Editorial

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Biographical notes: Dr. 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, ebusiness and problem based learning. She has published widely in conferences, journals and chapters of books.

Use of technology for learning

This issue consists of six papers. It covers a diversity of topics ranging from the feasibility of videoconference based lectures over the internet to the development of a diagnostic tool for assessing tertiary students' readiness for online learning.

The first paper by Raymond, Kenenishi, Matsuura and Yano is concerned with 'Feasibility of videoconference-based lectures over the internet'. There has been much research conducted to evaluate the benefits of videoconferencing in education. All of this research incorporates the use of high bandwidth systems. These systems bring high interactivity, but they incur high set up costs and require specific networks to be used. However, many distance learners use asynchronous systems and are neither able to buy high bandwidth systems, nor to obtain access to the necessary networks. Over lower bandwidth systems, videoconferencing quality is often poor because communication quality is not guaranteed on the internet. Because of the expectation of higher bandwidth required in education, video conferencing over the internet is rarely used for distance learning.

Parameters such as delay, jitter and packet drop have huge influences on audio and video communication. This paper evaluates the feasibility of achieving distance learning within a videoconference based environment. It addresses the communication issue of the videoconference lectures. The aim was to determine the influence of network perturbances (delay, jitter, packet loss) and the main communication channels from the learner's point of view. A videoconference based communication system is more than the recreation of a distant environment. Tools such as chat, application sharing and whiteboards offer different interactive modes, and the videoconference is only one tool of the collective work environment. The communications in this paper were set up to reflect on low bandwidth videoconferencing, use of collaborative tools and a 'head and shoulders' video with no students face to face with the professor. The results reveal that the influences of network problems in the learning context and in the communication context are different. Raymond, Kenenishi, Matsuura and Yano reported that audio

appeared to be the element having the most influence on the lecture. It was followed by slides/whiteboard. The video was considered to the least important element in this communication scenario. It may be suggested that the video aspect was small and of poor quality and did not contribute much toward the lecture. Since the video was showing a 'talking head', it did not transmit any major information, but only affective information. The authors concluded that for lectures, the quality of audio and slides is more important that video quality. This means that the larger bandwidth required for high quality video is not necessary for lectures.

From the use of videoconference lectures, we move on to the use of simulation technology for learning. There are three papers covering different aspects of simulation technology. The first of these, Paper Two of this issue is by Stern, Xing, Muste, Yarbrough, Rothmayer, Rajagopalan, Caughhey, Bhaskaran, Smith, Hutchings and Moeykens. In their paper, 'Integration of simulation technology into undergraduate engineering courses and laboratories', they describe the use of simulation in the teaching of Computational Fluid Dynamics, Experiential Fluid Dynamics and Uncertainty Analysis. The project involves four faculty partners from colleges of engineering at large public, private and minority private universities and the software partner, Fluent, Inc.

These authors believe that simulation based design and virtual reality will supplement and eventually replace experiential observations and analytical methods in engineering practice. The teaching modules were intended to be aids to supplement lectures, not to replace them. The focus was on handson experiences with Computational Fluid Dynamics, Experiential Fluid Dynamics and Uncertainty Analysis as tools for solving fluids mechanics problems. According to these authors, evaluation of data collected from students pointed to some success in the integration of simulation technology in the teaching modules for introductory level fluids mechanics courses and laboratories. This also led to improved strategies for effective implementation, especially the need for an effective handson computational fluids dynamic educational interface to better simulate actual engineering practice.

Paper Three is concerned with the use of computer based simulation in business teaching. In their paper, 'Modes of Learning on the use of computer based business simulation games', Moizer, Lean, Towler and Smith describe the role of computer based simulation in undergraduate business education. This paper examines the learning approaches adopted by students using a business strategy simulation game. Its purpose is to show an understanding of how to enhance the benefits of computer based learning using simulation games, through better appreciating the modes of learning adopted by undergraduate students. Through the collection of qualitative data from debriefing sessions, the study aimed at articulating the modes of learning adopted by students. The interview findings evidence a range of learning modes amongst students, characteristics of which mirror the concept of zero, single and doubleloop learning. Moizer, Lean, Towler and Smith suggest that zero, single and doubleloop learning provide a helpful framework for understanding the extent of and process by which learning is achieved within a computer based gaming context. Their study indicates that doubleloop learning does not automatically occur as a result of participation in a computerbased business simulation. A number of actions are proposed by these authors to maximise the effectiveness of this form of learning technology.

The last of the simulation papers, Paper Four, is on web orientation agent (WOA) in technology education. The paper, 'Web-Orientation Agent (WOA) for simulated learning in technology education' by Page, Lehtonen and Thorstseinsson discusses the theoretical

underpinning and central aspects of the development and application of WOA and presents preliminary results concerning its use in university studies.

WOA is a software based tool, which produces an interactive learning environment offering support and guidance in teaching and learning that makes use of local applications. It is an interactive aid and guide that enables student users to view multiple applications. The WOA and its supportive role in the teaching-learning process are based on activity theory, along with the constructive view of teaching, studying and learning.

Page, Lehtonen and Thorstseinsson describe the purpose of WOA as a guide to students in using local resources, such as simulation tools, in a pedagogically sound manner. WOA offers downloadable resources and digital objects to support and orient the study process. To these authors, WOA can overcome some of the problems which were observed when using simulations that allowed openended problem solving approaches. The problem has been that students are incapable of using the tool for deepening, creating or constructing, their understanding and knowledge as defined in module learning outcomes.

Moving away from simulation, Paper Five is by Kale and Rokopou on 'The effects of social acquaintance and gender on performance and attitudinal outcomes within cooperative computer-based instruction'. Although there has been growing research interest regarding the benefits of using cooperative learning strategies during computer based instruction activities, most focused on variables such as achievements and attitudes towards instruction, group cooperation, heterogeneity of groups in terms of ability and prior knowledge, and gender. According to Kale and Ropokou, there has been little research on important factors such as social acquaintance and gender within the context of cooperative computer based instruction. This paper examines the effects of social acquaintance among paired learners in cooperative computer based instruction on achievement and attitudes. The research study was a two level study of acquaintance (nonacquainted vs. acquainted) X two levels of gender (female vs. male) between subject quasi-factorial research design. The independent variables were acquaintance level and gender (male and female). The dependent variables were learning, attitudes, tutorial duration and interaction.

Their results revealed that there was no difference between acquainted and nonacquainted groups in their learning gains, whereas those in acquainted groups believed at a significantly higher level, that they had good communication skills with their peers and were able to follow them as compared to those in the nonacquainted groups. While there was no difference between females and males in their post application test scores, males significantly outperformed females in the post recognition test. There was also a significant interaction found between gender and acquaintance. Results of this research have implications for cooperative computer based instruction. Students should be assigned to groups of peers with whom they feel comfortable working, unless the goal of grouping is the development of social skills and organisational strategies.

The last paper is by Pillay, Irving and McCrindle on 'Developing a diagnostic tool for assessing tertiary students' readiness for online learning'. These authors believe that the increasing investment in developing high quality syllabuses for online learning has focused more on technology and the teaching process with little regard for the learner's readiness to learn through such systems. One of the reasons for this was an assumption that most students have the necessary capacity (technical and attitudinal) to deal with online learning. For Pillay, Irving and McCrindle, online learning requires a different

mindset for learning than that required in traditional teaching and learning environments. Greater responsibility is placed on students for self-regulation and independence, and for mental and onscreen indexing of information and becoming a discerning consumer of information. This paper reports an investigation into factors influencing student's readiness for online learning and the development of a diagnostic instrument to ascertain the readiness of a cohort of education students to work with online instructional material. Through confirmatory factor analysis, four factors (technical skills, learner self-efficiency, learning preference and learner attitude) were identified.