

Information society skills: Is knowledge accessible for all? Part I

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1 Introduction

In the last 30 years, the emergence of information and communication technologies (ICTs) has been associated with important changes and challenges in different disciplines. ICTs have been applied in these contexts with different levels of success [1]. The introduction of ICT in learning processes was thought to be important, and it was going to be a “silver bullet” to achieve better results by using the Internet and computers. However, it did not have the expected success [2, 3] motivated, among other reasons by the institutions’ resistance to change, the application of technologies even when they were not required, the diversity of stakeholders involved in learning processes and their knowledge about ICT and the lack of connection of different learning contexts [4].

The application of ICT to learning processes involves a shift in the set of tools used for learning purposes [5], which gives rise to new challenges to educational institutions, teachers and students to access to education and knowledge. This special issue will explore several of these new possibilities.

First, ICT and mobile technologies make possible that learning could take place anywhere and at any time, allowing students to access information and knowledge

where/when they want. This also leads to the definition of innovative learning activities that can be adapted to the student context [6, 7].

In addition, the emergence of ICT supports both learning activities that take place in the educational institutions, as well as those that take place beyond institutional walls. That is, ICT supports formal, non-formal and informal learning. In the institutional context, Learning Management Systems and the educational tools that they include are especially popular and beyond them, the Personal Learning Environments and the use of social tools provide new learning possibilities to individuals [8–13]. These different platforms and tools and how they are applied are also studied during this special issue.

Moreover, ICT also makes easier the application of learning methodologies such as student-centered learning [14], competency-based learning [15], game-based learning [16, 17], problem-based learning [18] or challenge-based learning [17]. These methodologies have been proved to be very successful though hard to be developed. ICT provides tools to facilitate their implementation and also to gather information and evidences about students’ and teachers’ actions while they are applied [19].

Another issue to take into account is how students access information and knowledge. It is necessary to take into account that not all people acquire their skills in the same way and using the same tools. It is necessary to take into account their age and the familiarity with technology. Several works have explored this issue, especially focused in the exiting digital gaps between those so-called digital natives and digital immigrants [20–23]. However, these are not the only groups that use ICT for learning in a different way; for instance, older or disable people have very specific needs that should be addressed [24–26]. For these groups, as well as for disadvantaged environments or

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societies where the technology and new devices do not have a strong presence, the use of ICT can be something exclusive. Therefore, the need arises to facilitate knowledge and skills acquisition for all.

The study of how to improve universal access to digital information and how to improve society skills to achieve this general objective is the starting point of the present special issue. Given this context, it is necessary to analyze the issues commented above. That is, we should consider where and when learning happens, how it happens and what are the needs, aims and abilities of the learners. In order to do so, it is necessary to explore existing methodologies, frameworks and tools used to access and manage knowledge, and this knowledge is accessible for all.

This UAIS special issue comes after the successful organization of two international events:

- The invited session entitled “Knowledge Society for all. New trends in Education,” organized in the context of the 18th HCI International Conference 2016, held in Toronto, Canada (<http://2016.hci.international>), thematic area “Learning and Collaboration Technologies,” with 21 papers accepted, and the Best Paper Award of the thematic area [27].
- The invited session entitled “Open and Social Environments for e-Learning and Educational Assessment,” organized in the context of the 17th HCI International Conference 2016, held in Los Angeles (California), USA (<http://2015.hci.international/>), thematic area “Learning and Collaboration Technologies,” with 13 papers accepted.

The development of this special issue involved three stages. The first consisted of the reception and evaluation of abstracts, as a way to reject those works out of the scope of the special issue. We received 31 abstracts to be evaluated and 23 were selected.

In the second stage, these papers were evaluated through a peer review process. Each paper was reviewed by three experts on the special issue’s topics. The papers were distributed and assigned according to the expertise and field of study of the different reviewers.

During the third stage, feedback was provided to the authors that had to correct their manuscripts and resubmit them. Once the review was completed, authors were contacted regarding the acceptance or rejection of their papers. A total of 16 papers were accepted after these three stages.

This first part presents nine papers describing studies, models and methodologies, systems and experiences, and evaluations related to different approaches in the field of information society skills and the accessibility of the content and knowledge.

The first work, by Fonseca et al. [28], is a position paper that aims to explore the educational contexts in which new

learning strategies using ICT have been adapted, by focusing on how users access information and improve their digital skills. The paper presents an overview of new learning strategies, best practices for ICT acceptance, outlines the educational contexts and finally provides a brief approach to understanding special needs students and older people. The authors state the hypothesis that in technological environments, learners use very specific devices and applications to access information, because the content’s accessibility depends on both the user’s profiles and ICT. This hypothesis is demonstrated through a case study applied in several Spanish universities.

The paper by Salvador-Herranz et al. [29] deals with the limitations of the traditional interaction in distributed digital spaces. They discuss the importance of blended interaction in distributed spaces and the particular challenges faced when designing accessible technology. In order to illustrate this, the authors present an interaction mechanism based on the design and implementation of a passive type of tangible manipulator that is capable of operating on interactive surfaces built with optical frames. It is a passive solution that can be used on the existing hardware and do not require additional adaptations.

Marchetti and Valente [30], in their paper, analyze, through three case studies, how audio content can be generated and shared among teachers and learners, how to define more interactive material and the impact in language learning of adding a social dimension to audiobooks. From these case studies, it is possible to see the wide spectrum of possibilities offered by audiobooks in language learning, from content generation to social and game-like interactivity. The experiments carried out show that audiobooks can help in documenting learning, in supporting different learning experiences and styles and in complementing visual information when exploring nonlinear narratives. Given these results, the authors have created a mock-up to develop a preliminary feasibility study in how their outcomes can be turned into use cases and implemented as web pages or mobile apps.

In the field of disabled people using ICT, Tang et al. [31] deal with the utility of gesture-based applications for the engagement of children with autism. They describe three pilots carried out with children with autism in two Children’s Educational Development Centers in a southern Chinese city. The results obtained reveal practices and perspectives regarding the use of finger- and hand gesture-enabled interactions. These outcomes are compared with other experiments in order to evaluate the usability of gesture-based applications and to find ways to increase the acceptability of these emerging technologies for Chinese autistic children and their families.

Another paper related to people with disability is the work by Huang [32]. It deals with blind users’ expectations

about touch screens, particularly focusing on the factors that can affect interface accessibility of touchscreen-based smartphones for people with moderate visual impairment. In order to define these factors, 32 persons with this type of disability were involved in an experiment. The authors identify six accessibility factors to be analyzed, namely tracking, detection quality, fuzzy field, dominance, colourity and speech quality. With the information gathered, it is possible to define issues that need to be addressed in order to define touchscreen interfaces adapted for people with visual impairment.

The work by Ebner et al. [33] addresses a group of students with very specific learning needs. This work presents a web-based (training) platform for German-speaking users aged 8–12. It aims to provide primary school pupils with a tool to improve their writing and spelling competencies. With this tool, the students can write and publish texts that are automatically assessed. The system provides students with feedback about their mistakes which helps them to improve their German writing skills and orthography. In addition, exercises are posed depending on the user mistakes. The paper is focused on the platform requirements and the user interface and presents some new possibilities if it is combined with Learning Analytics.

Given the different possible devices that students can use to learn, it is necessary to explore how information is accessed. Arain et al. [34] analyze in their work the influence of mobile learning apps on the outcomes of higher education students. In order to check this, the authors have carried out an experiment with a control and an experimental group. Both of them answered a test defined by experts as a pretest. The members of the experimental group used an ad hoc mobile learning app to learn, while the control group followed a traditional learning model. After this, students carried out the same test again and the results were compared. The experimental group members obtained higher scores in their posttest compared to the control group members, and the difference was statistically significant. Thus, the authors conclude that the exposure of the M-Learning App to the experimental group has contributed in enhancing the learning outcomes of the students.

The paper by Gallego-Duran et al. [35] deals with a very interesting problem, i.e., how to define activities for adaptive learning systems. Adaptive learning aims to maintain learners in a permanent state of flow by providing them the activities adapted to their skills. In order to do so, the difficulty level of the activities must be analyzed. Their work proposes a new definition of difficulty, based on learners' progress on activities over time, and a way to measure it. A case study, the PLMan Learning System, a web-based app and game used to teach Computational

Logic is presented. The definition of difficulty is tested with this system, and several measures are analyzed. Finally, some samples are presented to show the benefits of the proposal and that PLMan Learning can be an adaptive system.

The last paper of this first part of the special issue deals with ICT skills assessing. Kaarakainen et al. [36] present a novel performance-based approach for assessing ICT skills. The authors investigate the differences between three factors of ICT competence regarding basic, advanced and professional ICT skills. In order to do so, they carried out an experiment with 3159 students and 626 teachers from Finland. The results achieved were distributed using previously defined factors, taking into account the answers given by teachers and students also considering gender. From the results the authors conclude that to compare the ICT skills and the validity of the assessments, it is necessary to ensure consistent assessment both for students and teachers.

In conclusion, this special issue (in its two parts) presents some different approaches with novel data and solutions related with the improvement in the information society skills [24]. As we have previously stated, knowledge in general, and data, interactions and accessibility to content in particular are primary goals in our digitalized society. For these reasons, it is necessary to empower collaboration and learning by taking advantage of human abilities to use and manipulate mobile and digital devices. The proposed methods, case studies and analyses add new ideas for data representation and access to all types of data, something that should improve the universal access and usability of content [25].

The Guest Editors wish to thank the Editor-in-Chief of the International Journal Universal Access in the Information Society, Professor Constantine Stephanidis, for his patience and constant support and help during the process of editing this issue. We would also like to thank all the authors for their contributions and the reviewers for their assessment of the papers. We hope that the readers of the UAIS Journal will find the papers of this special issue interesting.

The Guest Editors

Miguel Á. Conde and David Fonseca

2 List of reviewers

Xavier Canaleta, vice-dean in Educational Innovation at La Salle, Universitat Ramon Llull, Spain

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