Editorial

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Biographical notes: Lorna Uden teaches computing in the Faculty of Computing, Engineering and Technology at Staffordshire University. Her research interests include technology learning, HCI, activity theory, knowledge management, web engineering, multimedia, e-business, service science, semantic web, and problem-based learning. She has published widely in conferences, journals and chapters of books.

This issue consists of five papers. The papers range from ubiquitous learning environments to network metaphors for learning. The first paper is by Ogata, Yin and El-Bishouty entitled ‘Computer supported ubiquitous learning environment for vocabulary learning’. According to Ogata et al., ubiquitous computing could help the organisation and the mediation of social interactions wherever and whenever these situations might occur. Using those technologies enables the learning environment to be embedded in the real daily life.

Ogata et al. propose tag added learning objects (TANGO) system for vocabulary learning. This system helps the learner to memorise foreign language vocabularies. The TANGO system detects the objects around the learner using RFID tags, and provides the learner with the right information in that context.

The idea of this system is to attach RFID tags instead of sticky labels onto real objects, annotate them (e.g., questions and answers), and share their information among other learners. Therefore, this system does not only use RFID tags to identify the objects, but also to share and exchange their information. TANGO is a computer supported ubiquitous learning (CSUL) system. This system allows the learners to move with their PDAs and to communicate with the surrounding objects through RFID tags. In the experiment, the learners were very interested in using this system and the results show that this system is useful and helpful to support vocabulary learning. However, more empirical studies are needed to validate its usefulness and effectiveness.

From ubiquitous learning environments we move on to the second paper, ‘From virtual machines to actual systems – realising the potential of virtualisation technologies for teaching, learning, and assessment in computing education’. The authors, Duignan and Hall describe their experiments of using virtualisation technologies for teaching, learning and assessment on a number of computing and information systems (IS) related higher education programmes.

According to these authors, through the use of virtualisation technologies, it has been possible for them to teach highly specialised courses in very ordinary laboratories. They have been able to facilitate and assess meaningful hands-on learning for their students, providing an environment in which the students construct (and frequently destruct!) what can eventually become complex integrated IS, from first principles, using the available hardware, and without affecting subsequent laboratory users in any way. Everything the students do (build, use, mis-use, configure, mis-configure, and destroy) is all done within the virtual machine environment and is fully contained within that environment. While these machines are virtual, their configuration, use and operation closely resemble the actual, which allows for a rich learning experience.

Duignan and Hall believe that virtualisation makes the possibility of subject specific dedicated laboratory facilities a reality. This in turn allows for a rethinking on the content and approach to practical work in all aspects of the curriculum, and a move toward more meaningful hands-on educational experiences where necessary; experiences in which questioning and 'habits of the mind' (questions relating to *evidence, points of view, connections, conjecture,* and *relevance*) can be encouraged in the students. These authors have experienced their learning design interventions with a number of student groups within a number of subject categories. The work is very encouraging and has potential to be used the learning of other subjects. Further research would be valuable to validate its effectiveness.

The third paper is**,** 'Exploring the requirements of tabletop interfaces for education' by Olivier and Sulaiman. They argue that with the advent of situated technologies for collaborative interaction that are based around digital tables, understanding the requirements of such digital tabletops in educational settings is a pressing concern. Olivier and Sulaiman conducted a study to observe how small-groups of higher education students collaborate in a pen-and-paper based group authoring and annotation task around a traditional table. The study was primarily concerned with issues that can have an impact on digital tabletop design, in particular, factors that contribute to or hinder successful collaboration. By analysing the study within a distributed cognition framework they examined the task, the participants, and the tools. The analysis demonstrated that many factors contributed to effective collaboration around the table. These include: elements of participants' actions (conversations, body position, gaze, gestures, and stylised actions), spatial characteristics of the setting and participant behaviour (dividing the workspace, and the position and orientation of artefacts on the workspace), and the artefacts themselves. These characteristics have been used to establish a set of requirements that must be taken into account when designing a computer system to support digital tabletop interfaces for co-located synchronous collaboration in educational settings.

According to Olivier and Sulaiman, the goal of the study was to elucidate the key requirements of digital tabletops for learning in groups through the analysis of a table-based collaboration task, involving paper, from a distributed cognition perspective. They chose the distributed cognition because it '*provides an effective theoretical foundation for understanding human-computer interaction and a fertile framework for designing and evaluating digital artefacts'*. Distributed cognition caused the authors to take note not only of the task the group is trying to accomplish, but also the activities around the task, the organisation of the collaboration, and the tools used. The distributed cognition approach adopted combines ethnographic observations and controlled experimentation. Sulaiman Kharuffa and Olivier argue that for digital tabletops to support learning and knowledge building, they must allow users significant flexibility to manipulate presentation states and the creation of new presentation states.

For both the user and the technologist the most fundamental issue in digital tabletop design is whether to use touch- or pen-based input technologies. From their observations, it was clear that the pen was not only used for writing but for a number of other communicative functions.

From their studies, they found that working in a face-to-face setting with no visual boundaries between the participants, not only facilitated conversation, but also allowed the use of gesture, gaze, and posture. Tabletop interfaces have the ability to combine the benefits of traditional tables and digital technologies. A good tabletop interface design will maintain the advantages of the table as a setting for collaboration and at the same time provide access to the advantages of digital technology, including: ease of data entry, access to digital information and resources, easy data exchange between users, reduction in volume of printed media, the provision of digital cognitive tools, and (potentially) the automated documentation and evaluation of learning.

The study has implications for small group learning. This was a very small scale study. Further studies are needed in order verify the results.

From tabletop interfaces for education, we move on to the next paper by He, Erdelez and Wang. Their paper is 'Examining a case-based reasoning retrieval system using mental models as a framework'. According to these authors, case-based reasoning is receiving increasing attention in educational settings and can be used to help students improve their problem solving and reasoning skills. So far however, user studies of CBR systems have been inadequately researched in the educational community. To ensure the effective use of case-based reasoning and to help promote the use of case-based reasoning to facilitate learning and transfer in educational settings, practitioners and educators who are using the CBR approach to support learning need to realise that learners must be able to easily find the information they need without having to make a lot of mental effort to figure out how to access that information. As the use of the web becomes more widespread in everyday life, various people with diverse user styles and backgrounds are now able to access web-based CBR systems. They need to be able to find the cases to address their problem situations quickly, without the assistance of in-house staff support. In the past, CBR systems were mainly used by in-house help-desk staff that searched the case library to meet the requests of users. The current trend is focused on designing CBR systems that allow users who require assistance to access the case base themselves in order to enhance the implications of CBR in education and to better support learning methods such as reasoning, problem solving and reflection. It is important to ensure that the various types of users understand how CBR systems work because the success of a system often depends upon the active involvement of users. Since mental models play an important role in people's interaction with IS, more attention has to be paid to the user's mental models and to the usability issues of the CBR systems when educators are designing or using CBR systems to support student learning.

In their studies, He et al. report on how the presence of a mental model affects the experiences of users of the knowledge innovation for technology in education (KITE) system. The mission of the project is to build a learning community through a CBR knowledge repository that enables learning through sharing, communal understanding through storytelling, continuous exchange and creation of new knowledge, and collective problem solving among K-12 schools and teacher education programs. The KITE CBR search engine is designed to assist educators to retrieve previous cases, archived by others, based on semantic meanings (similarities) of cases. There are four major components in the KITE CBR retrieval system:

1 the case library
2 the feature vector space
3 the user interface
4 the search engine.

The user interface is an important component of the KITE CBR system and interacts with most components of the system. The KITE CBR search engine retrieves cases based on semantic meanings (similarities) of cases.

Despite the claim that better understanding of users' mental model will inspire better design in system functionalities, interface and user instruction, and eventually improve software quality, there is very little evidence to validate this. It would be useful to have more empirical studies to validate its effectiveness.

The last paper is 'Connectivism: the network metaphor of learning' by Chatti, Jarke and Quix. These authors argue that connectivism is a new learning theory introduced by George Siemens in 2004 in order to cope with the increasing complexity and fast-paced change of the new knowledge era. Their paper addresses the network metaphor of learning, which explains learning in terms of networks.

According to Chatti et al., the growing complexity and constant change of knowledge requires a new approach to learning. Based on Siemens' work, they introduced connectivism as an alternative learning theory for the new knowledge era, and presented their own conceptual viewpoint on connectivism by discussing the learning as a network (LaaN) perspective representing a knowledge ecological approach to learning. By comparing Connectivism to influential learning and social theories on the one hand, and knowledge ecology to prominent social infrastructures discussed in the CSCL and CSCW literature on the other hand, their aim was to better explore the scope of the Connectivism/LaaN perspective and highlight the nature of the social landscape underlying Connectivism, i.e., knowledge ecology.

Summarising, connectivism addresses the network metaphor of learning, and is a new approach to learning that combines personalised, formal, informal, and lifelong learning within a social context. Although it occupies common ground with other social theories as it stresses the social nature of knowledge, connectivism is distinguished from all those theories in that it provides a more personalised, open, dynamic, emergent, and knowledge-pull model for learning. At the heart of connectivism lies knowledge ecology which is a complex, emergent, highly dynamic, open, self-controlled, self-maintained, and self-organised entity with the major task of handling the unanticipated changes in the new knowledge intensive era.

Depending on the learners and situation, different learning theories may apply. Different learning theories overlap and each learning theory has its strengths and weaknesses. Connectivism/LaaN presents a relatively young learning theory. The Connectivism/LaaN perspective presented in this paper yields general principles of a new vision of learning from which to derive a consistent set of conceptual models and frameworks for understanding and enabling learning in the new-networked world.