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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, intelligent transport systems, internet of things and problem-based learning.

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Welcome to V14N4 of *IJLT*. This issue consists of four papers. The first paper is ‘Tracking the public’s opinion of online education: a quantitative analysis of tweets on e-learning’ by Andreas Giannakouloupoulos, Alexandros Kouretsis and Laida Limniati. This paper analyses what kind of information related to e-learning is circulating in social media and in Twitter from the perspective of someone who searches on Twitter. It aims to discover to what extent is Twitter being used as a tool for e-learning and collaboration. The authors analysed approximately 156,000 tweets from online education in order to evaluate the information circulating in this kind of discourse.

According to the authors, the tweets were gathered in spring 2018 using R programming language. For analysing and visualising the patterns encoded in tweets, they relied on topic modelling using LDA. The dataset is composed by tweets extracted from Twitter API on e-learning related queries. The results indicate the prevalence of one-way promotional material over bidirectional discussions among users. This implies a need for quality control of educational information on social media and to motivate the educational community to participate more in related discussions. Further research is needed to validate the results.

The second paper is ‘Not all confusion is productive: an investigation into confusion induction methods and their impact on learning’ by Jeremiah Sullins, Katie Console, Rebecca Denton, Clayton Henrichson and Steven Barber. According to these authors, there is empirical evidence (in and out of the laboratory) suggesting that emotions are inextricably linked to learning. More specifically, recent research has suggested that ‘productive confusion’ can significantly increase learning gains when compared to various controls. The study by these authors was an attempt to discover the gold standard of inducing a state of confusion that is beneficial to the learning of complex science topics. Using a randomised controlled trial, participants received either one of three different types of confusion induction (deep-questions, intra-testing, breakdown scenarios) or a lecture-based information delivery control.

The results revealed that breakdown scenarios were the most beneficial in terms of pre-test to post-test learning gains. Additionally, significant interactions were discovered among learning, confusion induction methods, and measures of individual differences (i.e., goal orientation and attributional complexity).

Although the current study did explore how certain individual differences impact confusion and learning (i.e., attributional complexity and goal orientation) more work needs to be done in this area to understand when confusion works and for whom. Additionally, although these results are exciting and immediately applicable, caution should be taken in generalising these findings to other domains. It is suspected that certain disciplines are better suited for the introduction of desirable confusion, but further research is needed in this area.

The third paper is 'On the path to self-determined learning: a mixed methods study of learners' attributes and strategies to learn in language MOOCs' by Nikoletta Agonács, João Filipe Matos, Daniela Bartalesi-Graf and David N. O'Steen. The authors in this paper employed heutagogy (self-determined learning) to learn about autonomous learning characteristics of language MOOC learners using an embedded correlational mixed methods design. They administered quantitative and qualitative questionnaires to learners in two Italian Language MOOCs offered by Wellesley College on the edX platform. These authors then measured how four heutagogical attributes (self-efficacy, self-reflection and insight, and internet skills) predict self-directed learning readiness in three different learner cohorts (high, moderate and low self-determined learners), and learners' capability level. They also discuss learners' preferred activity types for foreign language acquisition as revealed by the qualitative survey.

According to these authors, the results of the quantitative data of this study indicate that the suggested model of self-reflection and insight, self-efficacy and operational, information-navigation, creative, social and mobile internet skills strongly predicts learners' readiness for self-directed learning in all three cohorts, explaining 31.5% of variance in high self-determined learners' readiness, 36.9% in moderate self-determined learners' readiness, and 48.4% in low self-determined learners' readiness to self-directed learning. However, there are several limitations in this study. These include: the study is only confined to Italian language; there is difference in sample size between high and moderate or low self-determined learners; incomplete demographic data and potential bias.

The last paper is 'Identifying potential design features of a smart learning environment for programming education in Nigeria' by Friday Joseph Agbo, Solomon Sunday Oyelere, Jarkko Suhonen and Markku Tukiainen. These authors argue that the aim of smart learning environment (SLE) is to enhance teaching and learning by providing personalised learning, quick feedback and motivation. This study discusses the features of SLE that are relevant to programming education and the general design features for developing SLEs. In addition, the study provides insights into the level of awareness and use of the SLE for programming education in the Nigerian higher education institutions (HEI). The authors used mixed research method to conduct a survey among the teachers and students of computer science at HEI in Nigeria. Data were collected through questionnaire and interviews.

According to the authors, the study shows that the students and teachers have no experience of SLEs but indicate strong willingness to embrace the use of the SLE for programming education. There is obvious limitation in this study because it was confined to the students and teachers of programming education in Nigerian HEIs.