Editorial for EAIT issue 2, 2021

Arthur Tatnall¹

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Education and Information Technologies (EAIT) is the official journal of the Technical Committee on Education (TC3) of the International Federation for Information Processing (IFIP). It is a research journal that covers the complex relationships between information and communication technologies and education, from the micro of specific applications or instances of use in classrooms to macro concerns of national policies and major projects; from classes of pre-schoolers to adults in tertiary institutions; from teachers and administrators; to researchers and designers; from institutions to open, distance and lifelong learning. The journal's breadth of coverage allows EAIT to examine fundamental issues at all levels, discuss specific instances and cases, draw inference and probe theory. This journal is embedded in the research and practice of professionals and has been accepted into the Social Science Citation Index (SSCI) in the category 'Education & Educational Research'.

Dedicated, professional reviewers are an essential part of any research journal and EAIT is fortunate to have some excellent reviewers. We thank them very much for their efforts and have included a list of all those who completed three or more reviews in 2020 in this journal issue.

We do, however, have a problem. We do not have enough reviewers! In 2020 we had over 1300 submissions to the journal (288 articles were published), and in the *first six weeks* of 2021 we have received 370 submissions. This will mean a huge effort for our present number of dedicated and professional reviewers. We need more people to register as reviewers and we encourage readers to consider registering and inviting their colleagues also to register. To do this, go to the EAIT Editorial Manager (<https://www.editorialmanager.com/eait/default.aspx>) and click on Register Now.

To begin this issue, Alireza Badeleh (Farhangian University, Iran) points out that advances in technology have made it necessary to make use of new educational methods in their article: *The effects of robotics training on students' creativity and learning in physics*. The research design was pre-test/post-test quasi-experimental, including a control and a treatment group of 11th grade students in Tehran. After

✉ Arthur Tatnall
Arthur.Tatnall@vu.edu.au

¹ Victoria University, Melbourne, Australia

an eight-session treatment period, data was collected through employing the Torrance Creativity Questionnaire including four dimensions namely Fluidity, Flexibility, Innovation, and detailed explanation, Learning points, and a package of training on robotic constructs in physics. Findings indicated that Robotics training influenced and improved creativity and learning in physics among the participants.

A literature review: efficacy of online learning courses for higher education institution using meta-analysis by Mayleen Dorcas B. Castro (Angeles University Foundation, Pampanga and Bulacan State University, Malolos, Philippines) and Gilbert M. Tumibay (Angeles University Foundation, Pampanga, Philippines) begins by stating that many educators and researchers are interested in online learning courses to enhance and improve student learning outcomes while battling shortages in resources, facilities and equipment, particularly in higher education institutions. For this study, the researchers reviewed literature through meta-analysis using the ADDIE (Analysis, Design, Development, Implementation and Evaluation) framework for designing and developing instructional materials that can provide wider access to quality higher education. The work highlights the importance of instructional design and the active role of institutions play in providing support structures for educators and students.

Suparoek Chootongchai, Noawanit Songkram and Krerk Piromsopa (Chulalongkorn University, Bangkok, Thailand): *Dimensions of robotic education quality: teachers' perspectives as teaching assistants in Thai elementary schools*. The primary objective of this study was to identify and confirm quality dimensions in robotic education from the teachers' perspectives. The researchers observed teachers in Thai elementary schools as, although educational robots have been used in many countries as teaching assistants in elementary schools, robotic education is not well established in Thailand. They proposed prototype development of an educational robot for the Thai educational context.

Cultural challenges eLearners from the GCC countries face when enrolled in Western educational institutions: A thematic literature review. This article, by Nafeth Al Hashlamoun (Higher Colleges of Technology, Abu Dhabi, UAE) offers an in-depth assessment of cultural challenges that e-Learners face in the Gulf Corporation Council (GCC) countries. As a theoretical framework, Hofstede's popular cultural dimensions and Hall's concept of low and high context cultures are considered. The author discusses considerations that should be taken into account when designing instructional materials for online courses targeting e-Learners from these countries.

Omar Córdor-Herrera (Universidad Tecnológica Indoamérica, Quito, Ecuador) and Carlos Ramos-Galarza (Pontificia Universidad Católica del Ecuador, Quito and Universidad Tecnológica Indoamérica, Quito, Ecuador) next present: *The impact of a technological intervention program on learning mathematical skills*. They claim that learning mathematics is seen as a challenge where a high percentage of students both fail to develop numerical-type skills and have low academic performance. Their research involved a quasi-experiment to develop mathematical skills and knowledge and the benefit of using virtual learning objects.

Examining PRESERVICE teachers' use of SMARTBOARD and pc tablets in lessons comes from Murat Yalman and Bulent Basaran (Dicle University, Diyarbakir,

Turkey). The authors point out that today, with developments in technology, education is using a wide variety of tools including smartboards, tablets, virtual laboratories and cooperative learning environments, and making use of two- or three-dimensional learning contents, animations, video conference lessons and interactive applications. In their study, they aimed to reveal preservice teachers' views about the use of smartboards in class. They found that there were significant differences between the preservice teachers' views about the audio-visual use of tablet computers and smartboards in classes and, based on gender, that use of tablet computers in classes did not decrease motivation.

Research based on educational data mining conducted at academic institutions is often limited by institutional policy with regard to the type of learning management system and the detail level of its activity reports say Yael Feldman-Maggor (Weizmann Institute of Science, Rehovot and The Open University of Israel, Ra'anana, Israel), Sagiv Barhoom (The Open University of Israel, Ra'anana, Israel), Ron Blonder (Weizmann Institute of Science, Rehovot, Israel) and Inbal Tuvi-Arad (The Open University of Israel, Ra'anana, Israel) in their article: *Behind the scenes of educational data mining*. Often, researchers deal only with raw data which often contain fictitious user activities that can create a bias in activity trends leading to inaccurate conclusions unless careful strategies for data cleaning, filtering, and indexing are applied. They examined online educational data collected from chemistry courses conducted at two academic institutions. Their results showed that adequate pre-processing of data can prevent major inaccuracies in research findings and significantly increase authenticity and reliability of conclusions.

Basil C. E. Oguguo, Fadip Audu Nannim, John J. Agah, Christian S. Ugwuanyi, Catherine U. Ene and Augustina C. Nzeadibe (University of Nigeria, Nsukka, Nigeria) then offer: *Effect of learning management system on student's performance in educational measurement and evaluation*. A non-equivalent group quasi experimental research design was adopted for the study, using a population of undergraduate students in Imo State University, using an instrument titled "Measurement and Evaluation Achievement Test (MEAT)" for data collection. Their findings showed that students taught using Moodle performed better than those exposed to another package and that female students performed better than the males in both, although the male students recorded a higher gain score.

Incorporating new literacies in designing a mobile learning application for secondary/middle school students by Chiew Hong Ng (Nanyang Walk, Singapore), Noi Keng Koh (Curtin University, Singapore) and Hua Loon Ling (Kuala Lumpur, Malaysia) examines the incorporation of new literacies to an adapted framework by Parsons et al. to design mobile learning applications for "Elements of Business Skills" for a group of lower academic ability secondary school learners in Singapore. Accounts of the actual process of designing a mobile learning application for teaching and learning are used to consider factors in incorporating new literacies into the modified mobile learning design framework based on mobile learning design principles.

The next research paper examines the acceptance of technology for learning by senior secondary school students and university newcomers. *The two perfect scorers for technology acceptance* describes research by Pritika Reddy (Fiji National

University, Suva, Fiji), Kaylash Chaudhary (The University of the South Pacific, Suva, Fiji), Bibhya Sharma (The University of the South Pacific, Suva, Fiji) and Ronil Chand (Fiji National University, Suva, Fiji). Their objective was to measure the computer competency, computer self-efficacy of selected student cohorts on the acceptance of technology for learning. The study uses the extended Technology Acceptance Model (TAM) with two additional attributes: computer competencies and computer self-efficacies to examine students' behaviour towards learning with technology.

A machine learning approximation of the 2015 Portuguese high school student grades: A hybrid approach was contributed by Ricardo Costa-Mendes, Tiago Oliveira, Mauro Castelli and Frederico Cruz-Jesus (Universidade Nova de Lisboa, Portugal). An information system that supports the nationwide education system should be designed and further structured to collect meaningful and precise data about the full range of academic achievement antecedents, they argue. Their article uses an anonymous 2014–15 school year dataset from the Directorate-General for Statistics of Education and Science of the Portuguese Ministry of Education as a means to carry out a predictive power comparison between the classic multilinear regression model and a chosen set of machine learning algorithms. The machine learning algorithms attain a higher level of predictive ability.

A simulator-based Intelligent Tutoring System (ITS) is a computer system that is made to provide students with a learning experience that is both customisable to a student's needs and includes simulations. The next article, by Asmaa Alabdulhadi (Ministry of Higher Education, Information Technology Department, Kuwait City, Kuwait) and Maha Faisal (Kuwait University, Kuwait City, Kuwait) is: *Systematic literature review of STEM self-study related ITSs*. They note that ITSs offers convenient and low-cost studying, and a variety of articles investigate this. This article reviews a number of these papers in recent work on Science, Technology, Engineering, and Mathematics (STEM) and identifies limitations and opportunities for self-study simulator based ITSs.

Toward a model for acceptance of MOOCs in higher education: the modified UTAUT model for Saudi Arabia by Maryam Altalhi (Taif University, Saudi Arabia) makes use of the Unified Theory of Acceptance and Use of Technology (UTAUT) to study the acceptance of MOOCs for academic purposes at Taif University in Saudi Arabia. The main finding is that although most studies of technology acceptance exclude attitude, this study found it to have a critical role in verifying the UTAUT model.

Gökhan Baş (Niğde Ömer Halisdemir University, Turkey) and Muhammet Baştuğ (Istanbul University-Cerrahpaşa, Turkey) next present: *Teaching–learning conceptions, teaching motivation, and perceptions towards ICT: A research in Turkish public high schools*. In this research, ICT scales were used. Correlations were calculated and it was found that there were significant correlations amongst teaching–learning conceptions, teaching motivation, and perceptions towards ICT.

Design and validation of an instrument of self-perception regarding the lecturers' use of ICT resources: to teach, evaluate and research describes research by Francisco D. Guillén-Gámez (University of Zaragoza, Spain) and María J. Mayorga-Fernández (University of Malaga, Spain). Their aim was the creation and validation

of a measuring instrument on the use of ICT resources based on the model: Higher Education Teachers to teach, Evaluate and Research (UICT-TER) and this article describes how this was designed and used.

There has been increasing interest among researchers to understand the negative effects of technology, and Pallavi Upadhyaya and Vrinda (Manipal Academy of Higher Education, India) look at this in: *Impact of technostress on academic productivity of university students*. They point out that technostress (stress induced due to technology) among working professionals is extensively reported in the literature and even though there has been an increased proliferation of digital devices in academia, there is a dearth of studies examining the prevalence of technostress and its impact among students. This study examines the prevalence of technostress among students in the age group 18–28 years, finding that the technostress instrument is valid for use, with minor modifications, in an academic context and that students experienced moderate levels of technostress.

“I’m not against online teaching, but what about us?”: ICT in Ghana post Covid-19 is investigated by Michael Agyemang Adarkwah (Southwest University, Chongqing, China). Globally, ICT is regarded as a dependable vehicle for facilitating educational reform and development, a platform for communication, and as a means to achieve the Sustainable Development Goal Four (SDG 4). Since the enactment of the No Child Left Behind act (NCLB) and declaration of the SDG 4, many countries have opted to embrace the lifelong education for all by integrating ICT in teaching and learning at all school levels. The Ghanaian Government’s initiative to ensure “education anytime anywhere for everyone” by revolutionizing teaching and learning through ICT has faced a lot of challenges and criticisms. This paper identifies critical factors that affect online learning, recommends post COVID-19 strategies to promote e-learning for policymakers in education and government and concludes with a conceptual model for emergency transition to elearning.

‘Dreaming in colour’: disabled higher education students’ perspectives on improving design practices that would enable them to benefit from their use of technologies focuses on the design of technology products and services for disabled students in higher education. It is from Jane Seale, Chetz Colwell and Tim Coughlan (The Open University, Milton Keynes, UK), Tali Heiman, Dana Kaspi-Tsahor and Dorit Olenik-Shemesh (The Open University of Israel, Ra’anana, Israel). Their article analyses the perspectives of disabled students studying in the US, UK, Germany, Israel and Canada, regarding their experiences of using technologies to support their learning. The students shared how the functionality of the technologies supported them to study and enabled them to achieve their academic potential.

Nashrawan Taha and Laila Dahabiyeh (The University of Jordan, Amman, Jordan) examine the rapid technological developments associated with a decrease in cost of smartphones, making them more accessible and convenient to use, in their article: *College students information security awareness: a comparison between smartphones and computers*. In an educational setting, students are increasingly bringing their smartphones to classrooms and this could have serious security implications, particularly when students are less aware of smartphone information security threats. This paper set out to provide an empirical comparison in the level of information security awareness among college students in terms of knowledge and

behaviour. The research showed that students are highly aware of some information security concepts, but they behaved differently in protecting their smartphones compared to computers.

Fun first, useful later: Mobile learning acceptance among secondary school students in Indonesia is from Ahmad R. Pratama (Universitas Islam Indonesia). As mobile devices become more ubiquitous, the benefits of mobile learning (m-learning) can be a great opportunity for educating a vast populace such as Indonesia, and especially also for developing countries. Middle and high school students in Indonesia participated in this study to investigate factors determining m-learning acceptance among adolescents and to discover the effects of sex, age group, and location differences with the Technology Acceptance Model (TAM) as a theoretical framework. The results indicate that all seven factors in the model are significant determinants of m-learning acceptance with some moderation effects by sex, age, and location.

Abeer Qashou (Palestine Technical University, Kadoorie, Palestine) now offers: *Influencing factors in M-learning adoption in higher education*. M-learning is a robust component that makes learning easier and more flexible, helps students perform educational activities and, the author claims, access the learning materials easily without temporal or spatial restrictions. Despite the large number of researchers who have dealt with the topic of m-learning, the issue of factors affecting adoption of m-learning has not been dealt with adequately especially in Palestine, says the author. The goal of this study was to inspect factors that influence higher education students in Palestine to adopt M-learning systems and use their applications. It is based on the Technology Acceptance Model (TAM) and some external factors. Results validate the capacity of TAM constructs and the external variables used in this research.

While many Higher Educational Institutions (HEIs) in Nigeria have not yet adopted e-learning, there is a rapidly growing interest in its implementation in teaching and learning processes say Muhammed Kuliya and Sani Usman (Federal Polytechnic Bauchi, Nigeria) in: *Perceptions of E-learning among undergraduates and academic staff of higher educational institutions in north-eastern Nigeria*. This research is a systematic study aimed to predict academics' and students' intentions to use e-learning in Northeastern Nigeria's HEIs where the use of e-learning is presently scarce. It makes use of the extended Technology Acceptance Model (TAM) augmented by two external variables. Data were extracted and analysed, and results showed that for both academics and students, perceived ease of use and perceived usefulness strongly predicted the participants behavioural intentions to use e-learning.

To WeChat or to more chat during learning? The relationship between WeChat and learning from the perspective of university students is a paper by: Rujing Hou (Tianjin University of Technology and Education, China), Shenghao Han (Shanghai University of Finance and Economics, China), Kun Wang (Rutgers Business School, Newark, USA) and Chubing Zhang (Tianjin University of Finance and Economics, China). They explain that WeChat has become an indispensable part of university students' life in China, but that there was little research into the relationship between WeChat and learning. This study investigated university

students' attitudes towards the impact of WeChat on learning, the determinants of WeChat learning engagement, and how WeChat usage influences students' academic performance.

Knowledge sharing technologies in higher education: Preferences of CIS students in Cyprus is by Fezile Ozdamli and Nadire Cavus (Near East University, Nicosia, Cyprus). This study aimed to determine preferences of Computer Information Systems (CIS) students as regards knowledge sharing technologies. It was found that CIS department students prefer using the opportunities offered by the technology in knowledge sharing processes. The study also discusses implications of knowledge sharing and web technologies for researchers and educators.

Based on the study of virtual learning systems, motion learning theory and instructional design theory, a virtual fitness trainer app named TRAINIME has been developed as one of the tools to teach exercise for fitness education programs, say Nur Azlina Mohamed Mokmin and Nurullizam Jamiat (Universiti Sains Malaysia, Penang, Malaysia) in their article: *The effectiveness of a virtual fitness trainer app in motivating and engaging students for fitness activity by applying motor learning theory*. Their paper describes the design, development and evaluation of the app. The design and development process was guided by motor learning theory and focused on the application of observation and random practice learning strategies in teaching fitness exercise. The app contains five virtual fitness trainers that show movements that target different fitness levels. Their results showed that the students had the motivation to do fitness activities after being in a practice session with the virtual fitness trainers.

Husam Qaddumi (Al Istiqlal University, Jericho, Palestine), Brendan Bartram (University of Wolverhampton, UK) and Ali L. Qashmar (Al Istiqlal University, Jericho, Palestine) next offer: *Evaluating the impact of ICT on teaching and learning: A study of Palestinian students' and teachers' perceptions*. This study aimed to investigate the impact of ICT on teaching and learning from the point-of-view of Palestinian students and teachers. It was found that students in Palestinian public schools perceived ICT to have a moderate influence on their learning. Students indicated that they face frequent challenges such as: lesson duration, access to modern devices and issues with information research skills. These results contrasted with the views of school teachers and reflected a much stronger impression of the influence of ICT on teaching.

Nese Sevim-Cirak (Mehmet Akif Ersoy University, Burdur, Turkey) and Omer Faruk Islim (Mersin University, Turkey) next state that smartphones have become an unavoidable part of daily life for many people. Several features and abilities have led to addiction. *Investigation into Nomophobia amongst Turkish pre-service teachers* introduces the term 'Nomophobia', which is generally defined as the sense of anxiety or fear of being unable to reach or use a mobile phone. Tests were conducted to identify differences between teacher candidates' nomophobic behaviours based on age, gender, class level, duration of mobile phone ownership, data plan ownership, and WiFi accessibility. The results indicated that the variables of gender, age, class level, and having a data plan, significantly affected the preservice teachers' nomophobic behaviours, whereas duration of smartphone ownership and Wi-Fi connection accessibility did not.

Parental mediation of adolescent Internet use: Combining strategies to promote awareness, autonomy and self-regulation in preparing youth for life on the web is from Nili Steinfeld (Ariel University, Israel). The study examines parental mediation strategies of adolescent Internet use and their relation to adolescent age, concerns of online risks, online activities and risky behaviour. Results, from a survey of adolescents, illustrate how parents combine mediation strategies in a variety of formats and contexts. Restrictive mediation correlated with increased adolescent concerns, suggest an internalisation of risks and consequences of Internet use. The study compares mediation strategies with parenting styles and concludes that a balanced combination of restrictive and active mediation, arguably supplies the best grounds for adolescents to develop a strong set of norms and boundaries and be able to self-regulate their own Internet activities.

Augmented reality (AR) as a learning material in special needs education describes research by Hasan Köse and Nevin Güner-Yildiz (Eskisehir Osmangazi University, Turkey) in which they examined articles published between 2013 and 2019 that addressed use of AR as learning material, meeting the inclusion criteria using descriptive content analysis in terms of general characteristics. They also examined the properties of AR contents and development environments in detail. Findings from the research indicate that the use of AR as a learning material gives positive results in the education of individuals with special needs.

Gila Cohen Zilka (Bar-Ilan University, Israel) then presents: *Feelings of belonging or alienation and social emotional perceptions of immigrant youths in the digital age, in comparison with native-born youths*. The purpose of this study was to characterise these when there are well-developed digital environments granting availability without barriers of time and place. It was found that the positive process of identity building by immigrant youths is a combination of interactions with those who remain in the country of origin and significant interactions in the new society, especially in schools, fostering a sense of belonging, sharing, acceptance, a sense of being needed, and attention, which are likely to create a sense of resilience in immigrant youths.

Secondary vocational education students' expressed experiences of and approaches to information interaction activities within digital environments: a Phenomenographic study is from Fernando Bolaños and Álvaro Salinas (Pontificia Universidad Católica de Chile, Santiago, Chile). They argued that being able to engage digital information abilities to solve an information interaction activity is key for social participation, equality and for bridging socio-economic and cultural gaps. Developing these abilities within school classrooms has thus become a priority. Research suggests, however, that most students can only complete basic and explicit information-gathering and management tasks within digital environments. To address important gaps, they employ phenomenography to study Chile's Secondary Technical and Vocational Education and Training students expressed experiences of information interaction abilities. This is a group that has likewise been overlooked.

Edisa Puška (Ninth elementary school of Maoča, Bosnia and Herzegovina), Adisa Ejubović (Münster University of Applied Sciences, Germany), Nataša Đalić (University of East Sarajevo, Bosnia and Herzegovina) and Adis Puška (Institute for Scientific Research and Development Brcko district BiH, Bosnia and

Herzegovina) note that the continuous development of information technologies has changed the way in which education is organized. In their article: *Examination of influence of e-learning on academic success on the example of Bosnia and Herzegovina* they suggest that students are now more likely to choose e-learning to achieve better results during their studies. Their results showed that metacognitive strategies and computer self-efficacy have a direct significant influence on academic success, while the set goals do not directly influence this.

The next study by Saman Ebadi and Saba Bashir (Razi University, Kermanshah, Iran) utilises a sequential explanatory mixed-methods design to explore the impact of Mobile-based Dynamic Assessment (MDA) on English as a Foreign Language (EFL) learners' writing skills. *An exploration into EFL learners' writing skills via mobile-based dynamic assessment*. Their overall results showed that MDA enhances EFL learners' written proficiency as a result of the collaborations between the learners and the instructor using text and voice-based mediation. Thematic analysis of data revealed the participants' satisfaction with both mediation types in terms of being efficient, convenient, and causing less social pressure.

Online and face-to-face composition in forming the professional competencies of technical teacher candidates with various learning style types by Hamonangan Tambunan, Marsangkap Silitonga and Uli Basa Sidabutar (Universitas Negeri Medan, Indonesia) follows. They state that it is necessary to ensure that the combination of blended learning forms is suitable for the type of learning style. Experiments were conducted with online-face-to-face composition implemented into four groups of learning style types: Diverger, Assimilator, Converger and Accommodator. Both the variety of compositions and the types of learning styles differed significantly in their competence.

Context aware mobile learning: A systematic mapping study is a paper by Bimal Aklesh Kumar (Fiji National University, Suva, Fiji), Bibhya Sharma (University of the South Pacific, Suva, Fiji) and Elisa Yumi Nakagawa (University of São Paulo, Brazil). They point out that Context Aware Mobile Learning (CAML) provides a learning experience tailored to educational needs and the particular circumstance of the learner. This has become an active area of research, and the aim of this paper was to provide an overview of research conducted on CAML through counting and classifying contributions. The applied method was a systematic mapping study using eight major publication databases.

In everyday life, people seek, evaluate, and use online sources to underpin opinions and make decisions say Elisabeth Mayweg-Paus, Maria Zimmermann, Nguyen-Thinh Le and Niels Pinkwart (Humboldt University of Berlin, Germany) in their article: *A review of technologies for collaborative online information seeking: On the contribution of collaborative argumentation*. They point out that education must promote the acquisition of skills related to seeking online information, and outline technologies that aim to support users when they collaboratively seek online information. They reviewed literature on technologies for collaborative online information seeking. They questioned how the studies considered the role of trust and critical questioning in sourcing of online information, learning processes at play when information seekers engage in collaborative

argumentation, and what affordances are offered by technologies that support users' collaborative seeking of online information.

A. C. Obieniu (Bayelsa Medical University, Nigeria) and F. I. Amadin (University of Benin, Nigeria) then write on: *User acceptance of learning innovation: A structural equation modelling based on the GUAM framework*. Several models have been developed and validated in different contexts to help explain technology acceptance. The authors claim that among these models, UTAUT is the most robust, and influential model in predicting acceptance of information technology by its users. UTAUT was limited by its poor variance on learning innovations but this study proposed and validated a Generic Usability and Acceptance Model (GUAM) with a view to measure behavioural intention in accepting and using learning innovations. GUAM incorporates four constructs: user expectancy, institutional supports, social influence, and perceived system expectations.

Francislaine Aparecida dos Reis Lívero, Gustavo Ratti da Silva, Eduarda Carolina Amaral, Amanda Nascimento Vasques de Souza, Irineia Paulina Baretta and Maria Elena Martins Diegues (Paranaense University, Umuarama, Brazil), Edson Arpini (State University of Maringá, Maringá, PR, Brazil) and Evellyn Claudia Wietzikowski Lovato (Paranaense University, Umuarama, Brazil) then write on: *Playfulness in the classroom: Gamification favour the learning of pharmacology*. They begin with noting that there has been growing interest in the application of gamification in education – this can be defined as the application of game design elements in learning activities with the aim to motivate students by creating an engaging learning experience that can keep them focused on learning tasks in the classroom. The reported study presents eleven gamification activities for teaching pharmacology in a medical course.

Cloud computing and semantic web technologies for ubiquitous management of smart cities-related competences from Omiros Iatrellis (University of Thessaly, Larissa, Greece), Theodor Panagiotakopoulos (Hellenic Open University, Patras, Greece), Vassilis C. Gerogiannis (University of Thessaly, Larissa, Greece), Panos Fitsilis (University of Thessaly, Larissa, Greece) and Achilles Kameas (Hellenic Open University, Patras, Greece) argues that one of the biggest challenges in building sustainable smart cities of the future is skill management and development. As developing digital skills of the municipalities' workforce is crucial for all occupational profiles and specifically for those that are actively involved in the development and operation of digital services for a smart city, this paper presents a semantically enhanced cloud-based IT approach which integrates learning pathways with competence management of personnel working as management and technical employees in a smart city municipality.

A data-driven approach to predict first-year students' academic success in higher education institutions, by Paulo Diniz Gil, Susana da Cruz Martins, Sérgio Moro and Joana Martinho Costa (Instituto Universitário de Lisboa, Portugal) analysed a dataset of ten academic years for first-year bachelor's degrees from a Portuguese Higher Institution. They found a set of features, encompassing socio-demographic, social origin, previous education, special statutes and educational path dimensions as being appropriate here. They proposed and tested three distinct course stage data models based on entrance date, end of the first and second

curricular semesters and found a support vector machines (SVM) model achieved the best overall performance and was selected to conduct a data-based sensitivity analysis.

Despite a large increase in enrolments of students in online courses at the K-12 level, there has been very little research on use of differentiation in fully online ('virtual') schools, say Dennis Beck and Jennifer Beasley (University of Arkansas, USA) in their article: *Identifying the differentiation practices of virtual school teachers*. This study asked virtual teachers from two different types of schools to discuss their differentiation practices and compared practices of teachers across these schools. Results showed that the large majority of teacher comments about differentiation definitions, assessments, curriculum, grouping and strategies fell in the novice category, and that newer virtual school teachers may struggle in developing skills in differentiation in an online environment.

Automated question generation is a task to generate questions from structured or unstructured data and this is explained in: *Question generation model based on key-phrase, context-free grammar, and Bloom's taxonomy* by Bambang Dwi Wijanarko and Yaya Heryadi (Bina Nusantara University, Jakarta, Indonesia), Hapnes Toba (Maranatha Christian University, Bandung, Indonesia) and Widodo Budiharto (Bina Nusantara University, Jakarta, Indonesia). This paper reports on the development of a question generation framework based on key-phrase method for online learning with a constraint that the generated questions should comply with the learning outcomes and skills from Bloom's Taxonomy. Their results indicate that not only are generated questions well understood and agreed by reviewers, but that they are also relevant to the expected Bloom's Taxonomy level for questions that can be delivered to students.

Evaluation of course outcome attainment of engineering course with traditional, blended and flipped classroom approaches by C. M. Vivek (Periyar Maniammai Institute of Science and Technology, Vallam, India) and P. Ramkumar (Kalasalingam Academy of Research and Education, Virudhunagar, India) points out that with development in technologies in educational and industrial sectors, students are facing strenuous competition. For assuring the learners attainment of cognitive, psychometric and affective levels, Kalasalingam Academy of Research and Education uses Outcome Based Education (OBE) measures in every aspect of assessment done by the students. In this paper a methodological evaluation is done on course outcomes of student learning.

Ricardo Borges Viana and Alex Vito Santos Neves-Silva (Universidade Federal de Goiás, Brazil), Douglas Assis Teles Santos (Universidade Federal de Goiás, Brazil) and Universidade do Estado da Bahia, Teixeira de Freitas, Brazil), Rodrigo Luiz Vancini (Universidade Federal do Espírito Santo, Brazil), Marília Santos Andrade (Universidade Federal de São Paulo, Brazil), Cauê Vazquez La Scala Teixeira (Universidade Federal de São Paulo, Brazil) and Claudio Andre Barbosa de Lira (Universidade Federal de Goiás, Brazil) next offer a paper on: *The usage of, and confidence in, social media as study sources among undergraduate students: A cross-sectional survey comparing it with traditional study sources*. Their purpose was to profile this usage for academic purposes among undergraduate students and to compare the level of usage of, and confidence in social media with other study sources. Social

media showed widespread usage as study sources, despite the lower level of confidence attributed to them.

The effect of virtual learning environments designed according to problem-based learning approach to students' success, problem-solving skills, and motivations describes the effects of these specific environments on students' academic success. This was investigated by Seda Akti Aslan (Ministry of Education, Elazığ, Turkey) and Kemal Duruhan (İnönü University, Malatya, Turkey). The study group of the pre-test-post-test control group research involved students in 7th grade secondary school. It was found that according to the last tests of the experimental and control groups, the virtual learning environment design based on a problem-based learning approach was more efficient in increasing academic success and problem-solving skills of the experimental group students when compared to the control group.

R. A. Crane and S. Comley (University of Exeter, Cornwall, UK) then write on: *Influence of social learning on the completion rate of massive online open courses*. They claim that Massive Open Online Courses (MOOCs) are now well-established as a highly effective, flexible and large participation capacity distance learning tool, but that they still suffer from significant student non-completion. Various theories have been proposed but we still lack a comprehensive understanding of why such attrition occurs. They investigated whether "Social Learners" (those which comment on MOOC forums) exhibit differential non-completion than "Non-Social Learners" and comment that results suggest that whilst Social Learners are in the minority Social Learning is an important tool to prevent student attrition.

Personalized tutoring through a stereotype student model incorporating a hybrid learning style instrument is a paper from Christos Troussas, Konstantina Chrysa-fiadi and Maria Virvou (University of Piraeus, Greece). Personalised computer-based tutoring demands learning systems and applications that identify and keep personal characteristics and features for each individual learner and this is achieved by the technology of student modelling. In their paper they present a stereotype student model that combines the Visual, Auditory, Reading/Writing and Kinesthetic (VARK) learning style model and the Herrmann Brain Dominance Instrument (HBDI). The aim of their article is to further enhance the personalisation to students' needs and preferences by introducing this hybrid instrument and using the technology of stereotypes.

E-learning environments can store huge amounts of data on the interaction of learners with content, assessment and discussion, point out Muhittin Şahin (Ege University, İzmir, Turkey), Aydın Ulucan and Halil Yurdugül (Hacettepe University, Ankara, Turkey) in their article: *Learner classification based on interaction data in E-learning environments: the ELECTRE TRI method*. They argue that after identification of meaningful patterns or learning behaviour in the data, it is necessary to use these patterns to improve learning environments and designs to benefit from how these patterns have been developed, particularly with the use of educational data mining and learning analytics. Their study sought to discover patterns in the interaction data gathered from e-learning environments.

Muhammet Arican (Kırşehir Ahi Evran University, Kırşehir, Turkey) and Bilal Özçakır (Alanya Alaaddin Keykubat University, Alanya, Turkey) then present: *Facilitating the development of Preservice teachers' proportional reasoning in*

geometric similarity problems using augmented reality activities. The literature reports preservice teachers' overuse of proportionality when solving these problems with non-proportional relationships. Changing this type of error is reported as difficult even after applying certain interventions. As a potential solution, this study used augmented reality activities to facilitate the development of preservice mathematics teachers' proportional reasoning.

Fear of missing out (FoMO) among undergraduate students in relation to attention distraction and learning disengagement in lectures by Suad A. A. Al-Furaih (Kuwait University, State of Kuwait) and Hamed M. Al-Awidi (Kuwait University, State of Kuwait and Middle East University, Amman, Jordan) investigates the level of a relatively new phenomenon: Fear of Missing Out (FoMO), demonstrated by smartphone use during lectures among undergraduate students at Kuwait University. Fear of missing out describes the situation where a student cannot resist using their smartphone during lectures because of their desire not to miss anything that is happening, especially on social media. The study sought to investigate whether FoMO was a predictor for attention distraction and learning disengagement among the students. They suggest some practical policies for higher education faculty members to lessen the negative outcomes of smartphone use and promote responsible use of smartphones in the classroom.

Cloud computing technology is considered pivotal for the success of any business or organisation say Jewan Singh (AMET University, ECR Kanathur, Chennai, India and Jammu and Kashmir Government, India), Vibhakar Mansotra (University of Jammu, India), Shabir Ahmad Mir (Jammu and Kashmir Government, India and SKUAST of Kashmir, Srinagar, India) and Shahzada Parveen (A.A.A Memorial, Government Degree College Bemina, Srinagar, Kashmir, India). Their article: *Cloud feasibility and adoption strategy for the INDIAN school education system* suggests that this technology is not just an infrastructure used to implement various strategies, but that it makes new emerging strategies possible. To embrace this emerging technology, challenges and uncertainties about expected economic, technical and operational feasibility, and related security, privacy and regulatory concerns, successful transition from planning to design and implementation, as well as its overall impact on the individual organisation, needs to be estimated or identified.

The last article in this issue: *Employing blended learning to enhance learners' English conversation: A preliminary study of teaching with Hitutor* comes from Chunying Wang (Lunghwa University of Science and Technology, Taiwan, Republic of China). The article points out that Taiwanese learners find it hard to communicate with others in English in their daily lives because of living in an EFL environment. ICT and blended learning have recently been recognised as being beneficial to English learners who live in a non-English speaking country, due to formation of a virtual native-like setting based on online learning. The described research aimed to assess whether teaching English conversation in both online and offline settings can improve learners' communicative performance as well as feedback from both instructors and learners. Hitutor was employed in this study to design a blended English conversation course and demonstrate its positive effect.

This issue contains articles from researchers in the following countries: Bosnia and Herzegovina, Brazil, Chile, China, Cyprus, Ecuador, Fiji, Germany, Greece,

India, Indonesia, Iran, Israel, Jordan, Kuwait, Malaysia, Nigeria, Palestine, Philippines, Portugal, Saudi Arabia, Singapore, Spain, Taiwan (Republic of China), Thailand, Turkey, UAE, UK, USA.

Arthur Tatnall

Editor-in-Chief

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