TECHNOLOGY ENHANCED LEARNING. TEACHING AND LEARNING IN THE DIGITAL AGE

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Abstract: This paper is about the challenges that technology, new media and the Internet have made on education forcing it to become more flexible. ICT development has offered the possibility to embed technology in the learning environments as it is widely known that students use it to communicate on daily basis. The modern educational methods incorporate new technology and new media in a more personalized, interactive and flexible delivery for a more efficient learning achievement. In the study titled Teaching as a Design Science. Building Pedagogical Patterns for Learning and Technology, Diana Laurillard analyses the impact of the technology development on education which according to her was rather a "shock" (Laurillard 2012, 2) that forced the educational system to adapt and embed it for better learning outcomes applying to all forms of knowledge: analytical, experiential, experimental. According to Collins and Halverson in the volume Rethinking Education in the Age of Technology. The Digital Revolution and Schooling in America, ICT development started the "Knowledge Revolution" in view of the fact that "technology is moving education out of schools and into homes and workplaces" (Colllins, Halverson 2009,6)[1].

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Diana Laurillard considered that the learning environment especially the higher education one should be focused primarily on helping students to understand and develop proper perspectives on reality and life. Consequently, she designed the conversational framework for academic teaching and learning. The conversational framework outlines the four major activities performed in the pedagogical process which operate with four interrelated types of concepts: teacher's concepts, student's concepts, teacher's learning environment and student's specific actions as a possible response to the instructions. It is based on communication and the mental activities attached to it: discussion, adaptation, interaction, reflection. It is described as a form of education contract signed between the teacher and the learner that takes effect and is implemented as a constant negotiation process between the learning content provider and the learner.

The first step in the process is establishing agreement between the agents on the learning objectives that should be consistent with both the learner's and the teacher's conception. Then the teacher takes action and designs the learning process as entirely adapted to the learner's expectations and his existing conceptions. There is a constant feed-back and mutual adjustment going on at this stage. The process continues with the interaction, which is the key moment as the instructor proposes a suitable learning environment and proper tasks to

[1] "People around the word are taking their education out of school into homes, libraries, Internet cafes, and workplaces, where they can decide what they want to learn, when they want to learn, and how they want to learn. These stories challenge our traditional model of education as learning in classrooms. These new learning niches use technologies to enable people of all ages to pursue learning on their own terms", Colllins, Allan, Richard Halverson. 2009. *Rethinking Education in the Age of Technology. The Digital Revolution and Schooling in America*, foreword by John Seely Brown. New York: Teachers College Press, p. 3.

be fulfilled. At this stage, teacher's support and feedback is necessary. The final stage is the reflection and the assessment of performance which is commonly achieved. The major task is for the learner to work on his conception and review it and for the teacher to assist the learner in succeeding that.

Flexible learning generally designates the modern educational methods which are supposed to adapt to the learners' needs on individual basis though personalized learning and on a group level through collaborative learning. It is related to five key elements regarding ICT, pedagogy, the strategic and institutional background and their implementation regarding the flexibility of time, location, educational program, content, and resources, logistics, communication and participation in the learning process. Flexible learning is a combination of different approaches to learning created to empower learners and enhance the learning outcome. In this process, the teacher becomes a manager who manages knowledge resources and a facilitator who gives access to the proper resources for every student particular needs. Flexible learning is a multi-layered student-centered learning where learners are given a greater control over their learning content, process, methods and outcomes. There are nineteen dimensions of educational flexibility organized into five major categories: time, content, assessment, instructional methods and logistics. According to the study *Flexible Learning in Higher Education*, the flexible learning approach began as an initiative of Loughborough University of Technology in 1992 which targeted to promote and implement flexible teaching and learning patterns and strategies. The authors argue that the "flexible delivery methods are an attractive option when seeking to improve the effectiveness and quality of teaching in higher education" and they provide a list of benefits to be taken into account when embedding the flexible learning strategy within the universities the most important one being the switch to active and interactive learning (Wade et. al. 1994, 13-14).

The concept of personalized learning emerged as a growing need for tailoring the teaching and learning process to every learner as it was concluded that "all students learn differently and bring a variety of differences to the learning enterprise – from differences in ability, language and culture to differences of family situations, ways of learning, personal and financial resources, and interests and passions" (Ferguson et. al. 2001, vi) to which teachers have to adapt for a better educational achievement. In the study *Collaborative Learning: Cognitive and Computational Approaches* edited by Pierre Dillenbourg, collaborative learning is defined as "a *situation* in which *two or more* people *learn* or attempt to learn something *together*. (Dillenbourg 1999, 2). The learning situation implies the presence of at least two persons and it can extend to the amount of a small or big group, a community and even a society who perform an interaction which can be face-to-face communication or online communication during an act of learning. The learning situation can be an institutionalized learning site and can occur in a short span of time (a course) or can happen over a series of years. The concept of collaborative learning views the learning group as a "cognitive system" (Dillenbourg 1999, 3) which can develop a group memory composed of a working memory and an interaction memory, even though it is considered that the

individual can be regarded as a group in the act of thinking which is defined as a type of "dialogue with oneself"[2].

Karl M. Kapp, author of the study *Gadgets, Games and Gizmos for Learning* stated the need for a „transfer of knowledge" from the older generations called the baby boomers to the newer generations of gamers[3] and he argues that the video games are „powerful teachers" (Kapp 2007, 26). There is a problem when the gamers' generation learners pour into schools and colleges with *new expectations and requirements* from the teachers. As the learners are used to play games and go on Internet, they have difficulties in focusing their attention in classrooms, showing ADHD symptoms. The author argues that the current lecturing approach seems to be not effective currently, in academic teaching the technology being not entirely incorporated, even though the students use it on daily basis. He states that there is a need for the educational delivery methods to incorporate "computer games, podcasts, blogs, and other forms of presenting information" in a multiple, diverse and flexible delivery (Kapp 2007, 227). In this learning situation problems may arise from the different generational approaches given that "the educational world in which our parents and grandparents grew up has significantly and permanently been altered; and so has the learning world experienced by most people reading this book"[4] (Bonk 2009, 2).

E-learning consists of learning and teaching activities that are delivered by using electronic media and ICT technology. It can be used for distance learning, as well as for blended learning, combined with traditional teaching. E-learning is a new, powerful and efficient learning method that provides education to learners all over the world no matter the space distance. A major part of educational resources can be accessed, used and downloaded with no charge by anybody who is connected to Internet using a laptop, a tablet or a mobile phone. E-learning takes place in the virtual space also known as cyberspace which is connected with the Internet use. The term cyberspace term coined by the science-fiction writer William Gibson is derived from cybernetics which originated in the old Greek *kybernētēs*, meaning "pilot". Global Internet Network users are called cybercitizens, netizens, and digital natives.

George Siemens, author of *Knowing Knowledge* pointed out that knowledge is dynamic and that „the knowledge set free has a great impact on society" (Siemens 2006, 5). It is generated individually or collectively, it is disseminated, processed by others and then it shifts into different forms as it goes through the Knowledge Flow Cycle (Siemens 2006, 7).

[2] "While distributed cognition treats the group as a single cognitive system, one may reciprocally view the individual as a distributed system (Minsky, 1987). This perspective broadens the scale issue, now including groups inside a single agent. Although it may sound awkward to talk about "collaboration with oneself", it common to talk about "conflict with oneself". The idea that thinking can be viewed as a dialogue with oneself is not a new idea; it has been argued by Piaget, Mead, and, of course, Vygotsky, for whom thought results from internalized dialogues", Dillenbourg, Pierre (ed.), *Collaborative Learning: Cognitive and Computational Approaches*, Bingley, Emerald Publishing Group Ltd., 1999, p. 4.

[3] "A *gamer* is someone who has grown up in the generation influenced and shaped by video games and technology", Karl, M. Kapp, *Gadgets, Games and Gizmos for Learning. Tools and Techniques for Transferring Know-How from Boomers to Gamers*, San Francisco, 2007, Pfeiffer, p. 7.

[4] "Books, crayons, pencils, overhead projectors, tape recorders and blackboards have not disappeared entirely, but learners are increasingly relying on online resources, electronic ink, virtual presence and digital displays", Curtis, J. Bonk, *The World Is Open: How Web Technology Is Revolutionizing Education*, San Francisco, Jossey-Bass, 2009, p. 2.

This cycle consists of several processes such as: Knowledge Creation, Co-creation, Dissemination, Communication, Personalization, and Implementation. All this knowledge is generated and shared by online learning communities on the ”Web of Learning” according to Bonk who provides a list of ten openers designed in the acronym WE-ALL-LEARN such as: Web searching in the world of e-books, E-learning and blended learning, Availability of open source and free software, Leveraged resources and opencourseware, learning object repositories and portals, Learner participation in open information communities, Electronic collaboration, Alternate reality learning, Real-time mobility and portability, Networks of personalized learning (Bonk 2009, 8). Bonk argues that the new technologies and Web generate change in education and have created a time and space extension in learning. The students have more learning options today emerging from the “increased access to learning, lifelong learning pursuits, recertification needs, immigration, longer life spans, better course marketing” (Bonk 2009, 92).

Global Networked Learning Environments (GNLE) are meant to connect learners form all over the world in a current trend for collective sharing of knowledge, enabling it to flow across multiple platforms in a versatile content. Millennial society heads towards an extended access to knowledge, blurring the limits between space and time and erasing the differences between users. In the study titled *The Virtual Student. A Profile and guide to Working with Online Learners* by Rena M. Palloff, Keith Pratt, it is offered “a guide to working with the virtual student” and a “toolkit for a successful online student”. The authors profiled the “typical online learner” who according to them is a young male or female over 25 professionally active and having family responsibilities (Palloff, Pratt 2003, 3), and not too much time on their hands. The authors give the characteristics of the ideal virtual student: open-mindedness, self-motivation and self-discipline, critical thinking ability and reflecting capacity. CCNMTL Columbia Center for New Media Teaching and Learning implemented an integrated project designed as an educational package consisting of virtual resources such as Courseworks database, Wikispaces for PBL project based learning, blogs for an interactive learning environment, Mediathread as a web-based open-source platform for multimedia content creation, iTunes platform, YouTube channel for video lectures, Podcasting and Media available for the students and teachers alike record courses and presentations, and an Experimental Digital Classroom, an innovative multimedia learning space. EDC offers a smartboard, a 87 inch touch-activated computer screen, colored pens useful for marking up, annotating and highlighting data right on the screen. It is possible to save text documents, photos and videos created during a class work and upload it to the CourseWorks site on the spot. There is a webcam used for web-conferencing and a Polycom VSX 7000s for video-conferencing.

According to Salmon’s e-tivities approach, e-learning occurs in five stages named as: access and motivation, online socialization, information exchange, knowledge construction and development. E-tivities are online tasks that break the learning content into chunks of information for a more effective learning experience and a better mind storage. Salmon defined them as follows: ”frameworks for enabling active and participative online learning for individuals and groups” (Salmon 2013, 5). The author goes into details about e-tivities that are primarily ”based on the strong idea that knowledge is constructed by learners through and

with others" (Salmon 2013, 5). The right e-tivities work by scaffolding the new learning content upon the knowledge the virtual learners already have acquired, as the scaffold is understood as a learning sequence. Online learners are called participants playing different roles into the learning process, and e-moderators play an important role in virtual education as they are supposed to guide the learners in their „learning journey" (Salmon 2013, 9).

There is a growing demand for embedding technology and integrating Open Educational Resources into higher education systems worldwide. The main purpose is to contribute to social development by boosting the knowledge sharing. Open Educational Resources OER are educational products that allow free access and sharing, including modifying options for the users online. Open Resources are available in the public domain and consist of various educational convergent products (created using text, image, audio, and video data) delivered as digital content on Internet. In the official report titled *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. European Higher Education in the World* launched by the European Commission in 11.7.2013, it is pointed out that the key priorities for Europe 2020 strategy in higher education are the internalization by promoting the international students and teachers' mobility and by promoting *internalization at home*, the digital learning and new means of delivering content that is ICT technology, MOOCs (Massive Online Open Courses) and OER (Open Educational Resources). The reports highlights that „New trends in digital education and the emergence of MOOCs should be an incentive for HEIs to rethink their cost structures and possibly also their missions, and engage in worldwide partnerships to increase the quality of content and of the learning experience through blended learning" (EHEW, 7). Around 45% of the international mobile students are learning in European university and their number is expected to grow from 4 million to 7 million students.

The report titled *Education and Training Monitor 2013* released by the European Commission highlights the need to integrate ICT technology in the educational process as connected to the integration of innovative ways of teaching and learning where the teachers are seen as *key agents* for this. The digital competences are required for the future citizens who need new skills and sharing and collaborative attitude. The study was conducted on a period of five years on the 4th grade students across Europe, pointing out the need for *digitally confident and supportive teachers.* According to Henry Jenkins, digital media had a great impact on the learning process and "media education for the 21st century" is required. The importance of digital literacy and the new skills and competencies the learners must acquire is stressed in order to function as fully-fledged citizens in the modern society, also called digital natives. New media literacy, convergence, participatory learning and collective intelligence regard the way digital technologies change the way young people learn, play, socialize, and participate in civic life. Play and education are convergent because "the skills we acquire through play may have implications for how we learn, work, participate in the political process, and connect with other people around the world" (Jenkins 2006, 23).

Participatory learning is a type of interactive learning strategy that allows students to create digital content and share it in order to develop the digital skills needed in the digital age. Digital divide and participation gap are real problems concerning children worldwide as

there is a proved connection between technology access and the skills and competencies necessary for modern citizens. Participation gap is defined as the access to open data resources stored online that are not available for everybody as a consequence of technology lack. The problem of uneven access to media resources and consequently the socio-economic disparity produced shows that there is a clear need ”to rethink the goals of media education so that young people can come to think of themselves as cultural producers and participants and not simply as consumers, critical or otherwise” (2006, 259). Participatory culture enables students to learn how to become fully participants in online communities and thus acquire new media literacy. New media literacy consists of a set of cultural competencies and social skills that young people need in the new media landscape characterized by community involvement, collaboration, and networking.

The new skills are as such: appropriation, the ability to multitask, simulation, playful learning, distributed cognition, collective intelligence, judgment, transmedia navigation, networking, and negotiation. There are concerns that call for a new educational policy to tackle on the participation gap, the transparency problem, and the ethics problem. The concepts of collective intelligence and of knowledge space have become of utmost importance in modern society. Group knowledge and collective thinking is established on a participatory and computerized civil society, whose most valuable capital is the intellectual capital. Its purpose is the production of relevant knowledge to the benefit of the human society. In this regard, knowledge creation and exploitation are vital resources necessary for the economic development, competitiveness, and global sustainability. Jenkins points out his ”three key terms – convergence, collective intelligence, and participation.” (2006, 22).

In order to reduce the digital divide and the participation gap, the OLPC international project (One Laptop per Child) developed to empower and help poor kids all over the world have access to e-learning. OLPC[5] started in 2005 and it is built on a few key objectives such as: children age should be between six and twelve years old, the laptops become their property without discrimination to use them freely and anytime they want. OLPC registered 2.4 million children and teachers as xo laptops or tablets users worldwide: North and South America, Europe, Africa, Asia, Australia. People can contribute by donating money or used laptops. Ben Schneiderman, writer of *Leonardo's Laptop* study, developed a learning framework called CRCD, meaning Collect - Relate - Create - Donate Framework. The framework helps teachers and students to design a innovative learning process as a four-step approach, which starts with the knowledge collecting, goes on with collaboration activities as students relate with each other, continues with the active creation part of the process, that finally ends with the donation moment (the student is pleased to share his project with others and contribute to the online collective knowledge deposit).

One of the highly appreciated higher education learning platforms MOOC Massive Open Online Course platforms: edX. edX is a joint project of Massachusetts Institute of Technology and Harvard University that started in 2012. Meanwhile, it attracted a community of 1.2 million online learners. edX offers a wide range of educational content grouped in a series of buttons as such: Real Classes, An Amazing Experience, On Your Schedule, Meet New Friends. Real Classes section contains various fields of study, from technical science to

[5] Xo Laptop, “a small machine with a big mission”, http://laptop.org/en/laptop/.

humanities and arts. The courses are delivered based on three styles of classroom interactions: teacher-to-student, student-to-teacher, and student-to-student. Online students can register to participate at the course, they can just audit it, or they can download free resources provided by different universities. The courses can be viewed in a wide range of languages. Online learners can play game-like labs, including a 3D molecular builder. It also delivers a tutorial on how the platforms work and a friendly welcome section for users listing the following buttons: Find Your New Course, Review and Choose, Become an edX Student, Start Studying and Have Fun. Online learners can socialize and connect with others using peer-to-peer social learning tools. All this massive educational content is available to anybody who is connected to Internet from every geographical point in space, from Asia to Africa and Europe. The virtual classes are functional twenty four hours a day, seven days a week, so go register to *study, have fun, and uncover a new passion or learn skills that just may change your life.*

As Bonk put it, we all bear a responsibility to share and participate in *the open educational world*: "We, the learners of this new world, need to rally around the learning tools, materials and resources that we have in order to improve the educational backgrounds of everyone on this planet, and, in doing so, their social, cultural and economic status and future life possibilities. That is a human and moral imperative" (Bonk 2009, 1).

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