

E-learning and Human-Computer Interaction: Exploring Design Synergies for more Effective Learning Experiences

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The current trend in developing e-learning systems is largely empirical anecdotal, while consolidated, evidence-based models ensuring systematic and pedagogically sound learning experiences are still lacking. Up to now, the e-learning community has mainly focused on investigating the technical qualities of such systems, but has tended rather to neglect their didactic effectiveness and usability. Thus the e-learning community needs to devise and discuss new criteria for the design of more usable and innovative systems supporting creative learning, based on strategies which can, on the one hand, guide the learner to make the most effective use of the didactic content, and, on the other hand, refrain from being too intrusive in scaffolding the learning process.

A major challenge currently faced by e-learning systems' designers is the development of improved tools better able to engage novice learners and sustain their online learning activities any time and anywhere. Human-Computer Interaction (HCI) theories and methodologies can support the design of appropriate e-learning settings responding to the complex and rapidly changing requirements of both the academic and business contexts of our society. Basically, e-learning applications should become smart enough to adapt themselves to the students' learning styles and to assure high standards of accessibility and usability, in order to make learners' interaction with the systems as natural and intuitive as possible.

Stronger synergies should be established between the design of e-learning experiences and the analysis of learners' preferred interactions with e-learning environments. To reach this objective an evolving learner-centred design perspective should be adopted, taking into account also the typical learning styles shared within the different cultural contexts. Future studies based on these assumptions could provide valuable results and inspire interesting lines of thought for the intersection of HCI and e-learning.

To be successful, the synergy approach requires that the researchers design new tools for the users whose feedback from concrete user scenarios is analyzed from the very beginning of and throughout the design process. In this regard, special needs education provides researchers with a particularly beneficial context since diverse learners force the designers to really listen to the users feedback to be able to create functional e-learning tools.

This special issue features the best papers presented at the workshop *e-learning and Human-Computer Interaction: Exploring Design Synergies for more Effective Learning Experiences* part of the International Conference on Human-Computer Interaction (INTERACT 2005) held on Rome in September 2005.

The workshop aimed at stimulating discussions about the latest advances in e-learning, based on application of HCI approaches to distant education.

The overall acceptance rate of the two blind review processes was 30%. The five published papers cover several key themes in the e-learning and HCI research area.

There are two papers in the area of accessibility of didactic resources. Di Iorio, Feliziani, Mirri, Salomoni and Vitali present a learning object creation and management process based on common personal productivity tools, which guarantees both content accessibility as well as universality and offers a simple and friendly interface to authors. Gabrielli, Mirabella, Kimani and Catarci propose a design method for increasing the quality of e-learning materials for learners with special needs and an authoring environment to support authors in their development of didactic material matching those needs.

Adaptivity is one of the most important topics of e-learning research. The aim is to supply more and more customized learning paths in order to meet the learners' needs and to achieve more effective learning. De Carolis, Pizzutilo, Cozzolongo, Drozda and Muci present an architecture of an Embodied Conversational Agent (ECA) designed to assist students by providing personalized suggestions related both to the fruition of didactic material and to general orientation for student's daily life.

Learner needs are the starting point of the Lanzilotti, Ardito, Costabile and De Angeli paper. The authors highlight the lack of high-quality systems tailored to the needs of individual users and groups. They refine the concept of quality of e-learning systems and propose a framework TICS (Technology, Interaction, Content, Services), which focuses on the user-system interaction as one of the most important aspects to be considered when designing or evaluating an e-learning system. Moreover they propose an evaluation methodology called eLSE (e-Learning Systematic Evaluation).

The last paper Piccinni and Scollo presents and analyzes a case study in software engineering education, spanning over a seven-year evolution, characterized by a blend of educational techniques: traditional classroom lectures, textbook and lecture notes, as well as a web-based cooperation platform, supporting interaction and self-organization of laboratory projects.

Conclusions

The special issue and workshop have played a major, "prime mover" role in fostering a greater sense among HCI-oriented researchers of e-learning and tracking important directions in e-learning research for the coming years. As Guest Editors we hope that this special issue will provide an overview of studies highlighting the multiple relationships between technological and educational approaches to the design of e-learning environments.

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