Editorial for EAIT issue 1, 2022

Arthur Tatnall¹

Accepted: 13 January 2022 / Published online: 14 January 2022

© The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2022

Education and Information Technologies (EAIT) is a research journal that covers the complex relationships between Information and Communication Technologies and Education. EAIT is the official journal of the International Federation for Information Processing (IFIP), Technical Committee on Education (TC3).

Because of the journals' increasing popularity, Springer has decided to increase the number of issues per year from six to nine this year. This is thus Issue 1 of nine issues for 2022.

1 Special sections

In addition to regular articles, this issue of the journal includes two special sections:

- Education, IT, and the COVID-19 Pandemic (- remainder of articles not included in November issue)

Guest edited by: Faten Saad Mahmoud Abdel-Hameed, Łukasz Tomczyk and Chenglie Hu

- The frontiers of augmented and mixed reality in all levels of education

Guest edited by: Ford Lumban Gaol and Ekaterina Prasolova-Førland

2 Education, IT, and the COVID-19 pandemic

A special issue on this topic was published in November 2021. This being a very important topic, unfortunately there were too many high-quality accepted articles to fit into a single issue and so the remainder are included in this issue. You should read those in the November issue and those in this issue as if they were a single

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

¹ Victoria University, Melbourne, Australia

issue. The following paragraph about this topic was published in the editorial of the November issue of the journal:

Since the mid-March of 2020 when the World Health Organization declared COVID-19 a pandemic, the world has been fighting the virus for well over a year. Although much progress has also been made in vaccination and medical therapeutics, much of the world is still battling more deadly COVID-19 variants. Meanwhile, education systems in every country have experienced unprecedented challenges in delivering education through remote or online means at all levels of learning. Educators around the world have been resilient and creative in finding ways to teach classes and make learning happen by overcoming not only the difficult circumstances they encountered due to the pandemic, but also the limitation of local education and information technology infrastructures. This Special Issue of the Journal of Education and Information Technology is devoted to research studies that were based on what educators had experienced during the first eight months of the pandemic.

3 The frontiers of augmented and mixed reality in all levels of education

Augmented Reality systems incorporate information into the user's real surroundings, creating the illusion that the information exists there. It is the process of fusing pictures from the actual world with virtual layers of information made up of three-dimensional (3-D) models including content, photos, sounds, and videos. This special section looks at Augmented Reality applications related to education.

4 Regular articles

Effect of coding activities on preschool children's mathematical reasoning skills by Büşra Somuncu (Department of Early Childhood Education, Anadolu University, Eskişehir, Turkey) and Durmuş Aslan (Department of Early Childhood Education, Cukurova University, Adana, Turkey). In the reported study, a pre-test – post-test control group quasi-experimental design was used, with participants being 29 children (in experiment and control groups) aged between 57 and 68 months and attending a public kindergarten in Adana, Turkey. The Coding Education Program, prepared by the researchers, was administered to the children in the experiment group while the children in the control group received the regular program. Evaluation Instrument for the Early Mathematical Reasoning Skills was administered to children both in the experimental and control group as pre-test and post-test, and data was collected by individual interviews conducted with the children. Results of the study showed that there is no significant difference between the groups in the pre-test, whereas a significant difference in favour of the experimental group was observed in the post-test. It was thus determined that the coding activities have a significant effect on mathematical reasoning skills of children.

Gamification refers to the use of game-design elements or mechanisms in non-game contexts to promote the expected behaviours, and Zhanni Luo (School of Educational Studies and Leadership, University of Canterbury, New Zealand) writes on this in: *Gamification for educational purposes: What are the factors contributing to varied effectiveness?* Empirical studies have reported mixed results on the effectiveness of gamification in educational practices. The author examined 44 articles on this topic, looking at three issues: how effective the educational gamification implementations were in previous empirical studies, how the effectiveness has been measured, and what factors contribute to varied effectiveness results. One significant output of the current study is the redefinition of two terms: game elements and gamification mechanisms.

Determinants of instructors' educational ICT use in Ethiopian higher education was contributed by Bekalu Ferede and Jan Elen (Centre for Instructional Psychology and Technology, Faculty of Psychology and Educational Sciences, KU Leuven, Belgium), Wim Van Petegem (Faculty of Engineering Technology, KU Leuven, Belgium), Adula Bekele (College of Education and Behavioral Sciences, Jimma University, Ethiopia) and Katie Goeman (Faculty of Economics and Business, KU Leuven, Brussels, Belgium). They note that ICT can address concerns about access and quality of higher education in developing countries like Ethiopia, and this has become more evident than ever during the COVID-19 crisis. Despite this, evidence about the educational use of ICT in developing countries is scarce as many previous studies on determinants of educational ICT focus on higher education in developed countries, while it remains unclear whether existing models explain ICT use by instructors in developing countries. Their study reports the findings of a qualitative study conducted in three public universities of Ethiopia to elaborate determinants of instructors' educational use of ICT. The article presents a conceptual framework of factors that explain instructors' ICT use based on literature, and on empirical evidence collected from instructors, it assesses their experiences and opinions in relation to the proposed framework components.

The next paper reports on a study which designed and developed a multi-fingered haptic interface in conjunction with a three-dimensional virtual model of a section of the cell membrane in order to enable students to work collaboratively to learn cell biology. *Haptic-enabled collaborative learning in virtual reality for schools* is by Mary Webb and Megan Tracey (School of Education, Communication and Society, King's College London, UK), William Harwin, Ozan Tokatli and Faustina Hwang (School of Biological Sciences, University of Reading, Reading, UK), Ros Johnson (The Abbey, Reading, UK) and Natasha Barrett and Chris Jones (School of Biological Sciences, University of Reading, Reading, UK). It investigated whether the addition of haptic feedback to the 3D virtual reality (VR) simulation affected learning of key concepts in nanoscale cell biology for students aged 12 to 13. The haptic interface was designed so that the haptic feedback could be turned on or switched off. Students (N=64), in two secondary schools, worked in pairs, on activities designed to support learning of specific difficult concepts. Findings from observation of the activities and interviews revealed that students believed that being immersed in the 3D VR environment and being able to feel structures and movements within the model and work collaboratively assisted their learning.

With the increased reliance on technology, computer programming has emerged as an essential skill that is interesting to many audiences beyond just computer scientists. Abdallah Mohamed (Department of Computer Science, University of British Columbia-Okanagan, Kelowna, Canada) then addresses: *Teaching highly mixed-ability CSI classes: A proposed approach*. Many students from various disciplines take first-year computer science courses, leading to classrooms diversity in student motivation, backgrounds, learning needs, and educational levels. The article aimed to: present a flipped-based approach that benefits from the mixed-ability nature of first-year programming courses rather than considering it as a burden, and to present a study that evaluates the extent to which the proposed approach enhances student learning in such a mixed-ability environment.

The strengths and weaknesses of user-generated microgames for assisting learning by Imam Fitri Rahmadi (Universitas Pamulang, Tangerang Selatan, Indonesia), Tony Houghton and Zsolt Lavicza (Johannes Kepler Universität Linz, Austria), Selay Arkün Kocadere (Hacettepe University, Ankara, Turkey) and Markus Hohenwarter (Johannes Kepler Universität Linz, Austria) points out that recent developments in educational technology have led to a renewed interest in the utilisation of user-generated microgames for facilitating learning. The advantages and disadvantages of microgames which have been voluntarily created, modified, shared and used by users on open learning platforms to support learning are not yet clearly understood. This study explores the strengths and weaknesses of user-generated microgames for assisting learning followed with some recommendations for the development and effective use of microgames from elementary teacher perspectives. The exploratory research was conducted within the GeoGebra application with the participation of elementary school teachers from Indonesia.

Erman Çakıt and Metin Dağdeviren (Department of Industrial Engineering, Gazi University, Ankara, Turkey) then offer: *Predicting the percentage of student placement: A comparative study of machine learning algorithms*. They note that in recent years, there has been an increase in the demand for higher education in Turkey, where the demand, as in most other countries, exceeds what is available. The purpose of their research was to develop machine learning algorithms for predicting the percentage of student placement based on the data related to the university's academic reputation, opportunities of the city where the university is located, facilities and cultural opportunities of the university. The authors claim that prediction and sensitivity analysis results obtained in this study can be used in many different ways, such as determining the quotas for universities, allocating resources, and making new regulations.

The effect of the e-mentoring-based education program on professional development of preschool teachers was presented by: Serap Erdoğan (Faculty of Education, Early Childhood Education Program, Anadolu University, Yunus Emre Campus, Eskişehir, Turkey), Gelengül Haktanır (Faculty of Education, Early Childhood Education Program, Ankara University, Cebeci Campus, Ankara, Turkey), Nalan Kuru (Faculty of Education, Early Childhood Education Program, Uludağ University, Gorukle Campus, Bursa, Turkey), Nurbanu Parpuç (Faculty of Education, Early Childhood Education Program, Anadolu University, Yunus Emre Campus, Eskişehir, Turkey) and Demet Koç Tüylü (Faculty of Education, Early Childhood

Education Program, Ankara University, Cebeci Campus, Ankara, Turkey). They argue that the qualifications of a preschool teacher is one of the important factors that determine the quality of preschool education, and to increase the quality in education, teachers should be equipped with the necessary knowledge starting from pre-service training, and in-service training should support the upgrading of their knowledge. Their study was to develop an e-Mentoring-Based Education Program (e-MENTE:PT) for preschool teachers and to test its effectiveness on their professional development during the in-service support period. The research concluded that the e-MENTE:PT program supported preschool teachers' professional knowledge, learning environments and classroom applications, and an e-mentoring based teaching management system was effective on professional development.

The next article was contributed by Daniel B. le Roux and Douglas A. Parry (Department of Information Science, Stellenbosch University, Stellenbosch, South Africa): *An exploratory investigation of the use and effects of academic instant messaging groups among university students*. The use of instant messaging groups for various academic purposes is rising, and this study investigated the use purposes and outcomes of three types of academic instant messaging groups or AIMGs. Formal AIMGs are created and managed by teaching staff, class AIMGs are created by students and joined by all members of a particular class, and study AIMGs are smaller groups created by students that know each other personally or collaborate in group assignments. Their findings indicate that, at the institution where data were collected, high rates of AIMG participation is the norm, with class AIMGs emerging as particularly popular.

Motivation theory is indispensable when discussing processes of learning say Rui Leitão (School of Design and Creative Arts, Loughborough University, Leicestershire, UK and Interdisciplinary Centre of Marine and Environmental Research, University of Porto, Portugal), Martin Maguire (School of Design and Creative Arts, Loughborough University, Leicestershire, UK), Sarah Turner (Centre for Academic Practice, Loughborough University, Leicestershire, UK) and Laura Guimarães (Interdisciplinary Centre of Marine and Environmental Research (CIIMAR), University of Porto, Portugal) in their article: *A systematic evaluation of game elements effects on students' motivation*. They argue that learners who are motivated can learn almost everything, and that student motivation is probably one of the most important factors for teacher effectiveness both for engagement in the learning process and high academic performance. The main aims of their reported work were: to understand through a systematic evaluation, how game elements affect the different motivation layers; and to compare them in terms of enhancing the motivation to recycle among secondary school students (11–14 years).

Critical success factors for improving learning management systems diffusion in KSA HEIs: An ISM approach is an article by Yousef Alduraywish, John Patsavelas and Konstantinos Salonitis (School of Aerospace, Transport and Manufacturing, Cranfield University, UK). This paper aims to develop the relationships among success factors typically found in learning management systems (LMS), as well as the human and organisational aspects using an interpretive structural modelling (ISM) approach for LMS diffusion in HEIs in the Kingdom of Saudi Arabia (KSA). A key finding of the modelling is that clearly defined information technology policies along

with appropriate technology infrastructure are significant factors for facilitating the technology aspect of LMS implementation. It is suggested that future research be targeted to develop the initial model through ISM for success factors for improving LMS implementation.

Jazlin Ebenezer (College of Education, Wayne State University, Detroit, USA), Jirarat Sitthiworachart (Faculty of Industrial Education and Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand) and Kew Si Na (Faculty of Social Sciences and Humanities, Universiti Teknologi Malaysia, Skudai, Malaysia) then offer: *Architecture students' conceptions, experiences, perceptions, and feelings of learning technology use: Phenomenography as an assessment tool*. The primary purpose of this phenomenographic qualitative study was to identify a group of second-year undergraduate architecture students' conceptions of learning technology use. The secondary purpose was to examine students' learning experiences, perceptions, and feelings of technology use in an education course. The study implies phenomenography can be used as an assessment tool to identify students' conceptions and characterize their structural aspects, which may be used as curriculum frameworks to design content that moves architecture students from the periphery to the core of the subject.

Ana Garcez (University of Beira Interior, Estrada do Sineiro, Portugal), Ricardo Silva (Universidade Federal da Paraíba, Cidade Universitária, João Pessoa, Brazil) and Mário Franco (CEFAGE-UBI Research Center, University of Beira Interior, Portugal) next present: *Digital transformation shaping structural pillars for academic entrepreneurship: A framework proposal and research agenda*. They point out that digital technology always accelerates change, altering organisations culturally, socially, and technically, and these modifications are known as “digital transformation” (DT). On a much greater scale than DT, the world was changed in 2020 by the COVID-19 pandemic, which re-organised society in the way of thinking, acting, producing, consuming and creating new business. This study proposes a framework showing the structural pillars of the link between digital transformation (DT) and academic entrepreneurship (AC) (DT-AC Framework) which identifies the new patterns, methods, skills and other discoveries in aspects such as management, information systems and culture sciences.

Brain-imaging techniques in educational technologies: A systematic literature review is offered by Kamilla Tenório, Emanuel Pereira, Sterfanno Remigio and Derecky Costa (Center of Excellence for Social Technologies—Computing Institute, Federal University of Alagoas, Brazil), Wilk Oliveira (Center of Excellence for Social Technologies—Computing Institute, Federal University of Alagoas, Brazil and Department of Computing Systems, Institute of Mathematics and Computational Sciences, University of São Paulo, Brazil), Diego Dermeval (Center of Excellence for Social Technologies—Computing Institute, Federal University of Alagoas, Brazil and Faculty of Medicine, Federal University of Alagoas, Brazil), Alan Pedro da Silva and Ig Ibert Bittencourt (Center of Excellence for Social Technologies—Computing Institute, Federal University of Alagoas, Brazil) and Leonardo Brandão Marques (Center of Excellence for Social Technologies, Education Center, Federal University of Alagoas, Brazil). They argue that recent studies are increasingly using brain-imaging techniques in the technology-enhanced learning (TEL) context to

understand students' cognitive processes during technology-assisted learning, with the ultimate goal to improve students' outcomes in these environments. Their article presents a systematic literature review to perform a rigorous study of literature to investigate, analyse, and understand how brain-imaging techniques have been applied in technology-enhanced learning contexts.

Higher education institutes are continuously exploiting technology to improve the delivery of courses, say Munil Shiva Goundar and Bimal Aklesh Kumar (Department of Computer Science and Information Systems, Fiji National University, Suva, Fiji) in their article: *The use of mobile learning applications in higher education institutes*. This paper reviews the use of mobile learning applications in higher education institutes and identifies publication trends and types of mobile learning applications used. It categorises the research papers published. The findings of this mapping study showed an increased research interest in the field and a variety of mobile learning applications used – learning management, vodcast and podcast, game-based learning, collaborative learning, and language learning applications.

Patrony: A mobile application for pattern recognition learning by María Lucia Barrón-Estrada, Ramón Zatarain-Cabada and Jorge Abraham Romero-Polo (Tecnológico Nacional de México, Instituto Tecnológico de Culiacán, Mexico) and Julieta Noguez Monroy (Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM), Mexico) argues that pattern recognition is an important skill of computational thinking and is one of the most important competences for solving a problem that involves finding similarities or patterns in small problems to solve more complex ones. In this article, they present the mobile application software Patrony with the aim to use this to promote the learning of Computational Thinking, especially pattern recognition, in specific sectors of education in Mexico. The results of tests showed that learning gain of students who used this mobile application shows a significant difference with respect to students who learned using a traditional method of classroom teaching.

Md Abdullah Al Mamun (Department of Technical and Vocational Education, Islamic University of Technology, Bangladesh), Md Abul Kalam Azad and Md Abdullah Al Mamun (Department of Business and Technology Management, Islamic University of Technology, Bangladesh) and Michael Boyle (The University of Queensland, Australia) next present: *Review of flipped learning in engineering education: Scientific mapping and research horizon*. They point out that the COVID-19 pandemic made flipped learning more relevant to address the challenges of remote learning. This study aimed to objectively map the conceptual, intellectual, and social structure of research development in flipped learning using a bibliometric review method. Their findings revealed that flipped learning in engineering education is a relatively new field of research and in recent time has grown exponentially.

Benjy Marks and Jacqueline Thomas (School of Civil Engineering, The University of Sydney, Darlingtown, NSW, Australia) then write on *Adoption of virtual reality technology in higher education: An evaluation of five teaching semesters in a purpose-designed laboratory*. They point out that virtual and augmented (VAR) technology can facilitate immersive learning in environments that are not usually physically accessible to students via 3D models and interactive 360° videos, but that this is in the early stages of being adopted as a teaching platform in higher education.

In this study, a purpose-designed virtual reality laboratory was formed in 2017 at The University of Sydney, and an evaluation conducted on the design, costs, rates of teaching adoption and student experiences over five teaching periods (2.5 years).

The following article by Alaattin Parlakkiliç (Management Information Systems, Faculty of Economics and Administrative Sciences, Ufuk University, Ankara, Turkey) investigates how responsive design allows users to benefit from a web page without having to worry about screen size and resolution: *Evaluating the effects of responsive design on the usability of academic websites in the pandemic*. Results showed that 99% of university students had smart phones, used smart phones to connect to the internet and that their attitudes towards responsive design did not differ according to gender. Students in the 24–26 age group had more desire to use responsive design.

The final regular article in this issue is: *Exploring the relationship between students' learning satisfaction and self-efficacy during the emergency transition to remote learning amid the coronavirus pandemic: A cross-sectional study*. The authors were: Monira I. Aldhahi (Department of Rehabilitation Sciences, College of Health and Rehabilitation Sciences, Princess Nourah Bint Abdulrahman University, Riyadh, Kingdom of Saudi Arabia), Abdulfattah S. Alqahtani (Department of Rehabilitation Sciences, College of Applied Medical Sciences, King Saud University, Riyadh, Kingdom of Saudi Arabia), Baian A. Baattaiah (Department of Physical Therapy, Faculty of Medical Rehabilitation Sciences, King Abdulaziz University, Jeddah, Kingdom of Saudi Arabia) and Huda I. Al-Mohammed (Department of Radiological Sciences, College of Health and Rehabilitation Sciences, Princess Nourah Bint Abdulrahman University, Kingdom of Saudi Arabia). The objective of this study was to assess learning satisfaction among students and to determine whether online-learning self-efficacy was associated with online learning satisfaction during the emergency transition to remote learning. This cross-sectional study involved a survey distributed to 22 Saudi Arabian universities. The survey used in this study consisted of an online learning self-efficacy (OLSE) questionnaire and an electronic learning (e-learning) satisfaction questionnaire. The findings revealed degrees of satisfaction ranging between high satisfaction and dissatisfaction. High satisfaction was positively correlated with the OLSE domains: time management, technology, and learning. The study concluded that students' satisfaction with the e-learning experience is influenced by e-learning self-efficacy.

Articles in this issue come from researchers in: Algeria, Australia, Austria, Bangladesh, Belgium, Brazil, Brunei Darussalam, Canada, Cyprus, Ethiopia, Fiji, Finland, Germany, Greece, Hong Kong – China, India, Indonesia, Iran, Ireland, Israel, Italy, Japan, Malaysia, Mexico, New Zealand, Norway, Oman, Portugal, Saudi Arabia, South Africa, South Korea, Spain, Taiwan, Thailand. Turkey, UAE, UK, and USA.

Dedicated, professional reviewers are an essential part of any research journal and EAIT is fortunate to have some excellent reviewers. We do, however, have a problem. We do not have enough reviewers! In 2021 we had 2,583 submissions to the journal (352 articles were published). This means a huge effort for our present number of 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.

Arthur Tatnall

Editor-in-Chief

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.