LEARNING FROM THE KNOWLEDGE AND EXPERTISE OF OTHERS

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Abstract. *There is a broad consensus that the digital revolution is moving towards the reshaping of traditional professions and jobs. The key idea emerging from expert opinion is that continuing education and learning are essential to help people stay employable in the labor force, and this idea is behind most of the programs and projects co-funded by the European Union over the last decade. Experts are also persuaded that education systems should be adapted to prepare individuals for the changing labor market, and that technological advances will offer new widely available ways to access education. From this perspective, new forms of learning that harness digital technology should be explored.*

Recently, we have been seeing an increasing interest from researchers in the engagement of connected people in initiatives and processes with social relevance, such as crowdfunding, crowdsourcing, and crowd sensing. Crowd learning is a new topic whose borders are not still well-defined.

This paper focuses on internet social learning and crowd learning, which appear to be closely related to two new topical fields of investigation: ubiquitous learning and smart and connected cities. It will present some preliminary results from an ongoing research on how interconnected citizen can use, share, remix, and co-construct learning and cultural resources.

Keywords: *collaborative learning, crowd learning, digital social learning, participatory learning.*

Introduction

The educative process, it has been argued, is a teaching-learning process. Although it consists of teaching on one hand and learning on the other, teaching and learning are actually interrelated activities. Learners are not passive recipients of what teachers provide and teachers are not neutral repeaters (Seufert, 2003).

The modern concept of the teaching-learning process is grounded on the principle that learners are at the center of the educational process and on the fact that individuals are not perfectly alike. Contemporary educators are persuaded that teaching is not only about giving and checking knowledge, but encompasses many other non-secondary activities, such as guiding, stimulating and motivating

learners, helping learners to be effective, supporting and reinforcing positive attitudes of learners, and so on. Moreover, teaching-learning is seen as a triangular process that comprises teachers, learners, and the subject matter being taught/learned.

However, over the last few decades, digital technology has been rapidly affecting and sometimes disrupting the teaching/learning process. Advances have been so rapid and profound, in fact, that, nowadays, the distance traveled since the first e-learning application seems enormous. The advances in Internet technology and, since the 2000s, the spread of social networking platforms have led to new forms of learning that are often in stark contrast to more traditional ones based on face-to-face and synchronous paradigms. The possibilities of social media and virtual interactions mean that the co-presence of teachers and learners in a physical classroom is no longer required and, accordingly, new modalities for synchronous and asynchronous learning have been introduced.

Recently, it has been claimed that digital technology will improve the efficacy of self-directed learning (Collins & Halverson, 2010), a learning practice that is, it is argued, strategic in adult education. Indeed, the ongoing digital revolution is moving towards the reshaping of traditional skills and jobs, and a large part of the workforce should be retrained in order to acquire new competencies and maintain their positions.

The article draws upon new forms of learning ushered in by ubiquitous connectivity and the popularity of ideas of smart cities as territories with a high capacity for learning and innovation (Albino, Berardi, & Dangelico, 2015; Huang, Zhuang, & Yang, 2017).

It focuses on crowd learning and internet social learning, highlighting how interconnected citizen can use, share, remix, and co-construct learning and cultural resources. Figure 1 illustrates the context of the teaching-learning process in a ubiquitous teaching-learning environment.
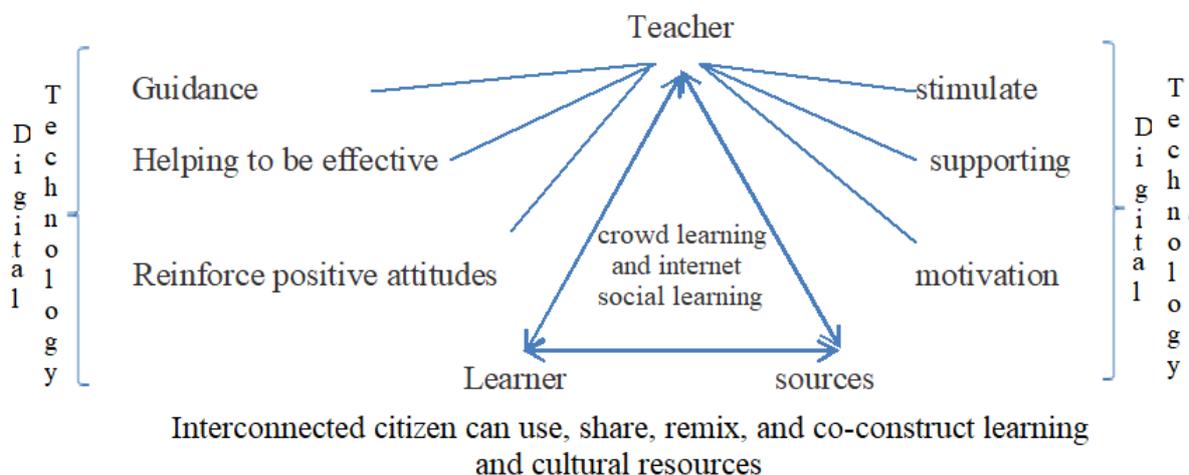

Figure 1. **The ubiquitous teaching-learning context** (Source: own research)

Research methodology

Our research into crowd learning and internet social learning was performed on the current literature by analyzing online databases and selected scientific journals, including ERIC, EBSCO, ScienceDirect, Web of Science, Springerlink, and Wiley. We also searched on Google Scholar, Academia.edu, and Researchgate.net to cover any missing studies and to evaluate the popularity of papers.

In order to capture relevant pieces of research, search criteria were based on the following combinations of keywords: "crowd learning", "internet social learning", "learning by social media", and "ubiquitous learning". We used filters to restrict the search, and concentrated our attention on publications from the last four years [2014, 2015, 2016, and 2017] concerning the subject of "education". The following inclusion criteria were adopted:

- subject of publication was relevant to our research;
- publication was academic and peer-reviewed;
- publication presented a conceptual or theoretical background;
- publication had a well-defined research design;
- sample was wide enough.

Our analysis of the literature resulted in 46 relevant publications, since we eliminated about 95 articles which did not respect the inclusion criteria. For example, we found that many articles containing the term "crowd learning" were instead focused on crowdsourcing or crowd sensing.

It is proper to underline that this is an ongoing research, and the work done so far should be considered as an exploratory step in the study of learning from the knowledge and expertise of others.

In the following paragraphs, we introduce a few of the elements that emerged from our preliminary analysis.

Ubiquitous learning

A major benefit of digital media is their independence from physical space and, as a consequence, their ubiquity. The portability of computing and communication devices has facilitated new forms of learning, namely Electronic learning (E-learning), Mobile learning (M-learning), and, recently, Ubiquitous learning (U-learning).

Ubiquitous learning is commonly defined as learning anywhere, anytime, and is closely associated with digital mobile technologies:

U-learning is a learning paradigm which takes place in a ubiquitous computing environment that enables learning the right thing at the right place and time in the right way. (Yahya, Ahmad, & Jalil, 2010: 120)

Most of the recent articles on ubiquitous learning focus on the design of ubiquitous learning environments, and address learning issues that are emerging in the face of the greater mobility and heterogeneity of computing facilities (Kalaivania & Sivakumar, 2017). A ubiquitous learning environment (*u*-learning) is supported by mobile and ubiquitous computing technologies which include mobile devices, and embedded computing devices such as GPS, RFID tags, pads, and badges, as well as wireless sensor networks and devices (Chiu, Tseng, & Hsu, 2017).

Solutions are proposed in order to exploit ubiquitous computing resources in learning processes in ways that harmonize various aspects such as flexibility, high adaptability, and intelligence. In this regard, Smart Learning Environments (SLEs) have been designed to deliver better and faster learning by enriching the environment with context-aware and adaptive digital devices. They should provide learners with multidimensional information and interventions that can stimulate a learner to learn as well as to socialize and collaborate with other learners.

Smart and connected cities

The notion of Smart and Connected Cities is a relatively new concept. In 2009, IBM launched a program called *Smarter Cities* to investigate the integration and application of new sensors, networking, and analytics to urban centers (Harrison et al., 2010). Similarly, in 2012, Cisco created a new division named *Smart and Connected Communities* to commercialize its new products and services developed through pilot projects conducted in three major world cities, namely Amsterdam, San Francisco, and Seoul (Coleman, Rajabifard & Crompvoets, 2016).

These initiatives share the vision, matured at the beginning of the 2000s, that the ICT industry is able to provide cities with new and effective tools to help their sustainable development (Albino, Berardi, & Dangelico, 2015).

The notion of Smart and Connected Communities (SCC) embraces a collection of initiatives rather than a tightly defined discipline (Green, 2011), and Cisco, which coined this term, uses it to indicate an orientation towards digital innovation in order to create new revenue and better serve citizens. The *Smart+Connected Digital Platform* promoted by Cisco is a pay-as-you-go cloud-hosted service for aggregating, analyzing, and correlating data from wired or wireless sensors.

In the context of SCC, digital crowdsourcing, as the practice of outsourcing tasks to a crowd, has been argued to be the best way to engage individuals for

providing new ideas and solutions as well as to involve users for cocreation and optimization of tasks, and reduction of costs.

Crowd learning share with crowdsourcing the idea of the engagement of crowd exploiting the opportunities offered by ubiquitous connectivity and intelligent applications.

Internet social learning and crowd learning

Social media have introduced profound changes in the way people interact and communicate (Fuchs, 2017). They provide an individual with the opportunity to play an active role in spreading opinions and connecting with a large mostly unknown audience. As a result, social media have enhanced participatory attitudes, although, paradoxically, are at the same time playing a part in increasing the segmentation of relationships, since users of social networks prefer to interact with those who share the same preferences and beliefs.

An interesting aspect that is emerging from our research is the topicality of *social learning theory* (Bandura, 1977) in internet-based learning approaches. In fact, the concept that "learning is a social activity" where individuals achieve their learning goals by interacting with each other (Stamps, 1997; Gherardi, Nicolini, & Odella, 1998; Pritchard & Woollard, 2013) is shared by many researchers engaged in internet social learning and online collaborative learning (Yu, Tian, Vogel, & Kwok, 2010; Hamid, Waycott, Kurnia, & Chang, 2015; Liao, Huang, Chen, & Huang, 2015). In the selected papers, 15 % make reference, either directly and indirectly, to social learning theory.

Furthermore, many articles on internet social leaning focus on online collaborative learning experiments (75 %), particularly concerning technological aspects (Toth, Ludvico, & Morrow, 2014; Popescu, 2014; Harasim, 2017), whilst only 25 % focus on learning processes, for example peer learning experiments (Kim, Cho, & Kim, 2015) or a qualitative metasynthesis (Mnkandla & Minnaar, 2017).

From our research, crowd learning appears to be a relatively new concept that essentially encompasses three main areas:
- Machine learning;
- Crowdsourcing and crowd sensing applications;
- Massive Open Online Courses (MOOC).

Indeed, crowd learning is designed as a process that involves "harnessing the knowledge and expertise of many people to answer questions, solve problems, or enable collaborative learning" (Sharples, Kloos, Dimitriadis, Garlatti, & Specht, 2015). It can accordingly be seen as a process of learning from the knowledge and experience of others.

On the basis of our research, we can define crowd learning as a form of collective learning in which individuals contribute their knowledge and experience to the achievement of prefixed learning objectives. This definition encompasses machine learning as well as crowdsourcing. In effect, we can gather data from crowd sources in order to implement machine learning solutions but studying the knowledge acquisition of individuals in time and space, namely in crowd contexts, can lead to the implementation of more effective crowdsourcing applications (Prpić, Shukla, Kietzmann, & McCarthy, 2015). Learning how a crowd behaves and knowing its attitudes are crucial factors, both in designing new services for a broad audience and in emulating learning capability in a machine.

Some preliminary questions

Many theoretical and practical questions have emerged from our research. A few of them are very challenging:

- How can we bring crowd paradigms to satisfy real social needs?
- What are the implications for privacy and security?
- How can we keep up, with crowd technological involvement controlling and guiding it?

These questions encompass both technical and social aspects.

Indeed, many of the articles we analyzed contain references to learner issues, as well as advice and recommendations:

- New solutions should support learners' reflection
- Content should be presented in such a way as to avoid learners' annoyance

Researchers are also cognizant of various social implications of crowd-based applications such as, for example:

- People's self-consciousness
- Different level of granularity in technology appropriation
- Control by users
- Social positive results
- Broad affordability

Conclusion

From our research, it emerges that, in crowd learning and internet social investigations, a great emphasis is put on technology, especially in regards to its integration, and a lot of effort is being directed at designing powerful and flexible environments that can support more sophisticated learners' expectations. Nevertheless, it is very likely that both crowd learning and internet social learning

research will impact on and affect current educational models as a whole. Indeed, although there are some who argue that the process of pedagogy will remain the same (Kalantzis, 2006; Kalantzis & Cope, 2008), many authors are persuaded that educational processes will change according to the new learning opportunities and modalities (Khapaeva & Genči, 2016; Sahito & Vaisanen, 2017). New learning paradigms that involve intelligent programs and smart devices will lead towards new forms of relationships and, accordingly, towards to a new generation of educational models. For example, what will peer-learning or collaborative learning mean if the learning interaction is with a robot or an intelligent virtual assistant?

From this perspective, our opinion, matured from the present research, is that crowd learning should be proposed as an autonomous scope of investigation.

The next step of our research will focus on the design of crowd learning as a distinct area of investigation with the aim of stimulating common research in order to tackle various questions, both technical and social, that ubiquitous connectivity is raising in the education field.

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