used to figure out scope and pricing for an eLearning

project. There are varying levels of the interactivity in eLearning. The course is considered basic training when there is no interaction and the progress of the course is linear. This eLearning process consists in the receiving of information through watching and reading. It may include images, graphics, rollovers, simple video and audio, test questions, etc. This level with text and images is most suitable for communicating basic concepts or easy principles.

If the participation is limited the learner is required to recall more information and makes simple responses to instructional clues. The learners may have some control over the eLearning material like animations, clickable menus, glossaries, links to external resources, drag and drop interactions, and multimedia.

In the third level, called moderate, the interaction is customized and complex. It contains knowledge checks and may include animated video, customized audio, complex drag and drop interactions, simulations, stories, scenario-based cases and multimedia.

The fourth level is going to be the most interactive and characterizes full immersion and simulation. This level of the real time learning may include: interactive games, simulated job performance exercises, customized audio or videos, avatars, stories and scenarios, multimedia and real-time feedback. The dynamic and personalized environment is created to teach complex subjects, theories or concepts with a professional run through for better comprehension. This level can make an impact on the learners, change their attitudes and get the best performance out of them (Pappas, 2014a).

It is important that at all these levels the students and their progress are more important than the technology itself. What are the benefits of that eLearning interactivity?

The eLearning interactivity has been proven to activate long-term memory and to improve attention. The usage of an eLearning course scenario questions and simulations can replicate the real world. This way the learners have the

opportunity to make decisions without taking real risk. It is possible to experiment with unpredictable paths with no stress involved and handle complex tasks with a high rate of success during online training courses.

The eLearning experience encourages the involvement of the learners. They receive feedback and that encourages their reflection. They are engaged by directing their attention towards the eLearning content and at the same time they are more motivated. Another benefit of the interactive activities is curiosity that leads the learners to better knowledge retention. It is possible because they are emotionally driven and memorize the eLearning experience.

The more interesting a story or an eLearning game is, the more intensive will be the learners' motivation. High quality content, aesthetically appealing design and easy navigability help in engaging and motivation to learn. Also the opportunity to explore the eLearning course is essential across links, stories, integration of visual components and interactive, reality based scenarios with the use of video, images and audio that lead to emotional responses. It is important that all these elements do not detract from the core content. Also the collaboration in the group can positively influence the motivation of every member on online forums, chats online or social media sites. The group collaboration is possible despite the fact that learners may not be meeting face-to-face. This interaction gives the opportunity to learn from other learners' experiences and to explore a topic in depth within a group setting (Pappas, 2014b).

TRENDS IN LEARNING MANAGEMENT SYSTEMS

A Learning Management System (LMS) is a software application for the administration, documentation, tracking, reporting of training program, classroom and online events and eLearning programs (Ellis, 2009). The Learning Management System is the infrastructure that delivers and manages instructional

content, identifies and assesses individual and organizational learning or training goals, tracks the progress towards meeting those goals, and collects and presents data for supervising the learning process of the organization as a whole (Szabo, 2002, pp. 929-936). This system delivers content but also handles registering for courses, course administration, skills gap analysis, tracking, and reporting (Gilhooly, 2001, pp. 52-53). With the recent technology and web application advancement, a new generation of LMS are expected to have some new features. These include: open, social, personal, flexible, learning analytics, and mobile scenarios (Stone, & Zheng, 2014, pp. 756-767).

One of the biggest trends in LMS is gamification. Gamification is the use of game thinking and game mechanics in non-game contexts to engage users in solving problems and increase users' self contributions (Huotari, & Hamari, 2012). Gamification attempts to harness the motivational power of games and apply it to real-world problems – such as the motivational problems of schools. Gamers recognize the value of extended practice, and develop personal qualities such as persistence, creativity, and resilience through extended play (McGonigal, 2011).

Games provide complex systems of rules for players to explore through active experimentation and discovery. By increasing engagement, gamification allows students to approach their learning from a strategic framework that balances time-management, point and reward-based incentive systems, and even more advanced learning tools, such as storyline and narrative. Games guide players through the mastery process and keep them engaged with potentially difficult tasks (Koster, 2004).

Games also invoke a range of powerful emotions, from curiosity to frustration to joy. They provide many positive emotional experiences, such as optimism and pride (Lazarro, 2004). The most dramatic example of emotional transformation in a game is around the issue of failure. Games maintain this positive relationship with failure by

making feedback cycles rapid and keeping the stakes low. Gamification offers the promise of resilience in the face of failure, by reframing failure as a necessary part of learning (Lee, & Hammer, 2011, p. 3).

Games allow players to try on new identities and roles and test their in-game decisions from different perspectives (Squire, 2006). Players also adopt roles that are less explicitly fictional, exploring new sides of themselves in the safe space of play. A well-designed gamification system can help players take on meaningful roles that are fruitful for learning (Lee, & Hammer, 2011, p. 4).

The investment in education can benefit everybody, from customer education to management training. It can be seen in enhancing behavior, motivation, and planning. The management training can reduce employee turnover, enhance conflict mitigation, and directly improve morale. A Learning Management System can put product information at customer's fingertips, help in development of an e-commerce strategy, or create customer service portals. So another trend in LMS is to extend enterprise learning that different content can be made available to specific audiences. This situation indicates also protecting information from different competitors.

Open source enables mass specialization, the small innovations and differentiating features. Its big advantage consists in the possibility of being open. Learning Management Systems are easy to set up and use thanks to the standardization from cloud-based and software-as-a-service (SAAS) solutions. There is the possibility of customization at the expense of frequent administration and downtime offered by open source. It allows for reduced set-up costs and easy customization (Sharma, 2015).

The social networks boom is based on the frequent use of e-portals and information sharing. Academic social networks are important both for students and professors. Learning Management Systems make extensive use of portals like Facebook, Twitter or LinkedIn but also

of portals dedicated directly to education like ResearchGate, Accademia.edu, Mendeley, Zotero or MyScienceWork and others. They help to find researchers or experts, to disseminate publications, to find relevant documents, to discuss topics and create a network of followers. Thanks to them it is possible to manage and share bibliography, to exchange with people sharing the same interest: topics, skill expertise. They give opportunities to evaluate or discuss documents, to share information, to ask questions and receive immediate answers, to consult documents and even find a job across the contact with companies or job offers. The big problem is connected with the propriety of the content: who is its original owner. For example Elsevier asked to retire the papers from Aacademia. edu in December 2013. Later Elsevier has begun sending take-down notices to Accademia.edu. for articles that authors has posted where they are in violation of the copyright transfer agreement that the authors has signed. Many authors sign that agreements with publishers (Aventurier, 2015).

The most effective learning programs are blended programs that integrate various learning interventions such as classroom sessions, webinars, self-study, coaching, assessments, and social learning. Classroom learning is augmented by the increased scheduling capabilities, efficiencies, and supplementary learning materials so easily available through an LMS that includes a classroom scheduling component, an assessment tool, channels and methods for sharing progress (Sharma, 2015).

The learners would like to have an experience that is connected with their needs, style, level, location and role. Many Learning Management Systems can help in personalizing and adaptive learning through a diagnostic, role selector, and other tools to ensure a targeted experience. The performance support of Learning Management Systems could be an on-demand resource. It should be easy to search, accessible everywhere, and anticipate needs.

One of the key trends in recent years is the focus on proving value. Learning departments have to demonstrate they are making a positive impact on the business (Wyles, 2015).

The massive, open, online courses (MOOCs) provide a new way to engage with potential customers and partners. MOOCs represent the latest stage in the evolution of open educational resources. First was open access to course content, and then access to free online courses. Accredited institutions are now accepting MOOCs as well as free courses and experiential learning as partial credit toward a degree. The next disruptor will mark a tipping point: an entirely free online curriculum leading to a degree from an accredited institution. With this new business model, students might still have to pay to certify their credentials, but not for the process leading to their acquisition. If free access to a degree-granting curriculum were to occur, the business model of higher education would dramatically and irreversibly change. As Nathan Harden ominously noted, "recent history shows us that the internet is a great destroyer of any traditional business that relies on the sale of information" (Harden, 2012).

Three key factors indicate movement in the direction of widespread use. The first factor is the growing number of MOOCs, students who take them, and institutions that offer them. The second factor is the glimmer of MOOC acceptance within the formal higher education structure. The third is the growing business interest in MOOCs.

There are the converging trends that are challenges for institutions:
- the emergence of the learning sciences and their application to educational practice,
- the movement toward competency-based education,
- new business models that effectively combine instructional quality, lower cost, and increased access through unlimited scalability (MOOCs).

A turning point will occur when a MOOC-based program of study leads to a degree from an accredited institution (Mazoue, 2013b).

In the new business model presented by Christensen and Wessel there are five characteristics that define the extendable core of precision education:

- Its research-based methodology produces learning-optimized course architectures.
- It is maximally effective because it individualizes learning.
- It is efficient because it is competency based.
- It is scalable.
- It is cost-effective (Wessel, & Christensen, 2012, p. 58).

The MOOCs are also criticized for the idea that "content is free" because the preparation and maintenance of the courses does not come free. It is impossible also that students can support each other without good tutors. Another myth is that MOOCs solve the problem of expensive undergraduate education or educational scarcity in emerging economies. But the statistics say that over 60 per cent of those who register for MOOCs already have degrees. Finally, education is not a mass customer industry – it is a personal client industry (Mazoue, 2013a).

The open badge structure permits achievement of skills which may help with future careers and education. Open badges provide an open access framework that can offer tangible recognition to learners who demonstrate achievement in a given competency. They collaborate with MOOCs, gamification and social learning.

API (Application Programming Interface) integration is defined as the allowance and processes to give programs access to connect and communicate with other programs. The old fashioned approach was to procure one single monolith system dedicated to everything. The new approach allows systems to share data and provide integrated services.

Young people depend on digital resources for communications. They easily adapt and integrate new functionality from smart phones, laptop computers, mp3 players, game consoles and virtual reality worlds and arrive at university expecting to use technology in the learning environment just as they do in their personal lives. By the beginning of the next decade, the number of unique objects connected wirelessly to the internet should reach 27 billion and the number of connected devices is expected to double every five years. This society we can name as technology immersed.

With the increasing availability of technology in the instructional process, educational institutions are now collecting, in real-time, data about what their students are learning and how they are progressing. So education will need the use of powerful analytical tools for analyzing the increasing quantities of data to improve student learning and to enhance academic operation. The transformation in education will consist in how governments, schools, colleges and universities allocate resources, create and deliver curricula, assess learning and teaching and support student success.

Academic analytics provide a detailed view of the academic environment at all levels of the organization. Learning analytics is the interpretation of data about an individual's learning progress and educators can analyze student actions such as attending class, completing assignments, taking exams, interacting socially online, participating in extracurricular activities and posting in discussion forums to understand the individual learning traits of students. They can then tailor instruction to fit individual needs (IBM Global Education, 2014, p. 5).

The studies will be no longer constrained to physical places and time. The programs and services will be designed to their abilities, lifestyle, needs and preferences. This transformation is creating a more personalized learning. Educational institutions are experimenting with greater accommodation and flexibility by offering programs that are based more on certification of competency versus the traditional "time in class" model.

The situation of postindustrial society requires new teaching methods with tools for interactivity, personalization and collaboration to engage students in real-life situations that convey concepts, promote learning and help the students develop lifelong skills. The reasons for that situation are delivering traditional courseware in a more interactive mode to increase what students learn and helping students learn the skills for service-based economies they need to work successfully in the 21st century.

Another trend in education is the alignment between educational systems and the economic development initiatives and goals of the regions or countries like the access to data and the skills to better understand and use that data. But is it possible to measure the contributions of education to the economy? At the local level it could be possible by aligning educational outcomes to the demands of tomorrow's workforce. On a public policy level, concerns about global competitiveness will compel policymakers to align educational programs to current and projected employer needs. It indicates the better alignment between jobs that are produced by economies around the world and the graduates produced by educational systems locally (IBM Global Education, 2014, p. 6-8).

These trends can either be perceived as challenges to traditional institutions or as opportunities for long-lasting transformation to systems of education. Which way it is possible to lead this transformation and offer unified and clever educational system? (IBM, 2009).

EDUCATIONAL CONTINUUM

The educational experience is very complex and varies with many different paths of educational attainment. There are many important academic and skills developments. They are employment retraining, vocational education, technical training, apprenticeship, internship and informal learning programs.

Specialists of IBM see the educational continuum that provides a more interconnected, instrumented and intelligent system. Learning services and resources should be linked seamlessly. Information about student needs and skill gaps ought to be gathered discretely as digital content. Insights based on an integrated view of learning will be connected with decision-making. The system should be dynamic and the students will have the possibility to individualized courses throughout their lifetimes. The courses of study would start with an emphasis on foundational skills (IBM, 2009, p. 8-11).

These foundational skills divide into some groups. The basic skills like writing or reading are fundamental. Then the thinking skills embrace creative thinking, problem-solving or decision making. The skills connected with people are for example negotiation, leadership or teamwork. The social skills show understanding, friendliness, and respect for the feelings of others, asserting oneself appropriately and taking an interest in what people say and why they think and acting as they do. The cultural diversity skills help to work well with people having different ethnic, social, or educational backgrounds and to understand the concerns of members of other ethnic and gender groups. They also give the base impressions on a person's behaviour, respecting the rights of others and trying to understand one's own culture and those of others. Finally, the personal skills are self-esteem, self-management and responsibility (Jones, 1996).

In the educational continuum the courses would also progress on the road to specialized competencies that correspond to their strengths, passions and employment opportunities. Competence can be attributed to individuals, social groups or institutions, when they possess or acquire the conditions for achieving specific developmental goals and meeting important demands presented by the external environment. Typical examples of these competencies include base competencies (e.g., mental arithmetic, literacy, general education);

methodological competencies (e.g., planning for problem solving; competent use of a variety of media; computer skills, and so on), communicative competencies (foreign language skills; rhetoric; written and oral exposition skills; and so on); and judgment competencies (e.g. critical thinking skills; multidimensional judgments about one's own and others' performance) (Weinert, 1999, p. 11).

Retraining is the process of learning a new skill in response to a change in the economic environment and education continually provides for retraining as the employment market changes. In that situation technology will progressively become the key of lifelong learning experiences for students. They will receive information, entertainment and education. It will be the answer to their preferences, abilities and needs. Learning anytime and anywhere will include any device (IBM Global Education, 2014, p. 9).

The comprehensive environment of students and learning projects consists of three-dimensional virtual worlds, telepresence, social community sites and interactive learning resources (IBM, 2009, p. 11).

Interactive Learning Resources are part of Open Educational Resources that can be described as "teaching, learning and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use or repurposing by others depending on which Creative Commons license is used" (Atkins, Brown, & Hammond, 2007). This enterprise is seen in MOOCs where in first four months were registered over 400 thousand students in edX (Cadwalladr, 2012). More recently, the Open University established Future Learn as the UK response to the emergence of MOOCs (*What would you like to learn, n.d.*).

European technology, services and value is seen in the initiative of the Future Internet Research and Experimentation (FIRE) led by the European Commission (What is fire?, n.d.). Forging Online Education through FIRE (FORGE) is a new European initiative bringing together the worlds of online education and FIRE. FORGE is concerned with

specifying development methodologies for offering FIRE experimentation facilities to learners, related both to communications and IT but also to other science, technology, engineering and mathematics (STEM) disciplines and possibly even social sciences (Mikroyannidis, & Domingue, 2013).

What is the connection between Interactive Learning Resources and Linked Data? (Bizer, Heath, & Berners-Lee, 2009).

Linked Data is the simplest form of the Semantic Web (Berners-Lee, Hendler, & Lassila, 2001), where data representing any entity (e.g. person, place or organization) is identified by a URI (Uniform Resource Identifier) (*URIs, URLs, and URNs, n.d.*) and can be linked to any other data item. Linked Data is now being used by companies such as Google, Microsoft and Yahoo to enhance web search (*Welcome to Schema.org*, n.d.) and by Facebook to support the linking of social media resources (*The Open Graph protocol*, n.d.).

FORGE uses Linked Data in delivery, navigation, discovery and recommendation of learning materials (*Discovering Open University Content from Other Online Resources*, n.d.). Specific learning text, images and video provide a new level of interactivity and can be integrated into interactive exercises (*Shared Virtual Microscope*, n.d.). FORGE aims at complementing online learning initiatives with laboratory courses for an in-depth and hands-on educational experience. FORGE also advances research in Linked Data by targeting the application of Linked Data in the delivery and discovery of online learning resources.

Training and education programs have traditionally been built around events limited to instructors and learners, a closed network richer in learning resources than live contacts. Also the actual task of professional networking has traditionally been seen as separate from the processes of learning and matriculation. But the nowadays technology and policy have come to enable the demand of a new class of products for programs. These make networking a more integral

part of learning experiences and create new interaction models that can define and differentiate programs.

A Value Network is used to describe associations and interactions among resources (human or otherwise), and its articulation allows one to understand and optimize an overall interaction model. A Facilitated Network is a business model that assumes a shared platform for people to exchange resources and services.

Lifelong learning, Human Capital Management, and any institution in education can be mapped as a Value Network. There are a number of products that provide a path to programs that seek a more networked learning experience (Miles, 2015).

Degreed is a community of college students, professionals, and lifelong learners dedicated to advancing their education. It takes the Facilitated Network business model directly to learners as buying agents. Degreed applies an algorithmic and normalized approach to track and measure the educational achievements including formal (e.g., degrees), informal (e.g., books read, conferences attended), and soon, experiential learning (Degreed, n.d.).

Fidelis Education builds learner-centered, relationship-oriented program experiences for higher education (*Learning Relationship Management, n.d.*). The company launch a new category of educational technology called Learning Relationship Management (LRM) (Stansbury, 2014). It focuses on helping universities scale and manage relationships between students, coaches, faculty, and mentors. The company is developing a cloud based software platform that allows users to manage personal and professional goals from matriculation, through graduation, and continuing into their careers. The platform allows each student to connect with a professional coach and a team of mentors who provide advice and encouragement through the entire process (Vander Ark, 2014).

Gild recruits and places software developers, and their use of analytics suggests a direction for merging social interactions and portfolio building

in order to assess, place, and support individual learners. In reality, all of these products suggest new forms of assessment/evidence of learning. Gild fundamentally transforms your entire talent acquisition and hiring process (*Gild, n.d.*).

Mentor Cloud builds mentoring networks within organizations. It provides a cloud-based platform that enables members within an organization to collaborate and support one another to achieve their personal, academic, and professional aspirations (*Mentorcloud, n.d.*).

Minerva Project was stablished in 2012 to provide an extraordinary liberal arts and sciences education to the brightest, most motivated students in the world (*Minerva schools at KGI, n.d.*).

Today's scientific research projects may involve dozens to thousands of researchers working in multiple institutions around the globe. Collaborative work and big data are also becoming more important in other academic disciplines, including arts and humanities.

At the end of a certain way of assuming knowledge, skills and competences people achieve credentials that are the attestation of qualification or authority issued to an individual. Colleges and universities are the beneficiaries of credentials like diplomas, academic degrees, certifications, security clearances, identification documents, badges, passwords, user names, keys, powers of attorney, and so on.

Today life is going more and more towards relations online where people learn and find also a job. That is the reason for placing digital diplomas into online profiles. The rising expectations of the credential society means that the paper-based approach doesn't respond to these expectations. The novelty of several trends can satisfy these expectations including co-curricular experiential transcripts, micro-credentialing, and the electronic transcript.

A.European example of this trend can be found in the United Kingdom with the degree classification system towards a Grade Point Average system that brings more information

about students' learner experiences. The Higher Education Achievement Report is trying to get ahead of the problem (*Higher Education Achievement Report, .n.d.*).

In USA there is the Postsecondary Achievement Report where the cover page talks about the college/university, the student for whom the credential has been prepared, how awards are issued, and some information about accreditation. This might be followed by the actual transcript, since there are still expectations surrounding credit hours and how we break education up into discrete chunks.

There are more possibilities at Stanford University that offers an interactive digital transcript. There is the possibility to click on any course listed and go right into the catalog description of the course and to the syllabus. Clicking further leads to an e-portfolio and shows actual evidence of the learning inside that classroom. At this point the report might bring in competency information, as in the example of Northern Arizona University.

Then there are possibilities to integrate the certificates and diplomas into online identities. Students claim an electronic credential, with the associated security that makes it official, and put it into their LinkedIn or Facebook profile or into an online professional community profile. They need the ability to collect multiple credentials from their home institution and also other institutions— licenses, badges, MOOC certificates, and experiential, academic, or competency transcripts—so they can share and deliver those credentials securely online. Of course higher education needs to do all this in a way that protects, preserves, and limits access to that data but that makes the data portable, available, and actionable for learners, graduates, other institutions, and employers (Pittinsky, 2015).

Many universities in Poland don't use the classical, paper-based grade transcript, but many cerfificates and doplomas have still the classical form of printed paper. In the global environment of education and job opportunities, it could be very usefeul to integrate the certificate and diplomas into online idenitities. For the reasons of security, it could be still necessary to possess these achievements printed on paper together with these digital documents, but the possibility of possesing the electronic credentials would be very comfortable.

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