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## Editorial

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**Biographical notes:** Lorna Uden is an Emeritus Professor of IT Systems in the Faculty of Computing, Engineering and Technology at Staffordshire University. Her research interests include technology learning, HCI, activity theory, big data, knowledge management, web engineering, multimedia, e-business, service science and innovation, mobile computing, cloud computing, social media, and problem-based learning.

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Welcome to V9N3 issue of *IJLT*. This issue consists of four papers. The first paper is, 'The relationship between cognitive disequilibrium, emotions and individual differences on student question generation' by Jeremiah Sullins and Arthur C. Graesser. According to these authors, the purpose of the study was to explore the effects of cognitive disequilibrium and individual differences on student question generation. Students were placed in a state of cognitive disequilibrium while they learned topics of computer literacy. During the course of the study, a confederate was present to answer any questions that the participant may have had. Additional analyses examined any potential influence the confederates had on student question asking. Furthermore, the study explored the relationship between emotions and cognitive disequilibrium. Lastly, they examined any relationship between individual differences (e.g., personality and motivation) on question generation. The results revealed that participants who were not placed in a state of cognitive disequilibrium generated a significantly higher proportion of questions. Results did reveal significant main effects as a function of time for certain facial action units. Lastly, it was discovered that certain measures of individual differences were related to student question generation. It would be useful to conduct more empirical studies to validate the results.

The second paper is, 'Example-based feedback provision using structured solution spaces' by Sebastian Gross, Bassam Mokbel, Benjamin Paassen, Barbara Hammer and Niels Pinkwart. According to these authors, intelligent tutoring systems (ITSs) typically rely on a formalised model of the underlying domain knowledge in order to provide feedback to learners adaptively to their needs. The authors argue that this approach implies two general drawbacks: the formalisation of a domain-specific model usually requires a huge effort, and in some domains it is not possible at all.

In this paper, they propose feedback provision strategies in absence of a formalised domain model, motivated by example-based learning approaches. They demonstrate the feasibility and effectiveness of these strategies in several studies with experts and students. They discuss how, in a set of solutions, appropriate examples can be automatically identified and assigned to given student solutions via machine learning techniques in conjunction with an underlying dissimilarity metric. The plausibility of such an automatic selection was evaluated in an expert survey, while possible choices for

domain-agnostic dissimilarity measures were tested in the context of real solution sets of Java programmes. The quantitative evidence suggests that the proposed feedback strategies and automatic example assignment are viable. User studies in large-scale learning environments will be beneficial.

The third paper is, 'Predicting semantic changes in abstraction in tutor responses to students' by Michael Lipschultz, Diane Litman, Sandra Katz, Patricia Albacete and Pamela Jordan. According to these authors, certain types of discourse relations have been shown to be beneficial for learning. They argue that two relations in particular have been found to correlate with learning: tutor generalisation and tutor specification. Tutor generalisation occurs when the tutor repeats part of a student's utterance, but at a higher level of abstraction. Tutor specification occurs when the tutor repeats part of a student's utterance, but more concretely.

In this paper, post-problem reflective tutorial dialogues between human tutors and students are examined to predict when the tutor changed the level of abstraction from the student's preceding turn (i.e., used more general terms or more specific terms). These authors believe that such changes correlate with learning. They argue that prior work examined lexical changes in abstraction. In their work, they consider semantic changes. They are interested in developing a fully-automatic computer-based tutor, by using only automatically-extractable features (e.g., percent of domain words in student turn) or features available in a tutoring system (e.g., correctness). They found patterns that predict tutor changes in abstraction better than a majority class baseline. According to these authors, generalisation is best-predicted using student and reflection features. Specification is best-predicted using student and problem features.

The conclusions drawn from this sample by these authors only indicate when a computer-based tutor may want to generalise. Studying a larger group of skilled tutors' behaviour to determine when they tend to generalise and specialise will provide a better idea of when it is best for a computer-based tutor to generalise or specialise.

The final paper, 'Community of inquiry framework: employing instructor-driven measures in search of a relationship among presences and student learning outcomes', is by McDonald van der Merwe. The author of this paper argues that although the community of inquiry (CoI) framework is generally regarded as the most influential learning process model available to support a constructivist orientation in computer-mediated higher education distance learning environments. The framework is not without criticism – the central assertion a lack of empirical evidence to support the claim that a CoI leads to deep and meaningful learning outcomes.

In recent studies, the relationship between student perceptions of a CoI and instructor-assessed learning outcomes was examined. In reporting a lack of correlation, the results appear supportive of the criticism levelled. The author of this paper took the study further by removing student perception measures and investigating the relationship between instructor-driven measures of the CoI and learning achievement outcomes.

The current study takes this approach further by removing student perception measures, and investigates the relationship between instructor-driven measures of the CoI and learning achievement outcomes. The author argues that whereas a small sample size ( $n = 24$ ) prevents the study from claiming full evidence of a relationship, significant positive relationships found between learning outcomes and most of the CoI presences and its dimensions suggest that instructor-driven measures may provide a way forward in the search for proof that a CoI leads to deep and meaningful learning outcomes. Further empirical studies are necessary to validate the results.