Tecnologias da Informação em Educação

(Re)framing assessment in Higher Education from a connectivist approach: the potential of ePortfolios

Maria de Lurdes Martins

lurdesmartins@estv.ipv.pt

Abstract: During the last decades, the rapid and dynamic technological changes had important repercussions on the educational systems. This paper focuses on the challenges of Information and Communication Technologies (ICT) developments regarding assessment in higher education. Higher education is now entering the era of digital modernity which transformed the way knowing, learning and, consequently, assessment are perceived. Such shifts have prompted the emergence of connectivism as a learning theory for the knowledge society. In this context, ePortfolios 2.0 have an extensive potential for the assessment of lifelong and life-wide learning, for they add to the traditional Portfolio the benefit of social learning and communities of practice.

Key-words: Knowledge, Learning, Connectivism, Higher Education, Assessment, ePortfolio.

Resumo: Ao longo das últimas décadas, as rápidas e dinâmicas mudanças tecnológicas tiveram importantes repercussões nos sistemas educativos. Este texto debruça-se sobre os desafios dos desenvolvimentos das Tecnologias da Informação e da Comunicação (TIC) no que diz respeito à avaliação no ensino superior. O ensino superior encontra-se agora a entrar na era da modernidade digital, que transformou o modo como o conhecer, o aprender e, consequentemente, o avaliar são compreendidos. Tais mudanças conduziram à emergência do conectivismo como uma teoria de aprendizagem para a sociedade do conhecimento. Neste contexto, os ePortefólios 2.0 detêm um extenso potencial para a avaliação da

aprendizagem ao longo e através da vida, uma vez que adicionam ao portefólio tradicional o benefício da aprendizagem social e das comunidades de prática.

Palavras-Chave: Conhecimento, Aprendizagem, Conectivismo, Ensino Superior, Avaliação, ePortefólio.

Résumé: Au long des dernières décennies, les rapides et dynamiques changements technologiques ont eu d'importants retentissements dans les systèmes éducatifs. Ce texte se penche sur les enjeux des développements des Technologies de l'Information et de la Communication (TIC) dans le domaine de l'évaluation dans l'enseignement supérieur. L'enseignement supérieur entre maintenant dans l'ère de la modernité digitale, qui a transformé la façon dont la connaissance, l'apprentissage et, par conséquent, l'évaluation sont compris. Ces changements ont conduit à l'émergence du connectivisme comme une théorie de l'apprentissage pour la société de la connaissance. Dans ce contexte, les ePortefolios 2.0 détiennent un vaste potentiel pour l'évaluation de l'apprentissage au long et à travers la vie, une fois qu'ils ajoutent au portefolio traditionnel le bénéfice de l'apprentissage social et des communautés de pratique.

Mots-clé: connaissance, apprentissage, connectivisme, enseignement supérieur, évaluation, ePortefolio.

Knowledge and learning in the digital age

The 21st century has witnessed a wide range of societal changes, creating an atmosphere of suspended certainty (Siemens, 2006) and supercomplexity (Barnett, 2000). The world has become interconnected due to the globalization phenomenon and to innovations in ICT tools, which have generated a rapid pace of information development. With the diffusion of Web 2.0, the process of retrieving, creating and sharing information is now accessible to all individuals. The shift from knowledge consumers to knowledge prosumers (producers and consumers) has reformulated concepts such as knowledge, learning, student and teacher. The learning process is, undoubtedly, related to the construction of knowledge, a process that makes our daily lives meaningful. According to Siemens (2006a: p. V): "we supposedly exist in a knowledge era. Our work and our lives center on the creation, communication and application of knowledge." The author considers that it is of the utmost importance to consider the context in which knowledge occurs and points out eight social tendencies:

1. Abundance
2. Capacity for recombination
3. Certainty for now
4. Pace of development
5. Representation through media
6. Flow
7. Spaces and structures of knowledge organization and dissemination
8. Decentralization (Siemens, 2006, p.79)

Relationships between individuals are, nowadays, based on personal convenience, prompted by similar interests, common value commitments or intellectual proximity, for instance. Thus, distance ceased to be an obstacle. We are able to share and discuss information globally, combining, reinterpreting and repacking different fragments of knowledge in order to create a unity that suits our needs. We have thus become knowledge co-creators. Web 2.0 tools have played a key role in knowledge creation, as is stated by Downes: "in a nutshell what was happening was that the web was shifting from being a medium in which information was transmitted and

consumed, into being a platform, in which content was created, shared, remixed, repurposed and passed along" (Downes, 2006 p.1)

Considering the ephemeral and immediate nature of knowledge, the development of filtering, analytical, life-long learning skills is crucial in the learning process where more important than knowing how and what is knowing where to find updated and trustful information. The changing nature of knowledge has brought new challenges and opportunities to the learning process.

Learning as network creation

A transformation in the means, aims, modes and "ecology" of learning has been a landmark of the 21st century (Siemens, 2004). Learning has become an increasingly social activity since people discuss, share and negotiate knowledge through networks. An important question arises then: how does learning occur in the knowledge society? The changes in the concept of knowledge have led to new trends in learning, as Siemens (2004) points out. The lifelong employment concept was replaced by lifelong learning, and during a lifetime, students will have the chance of experiencing a variety of different working fields. Hence, learning and working are not worlds apart; learning is a lifetime process which can be paralleled with work. Another trend is the relevance of informal learning through involvement in social networks. Technology, more specifically web 2.0 tools are reconfiguring and defining the way we think and they can perform activities that, according to the main theories of learning, were carried out by the individual, like knowledge storage. As a result, knowing where to find knowledge (know where) is more important than the state of knowing, because of knowledge obsolescence.

Are the main traditional learning theories – behaviorism, cognitivism and constructivism – developed in a different educational scenario not yet impacted through technology, enough to explain the learning process in the digital era? This has been a rather controversial matter among researchers. According to authors such as Siemens and Downes, the above mentioned theories consider learning an inner process, disregarding technology performance in the storage, retrieval and manipulation of information. They also claim that the three broad learning theories

focus on the actual process of learning, failing to consider meta-skills "needed to evaluate the worthiness of learning something" (Siemens, 2004 p.2) and they do not observe challenges of knowledge organization and transfer. The authors consider that in a knowledge society the ability to form connections between sources of information, and thereby create information patterns, is a key competence.

By integrating the principles of chaos, network, complexity and self-organization theories, Siemens (2004) sets connectivism as a learning theory for the digital age, presenting "a model for learning that acknowledges the tectonic shifts in society, where learning is no longer an internal, individualistic activity" (p.5), but rather a process of establishing connections with different nodes within networks. According to Siemens (2004), connectivism is anchored in seven principles:

1. Learning and knowledge rests in diversity of opinions.
2. Learning is a process of connecting specialized nodes or information sources.
3. Learning may reside in non-human appliances.
4. Capacity to know more is more critical than what is currently known.
5. Nurturing and maintaining connections is needed to facilitate continual learning.
6. Ability to see connections between fields, ideas, and concepts is a core skill.
7. Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities. (p.4)

Learning is a process of making connections between seemingly disparate nodes in order to collaboratively build knowledge. The setting, nurturing and maintenance of connections is the basis for continual learning.

Downes (2006) mentions that connectivism

> asserts that knowledge - and therefore the learning of knowledge – is distributive, that is, not located in any given place (and therefore not 'transferred' or 'transacted' per se) but rather consists of the network of connections formed from experience and interactions with a knowing community (p. 1).

The connectivist theory is engrained in the concept of network formation, as Siemens (2004) emphasizes: "learning, defined as actionable knowledge, can reside outside of ourselves (within an organization or database), is focused on

connecting specialized information sets, and the connections that enable us to learn more are more important than our current state of knowing" (p.4). This aspect had already been referred to by Salomon, one of the authors of distributed cognition psychological theory, who asserted that knowledge building "takes place within cultural and social contexts. Knowledge is situated in these contexts and is socially distributed. To learn, we need to exchange ideas, stimulate each other, argue, offer feedback and jointly construct new ideas and meaning" (Salomon, 1999, p.10). The importance of the capacity to form connections is also pointed out by Stephenson (undated) who draws attention to the fact that "since we cannot experience everything, other people's experiences, and hence other people, become the surrogate for knowledge. 'I store my knowledge on my friends' is an axiom for collecting knowledge through collecting people."

Concerning the impact of connective learning in higher education, Siemens (2005) states that:

> Instead of presenting content/information/knowledge in a linear sequential manner, learners can be provided with a rich array of tools and information sources to use in creating their own learning pathways. The instructor or institution can still ensure that critical learning elements are achieved by focusing instead on the creation of the knowledge ecology. The links and connections are formed by the learners themselves (p.26).

The concept of ecology is central to the learning process and it is related to the creation and dissemination of a rich learning environment, enabling learners to, according to their needs, interests and motivations create and expand their own networks.

New challenges for higher education

For a long time universities were citadels were knowledge resided and where one had to go in order to pursue knowledge (Salomon, 1999). Knowledge was something scarce and apart from regular life. However, the emergence of a knowledge society nurtured by the broadening of web 2.0 has turned autonomy, mobility, learner centeredness, internationalization, lifelong learning and innovation into structuring concepts of the new educational paradigm for higher education.

In Europe, governments have been creating policies in order to foster a European Higher Education Area (EHEA). Principles like lifelong-learning, recognition of prior formal and informal learning, student centeredness are recognized as essential to meet the challenges of the future. The London Communiqué (2007) highlights the social dimension of higher education:

> Higher education should play a strong role in fostering social cohesion, reducing inequalities and raising the level of knowledge, skills and competences in society. Policy should therefore aim to maximize the potential of individuals in terms of their personal development and their contribution to a sustainable and democratic knowledge-based society" (p. 5).

The Council of Europe also elaborates on the major purposes of higher education, namely the cultivation of a broad knowledge base, personal growth, training for the labor market and preparation to fully take part in social life as active citizens. The Tuning Project (2003) lists some generic competences which are regarded as crucial for preparing students to employability and citizenship. They distinguish between instrumental competences (cognitive, methodological, technological and linguistic), interpersonal competences (social interaction and co-operation) and systemic competences (combination of understanding, sensibility and knowledge).

The American project Partnership for 21st Century Skills (2009) also describes the skills, knowledge and expertise that students should have to be fully integrated in the knowledge society.
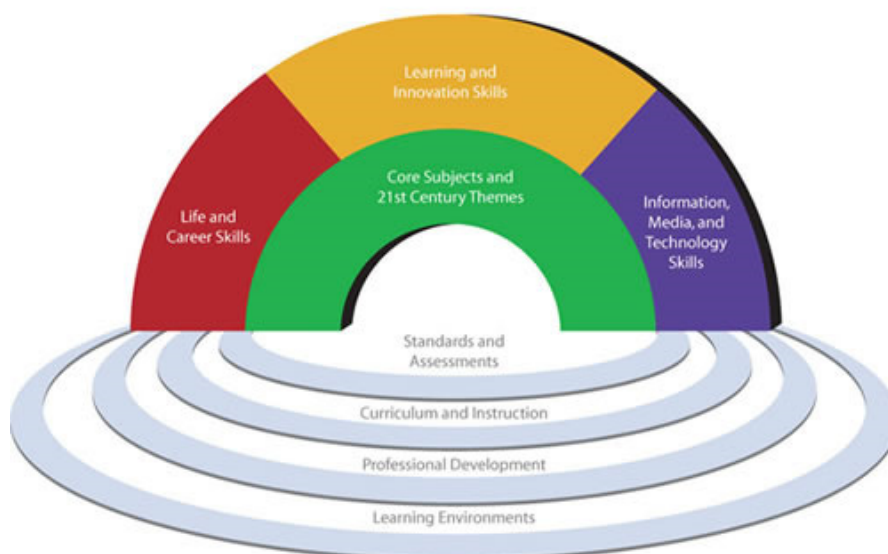
Figure 1. Core subjects and 21st century themes [Source: Partnership for 21st century skills (2009)].

The acknowledgement of the skills mentioned would be sustained by different support systems, which aim to enhance the development of the core skills stressed. The engagement of students with real data, the importance of useful feedback on student performance, a technology-enhanced assessment, the use of innovative learning methods supported by ICT, the encouragement of knowledge sharing through communities of practice and allowing students to learn in 21st century real contexts are some of the guidelines provided.

Rethinking assessment

A meaningful question raised by the Partnership for the 21st Century Skills (2007, p. 4) is "How do we measure 21st century learning?". Cumming (2009) asserts that assessment is a dynamic process, where "students and teachers are engaging in learning dialogues of unprecedented complexity in recognition of changing times, changing needs, changing social groupings and not least, changing technology" (p. 12). Boud (2007) emphasizes the importance of life-long assessment "that will prepare [students] to make judgments about their own work and that of others and for making decisions on the uncertain and unpredictable circumstances in which they will find themselves in the future" (p. 434). Concepts like connectedness and responsiveness (Finger & Jamieson-Proctor, 2009) should be central to the evaluation process, which should take into account "students' interests, capabilities, and repertoires of practice, both inside and outside schooling, including the actual and virtual communities in which students live" (Wyatt-Smith, Cumming & Eltans – in Finger & Jamieson-Proctor, 2009, p. 70). The challenge is to find ways to support in-depth learning, enhancing greater students' engagement and promoting social interaction so that students themselves can recognize what and how they have learned, thus ensuring that each learner has a "framework upon which she/he can build and function within society as a whole" (Siemens, 2006b, p.2).

Technologies afford new opportunities for assessment practices through a wide range of tools like blogs, wikis, chat rooms, instant messaging, videoconferencing, discussion forums, social networks, virtual environments, which have potentiated communication both synchronously and asynchronously.

ePortfolio opportunities

Digital portfolios are becoming an alternative assessment model which enhances collaborative and networked learning and, simultaneously, provide a personal learning environment for each student. Regarding the traditional definitions of ePortfolios, authors are unanimous in considering that they respect each student's uniqueness, conceives learning as a process and it also promotes reflection, hence empowering students and allowing them to continue learning throughout their lives.

A great potential of ePortfolios in students' assessment is that it allows the connection between the multiple contexts in which knowledge occurs, offering a beneficially holistic view of student's learning. Barbas and Moreira (2008) also state that the ePortfolio:

> Provides students the opportunity to clearly articulate their knowledge and skills in different environments as well as to identify areas for future learning or improvement. The process of collecting, shifting and reflecting allows learners to develop a more holistic conception of their learning and of opportunities for learning (p.583).

Web 2.0 technologies have given ePortfolios a new dimension, allowing connections and collaboration between the different nodes involved in the leaning process, promoting the cultivation of collective knowledge (Kelly, 2007). Barrett (2006) explores web 2.0 tools and conceptualizes the notion of the ePortfolio 2.0.

ePortfolios 1.0	ePortfolios 2.0
Hierarchical, designed	Networked, emergent
Metaphor: Portfolio as a checklist	Metaphor: Portfolio as story
Data-driven	Learner-driven
Focus on standardization	Focus on individuality, creativity
Feedback from authority figures	Feedback from community of learners
Large, complex systems	Small pieces, loosely joined – 'Mash-ups'
Web-based form	Blog and wiki
Positivist	Constructivist, connectivist
Accountability-driven	Learning-focused
Proprietary	Open standards
Digital paper (text and images)	Digital story (multimedia)
Local storage (hard drives, CD)	Network storage (lifetime personal web space)

Table 1 - ePortfolios 1.0 and ePortfolios 2.0 [Source: Barrett (2006, p.7)].

Ivanova (2008) also defines ePortfolios 2.0, highlighting the following features:

a) Active participation - boosted by a set of free easy to use tools and numerous features that enable knowledge creation, sharing, dissemination and reinterpretation.

b) Possibility of multiple accesses - easy access, particularly via mobile devices, contributes to the increase of interaction and collaboration.

c) Enhances the creation of learning communities - offering opportunities for making connections and creating learning networks, by integrating both formal and informal leaning environments.

d) Transparency - the fact that it is a collaborative process, with reflections and comments from various stakeholders, makes the evaluation process transparent.

e) Empowerment - through an immersive learning that involves students in effectively managing the entire process.

f) Encourages individual creativity - in the production of information, selection and integration of content and tools.

g) Flexibility and visibility of the author - since it can be re-architected to be used in a variety of contexts (educational, professional, personal and social).

Zhang, Olfman and Rachtam (2007) state that ePortfolios 2.0 are not only easy to use, but also flexible, enable knowledge sharing and collaboration as well as community-wide reflection and interaction. Web 2.0 ePortfolios are maps of the ongoing learning process, combining the diverse "paths through the congruent landscapes of identity and knowledge acquisition" (p.5).

One of the core advantages of social networked ePortfolios is that they allow the connection with the networked digital world of the student, considering both formal and informal education. Hence, they equip students with assessing skills knowledge and attitudes of self-directed, collaborative networked learning that are of utmost importance in contemporary society, whilst meeting the new demands for higher education. ePortfolios can be envisaged as a hub for personal learning and knowledge management that can be rolled out on a wider scope (personal, business, social and educational), creating a Lifetime Personal Web Space (LPWS) (Cohn & Hibbits, 2004). Siemens (2006) also refers to the holistic function of evaluation: "the focus of evaluation is to ensure that a learner has a framework upon which she/he can build and function within a field or within society as a whole."

Conclusions

Information and communication technology innovations significantly shifted in the way people access, use, create and share information. These trends impacted on different sectors, including education. Education systems, however, have been slow in responding to these new challenges which affect curricula, pedagogy, school organization and assessment. As the world becomes increasingly shaped by web 2.0, there is a need to bring social networking applications inside schools. The entrance of the so-called digital natives or network generation or even milliards in higher education can function as the impulse required for the advent of a new paradigm in education. They are already acquainted with web 2.0 tools and have fully integrated them in their daily lives for socialization purposes. Actually, the first thing that must be acknowledged is that learning is much more than formal education. It is increasingly being perceived as connection-based and dependent on the ability to incorporate experiences from multiple contexts through social networking.

One of the biggest challenges of regarding assessment form the lens of connectivism is that new spaces and structures require new skills both from teachers, learners and society in general. New knowledge about the implications of social network technologies and contemporary theories of learning is both vital and lacking. Digital portfolios must be perceived as story, a journey along different paths in a dynamic landscape where more important than knowing is the process of becoming.

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