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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).

The journal is embedded in the research and practice of professionals and is accepted into the Social Science Citation Index (SSCI) in the category 'Education & Educational Research', with an Impact Factor (2021) of 3.666. EAIT is now in the top quartile (Q1) of journals in Education & Educational Research.

To begin this issue, Majuto Clement Manyilizu (The University of Dodoma, Tanzania) writes that science subjects at pre-tertiary and tertiary education levels are important for socio-economic and industrial development of any country, but it can be difficult for students to construct their concepts. This research assesses the effectiveness of paper-based practical against virtual laboratory experiences towards improvement of real, hands-on, chemistry practical in Tanzanian secondary schools, focusing on the Dodoma region.

The significance of the English language, and the number of English speakers, are increasing around the world. Monther M. Elaish (University of Benghazi, Libya), Mahmood H Hussein (University of Malaya, Kuala Lumpur, Malaysia) and Gwo-Jen Hwang (National Taiwan University of Science and Technology, Taipei, Taiwan and Yuan Ze University, Taoyuan, Taiwan) write on how Mobile Learning (M-Learning) has been recognized as a promising approach to enhance students' competencies and skills in the English language. Their study performed a review of the top 100 most cited articles, published between 2007 and 2020, indexed by the Web of Science, and addressing the English language only. The results revealed that most research in Mobile English Language Learning followed an experimental design and employed a single mobile learning implementation.

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Cahit Erdem (Afyon Kocatepe University, Afyonkarahisar, Turkey), Eylem Oruç (Bilecik Şeyh Edebali University, Bilecik, Turkey), Cihat Atar (Sakarya University, Sakarya, Turkey) and Hakkı Bağcı (Sakarya University, Sakarya, Turkey) next present their research on digital literacy, media literacy and digital citizenship. Their paper examines the effect of media literacy on digital citizenship, and how their research tested the mediating role of digital literacy in this relationship. They point out that although media literacy is a critical component for digital citizenship, the nature of this relationship and the role of other mediating variables such as digital literacy are not empirically tested in various contexts.

The next study conducted a scoping review of publications in mobile Computer-Supported Collaborative Learning for mathematics, with papers published between 2007 and 2021. It is the work of Rex P. Bringula (Ateneo de Manila University, Quezon City, Philippines) and Francis Arlando L. Atienza (National University, Manila, Philippines). Intending to improve mathematics pedagogy, the two most popular math mCSCL contents were general elementary mathematics and geometry. The review also revealed that math mCSCL benefited elementary students the most.

Artificial Intelligence (AI) has become an important technology affecting the development of society and education. Shaofeng Wang (Zhejiang Wanli University, Ningbo, China and Beijing Normal University, China), Zhuo Sun (Beijing Normal University, China) and Ying Chen (Beijing Normal University, China) point out that it is important to explore AI to enhance students' creativity and learning performance. Their research proposes a model and hypothesis based on the resource-based theory and related research. This study focuses on AI applications within a higher education institute and confirms the new explanatory power of resource-based theory in technological practices. It deconstructs the intrinsic mechanics, especially in relationships between students' creativity, self-efficacy, and learning performance.

Eric S. Belt (University of Maryland Baltimore, USA) and Patrick R. Lowenthal (Boise State University, USA) then write on online learning and video-based communication. They note that up to now online instructors have primarily, if not solely, used asynchronous text-based communication to interact and communicate with students in online courses, but that online instructors and students have expressed concerns and limitations with asynchronous communication. The purpose of this study was to explore instructors' experiences and perceptions of synchronous communication technology.

Lifelong learning has gained an important place in the agendas of national and international organizations and the education policies of countries with globalization and digitalization in education, say Rabia Vezne and Etem Yeşilyurt (Akdeniz University, Antalya, Turkey) in their article that follows. This study analyses the effect of web pedagogical content knowledge, attitude towards web-based instruction, and usage of information searching-commitment strategies in a web environment on lifelong learning tendency and their explaining ratio. For this, eight hypotheses were developed, and four scales were used to collect data: web pedagogical content knowledge, attitude towards web-based instruction, usage of information searching-commitment strategies in a web environment, and lifelong learning tendency.

Learning to be tolerant is important in multiethnic societies, point out Laura Helena PorrasHernández (Universidad de Las Américas Puebla, Puebla, México) and

María de Lourdes NavarroHernández (Colegio Los Sauces A.C., Puebla, México). Based on the premise that tolerance is built through dialogue and that much informal learning takes place in social media, this paper explores the reactions of young people when they receive racist memes through social media, and how they dare to express their opinions. To do this, responses of undergraduate students to messages presented in print and Facebook were compared using quantitative and qualitative techniques.

Yusuf Islam Bolat (Kahramanmaraş İstiklal University, Kahramanmaraş, Turkey) and Nurullah Taş (Atatürk University, Erzurum, Turkey) then look at how Gamifed-Assessment Tools (GAT) affect student academic achievement. They used PRISMA systematic procedures to screen articles across Web of Science, ERIC, Scopus, Pubmed, and PsycArticles databases and identified independent results from primary studies with academic achievement outcomes using GAT in formal educational settings. They also examined the learner stage, learning domain, sync type of assessment tools, research design, and assessment tool as moderators in which GAT may be effective.

While many theories have been developed to study people's technology usage, the plurality of perspectives offered are complex to navigate due to the diverse range of problems and topics addressed and the varied theoretical foundations used, and Suzanne Sackstein (University of Pretoria, South Africa and University of the Witwatersrand, Johannesburg, South Africa), Machdel Matthee and Lizette Weilbach (University of Pretoria, South Africa) address this in the next article. Their paper is aimed at assisting and guiding researchers with this problem.

Due to the impact of the recent pandemic, the teaching and learning experience worldwide was marked by a wave of emergency digitalization, say Margarida Lucas (Universidade de Aveiro, Portugal) and Paulo Nuno Vicente (Universidade Nova de Lisboa, Portugal) in the next article. The sudden need to transition to online teaching and learning (OTL) has forced Higher Education actors to adapt quickly without proper planning, so this study examines teachers' perceptions of the benefits and challenges posed by OTL in Higher Education during the pandemic. While the main benefits perceived by teachers relate to flexibility (in tasks execution), accessibility, pedagogical innovation, and self-regulation, key challenges emerge in domains such as engagement, interaction, infrastructure/ technical support, assessment and pedagogical practice.

The generation of examination questions from extensive text material is challenging and complicated. This study's motivation was to propose a pipeline that could provide new questions from a given text corpus that could be retrieved from a particular input. These generated questions could be incorporated into a question recommender while being automatically classified under the specific cognitive domain under the Bloom's taxonomy. The study is by Harsh Sharma, Rohan Mathur, Tejas Chintala, Samiappan Dhanalakshmi and Ramalingam Senthil (SRM Institute of Science and Technology, Chennai, India), who concluded that the pipeline is effective and significant in generating questions.

Özgür Anil (National Defence University, Ankara, Turkey) and Veli Batdi (Gaziantep University, Turkey) next write about Augmented Reality (AR) in science education. Their research encompasses an examination of AR applications in Science Education using the Multi-complementary Approach (McA). This incorporates

multiple analyses: pre-complementary is meta-analysis and meta-thematic analysis, post-complementary with an experimental design with a pre- and post-test control group, and complementary which merges the results of the first two stages making it possible to work through the effectiveness of AR in science education more comprehensively and from a wider perspective.

The next article is from China and was contributed by: Xin An (Beijing Normal University, China), Ching Sing Chai (Chinese University of Hong Kong, China), Yushun Li (Beijing Normal University, China and Engineering Research Center for E-learning and Lifelong Learning of Ministry of Education of the People's Republic of China, Beijing, China), Ying Zhou (Beijing Normal University, China), Xi Shen (Beijing Normal University, China), Chunping Zheng (Beijing University of Posts and Telecommunications, China) and Mengyuan Chen (Beijing Normal University, Zhuhai, China). They note that Artificial Intelligence (AI) provides new opportunities for K-12 English as foreign language (EFL) teachers to improve their teaching, and their study investigated EFL teachers' perceptions, knowledge, and behavioural intention to use AI to support teaching and learning of English in middle schools. This study combined relevant aspects of the Unified Theory of Acceptance and Use of Technology (UTAUT) and Technological Pedagogical and Content Knowledge (TPACK) as the theoretical basis.

Video clickstream behaviours such as pause, forward, and backward offer great potential for educational data mining and learning analytics since students exhibit a significant amount of these behaviours in online courses, say Ozan Raşit Yürüm (İzmir Institute of Technology, İzmir, Turkey), Tuğba TaşkayaTemizel and Soner Yıldırım (Middle East Technical University, Ankara, Turkey) in the article to follow. The purpose of their study was to investigate the predictive relationship between video clickstream behaviours and students' test performance with two consecutive experiments.

Ming Ouyang (YongZhou Vocational Technical College, Yongzhou, China) then writes on a study to evaluate the effectiveness of introducing digital software in music education to improve academic performance and solfeggio class attendance. Overall, the results showed that ChordIQ is a useful mobile app teaching the user music in an exciting and interactive way. The findings collected can be used to update traditional solfeggio curricula, and conduct scientific studies in the field of interactive music education, as well as create new dedicated software.

Sign language is the natural way of communication for speech and hearing-impaired people, and R. Sreemathy, Mousami Turuk, Isha Kulkarni and Soumya Khurana (Pune Institute of Computer Technology, India) write that using Indian Sign Language (ISL) interpretation system, hearing-impaired people may interact with normal people with the help of Human Computer Interaction (HCI). This paper presents a method for automatic recognition of two-handed signs of Indian Sign language (ISL). The three phases of this work include pre-processing, feature extraction and classification.

During the pandemic period, most universities shifted their curricula into fully distance learning models, and Konstantinos Antonis and Petros Lampsas (University of Thessaly, Lamia, Greece), Ioannis Katsenos (University of Patras, Lamia, Greece), Spyros Papadakis (Hellenic Open University, Patras, Greece) and Stella-Maria Sta-

mouli (University of Thessaly, Lamia, Greece) write on how due to these Emergency Remote Education circumstances, they adopted application of a Flipped Classroom model combined with Team-based Learning pedagogical strategy in four Computer Engineering courses.

Different reasons may hinder education of children with a disability or from vulnerable families, and Teresa Mirian Santamaria-López (Universidad de Guayaquil, Ecuador) and Vicente Gonzalez Ruiz (University of Almeria, España) write on this in the following article. Reasons for this hinderance include living in rural areas where they do not have access to public transport, restriction of opportunities to access schools, precarious economic situations, and lack of minimum services that meet the needs of hygiene and personal care. For this reason, the objective of this study was to build a theoretical base that facilitates an understanding of the requirements of these children in terms of distance education.

Increasing children's access to media has attached greater significance to media literacy education, particularly as its content and methods have changed with media development. A study by Farhad Seraji, Saied Ansari and Muhammad Reza Yousefzadeh Chosarih (Bu – Ali Sina University, Hamedan, Iran) investigated the effects of the Community of Inquiry (CoI) method on media literacy competencies in elementary students.

Lisana Lisana (University of Surabaya, Indonesia) next points out that adopting technology by its intended users is one of the most important contributors to that technology's success, and so the success of mobile learning (ML) depends on the students' acceptance of the method. The reported quantitative research aimed to identify factors that affect switching intention to adopt ML among university students in Indonesia based on migration theory, Push-Pull Mooring (PPM) framework. A theoretical model was developed to examine the determinants that affect students' decision to use ML platforms.

The next research paper continues the tradition of Technological Pedagogical Content Knowledge (TPACK) studies aimed at better understanding the development of pre-service teachers' TPACK. It comes from Teemu Valtonen, Miikka Eriksson, Sirpa Kärkkäinen, Ville Tahvanainen, Anni Turunen, Henriikka Vartiainen, Jari Kukkonen and Erkko Sointu (University of Eastern Finland, Joensuu, Finland). The aim of the study was to show what areas of TPACK pre-service teachers perceived as important and relevant for them, from a teacher training course. The course is not specially designed for mere educational technology, instead the course focuses on biology, using inquiry-based learning activities supported with various technologies.

From Malaysia, Ali Vafaei-Zadeh, Venisri Ganesan, Haniruzila Hanifah, Ai Ping Teoh (Universiti Sains Malaysia, Malaysia, Malaysia) and T. Ramayah (Universiti Sains Malaysia, Sunway University Business School, Universiti Malaysia Sarawak, Universiti Tunku Abdul Rahman (UTAR), Universiti Kebangsaan Malaysia and Universiti Teknologi Mara, Malaysia) then write on an investigation of the factors affecting cyber-entrepreneurial intentions among final-year students of public universities in Malaysia utilizing the Theory of Planned Behavior (TPB) and Theory of Self-Efficacy (TSE). Their results showed that attitude toward entrepreneurship, entrepreneurial creativity, entrepreneurial knowledge, entrepreneurial orientation, entrepreneurial self-efficacy, and opportunity recognition were positively correlated

with cyber-entrepreneurial intentions except for personal innovativeness in technology and subjective norm, which was insignificant.

Next, Laurent Beaudoin and Loïca Avanthey (EPITA Engineering school, France) present an educational reform they implemented a few years ago to respond to a marked drop in the success of students entering higher education in computer science. The main objective of their reform was to adapt the teaching methods of Generation X-Y to Generation Y-Z or more, and to do this, they proposed two approaches. Firstly, to make learning more active, stimulating and empowering, and secondly to make learning more individualized in a context of a large group of students with an optimization of the teacher's time.

Escalator-related injuries are common among metro passengers in urban cities, point out Jen-I Chiu and Mengping Tsuei (National Taipei University of Education, Taiwan). In their study, a motion graphic promoting escalator safety principles was developed and used to investigate college students' behavioural intentions regarding escalator safety, and a unified theory of acceptance and use of technology (UTAUT) model was adopted as the study framework. This study attempted to empirically identify the main factors affecting passengers' attitudes toward escalator safety-related behaviour, and the results have implications for the design of motion graphics for escalator safety education as part of the public service announcements of metro systems.

Simulations, which are very powerful educational tools on their own, enable concretisation of abstract concepts and help students research the variables related to the subject matter of the simulation. Seyhan Eryılmaz Toksoy and Emine Bulut (Recep Tayyip Erdoğan University, Turkey) point out that simulations provide powerful modelling environments that include the interaction processes of physics concepts, bring active participation of students into the learning process and support their learning by doing and living. This research was carried out to answer if simulations with images from everyday life or abstract things yield different results in being more comprehensible, suitable for students' level, more beneficial, more interesting and helping permanent learning.

Individuals learn to develop problem solving strategies and make connections between their mathematical ideas while programming, so they have the opportunity to improve their thinking skills. Semirhan Gökçe and Arzu Aydoğan Yenmez (Niğde Ömer Halisdemir University, Turkey) indicate that scratch provides an environment to experience problem scenarios and encourages them to act out imagination while having fun. The purpose of the study was to investigate the development of reflective thinking skills towards problem solving and computational thinking of elementary school students based on their Scratch instruction. The results of the study revealed that Scratch significantly strengthened students' reflective thinking skills for problem solving and computational thinking.

From Australia, Lesley Andrew, Donna Barwood, Julie Boston, Martin Masek, Lauren Bloomfeld and Amanda Devine (Edith Cowan University, Joondalup, Australia) explore the use of serious games for health promotion with adolescents. They point out that there is significant interest in using games to enhance learning, with 'serious games' being included in classrooms to engage adolescents' learning across a range of domains. In their study, a systematic scoping review of serious games

used for health promotion with adolescents was conducted to identify serious games, review the methods used to evaluate these games, and outline evidence available to support the efficacy of these games in improving knowledge, beliefs/attitudes and behaviours in the target groups.

Research in teaching innovation encourages leveraging the evolution of digital technologies from using the device to learning with the device, which means a change from using information and communicational technologies to learning and knowledge technologies, and Mercedes Marzo-Navarro and Carmen Berné-Manero (University of Zaragoza, Spain) write on this in their article. Nevertheless, although the feasibility of implementing active and interactive methodologies to improve education is widely recognised, more research is needed to obtain evidence on the subjects and contents with the most significant potential for success. The most recent literature claims greater attention to the improvement of transversal skills, as they are critical in the student's professional future. Thus, the main objective of this study was to contribute to the development of immersive learning aimed at improving the cross-cutting skills of university students.

Interests play an essential role in the process of learning, thereby enriching learners' interests leading to an enhanced experience in MOOCs. In this paper the authors, Hajar Zankadi and Abdellah Idrissi (Mohammed V University, Rabat, Morocco), Najima Daoudi and Imane Hilal (Lyrica Labs, Information Science School (ESI), Rabat, Morocco) aim to identify and extract the topical interest from the text content shared by learners on social media to enrich their course preferences in MOOCs. Learners interact freely and spontaneously on social media through different forms of user-generated content which contain hidden information that reveals their real interests and preferences.

Smartphones and computer-based technology have revolutionised different development sectors including education, say Aloys Iyamuremye, Janvier Mukiza, Theophile Nsengimana, Edwige Kampire, Habimana Sylvain and Ezechiel Nsabayezu (University of Rwanda, Kayonza, Rwanda). Their article describes the literature on Web-Based Learning (WBL) as a novel methodology applied in teaching and learning, and its potential effectiveness in teaching and learning chemistry. Further, the study also reflects on how the WBL could be applied in the Rwandan context of teaching and learning chemistry as the country adopted the competency based curriculum (CBC) in 2015.

A paper by Susanne P. Lajoie (McGill University, Quebec, Canada), Eric G. Poitras (Dalhousie University, Halifax, Canada), Tenzin Doleck (Simon Fraser University, Burnaby, Canada) and Lingyun Huang (McGill University, Quebec, Canada and The University of Hong Kong, Pok Fu Lam, China) builds on the literature that emphasizes the importance of self-regulation for academic learning or self-regulated learning (SRL). SRL research has traditionally focused on count measures of SRL processing events, however, another important measure of SRL is being recognized: time-on-task. Their study captures the influence of time spent on learning performance.

In the children's education process, not only children but parents, educators, and teachers are using touchscreen technology-enabled contrivances for better quality of life, write Vinay Kukreja (Chitkara University, Punjab, India), Anuj Kumar Jain

(Chitkara University, Punjab, India). Amitoj Singh (Jagat Guru Nanak Dev Punjab State Open University, Punjab, India), Rajesh Kumar Kaushal (Chitkara University, Punjab, India) and Arun Aggarwal (Chitkara University, Punjab, India) in the next article. Every stakeholder has their perspective on the usage of touchscreen contrivances, and a lot of moderators and critical factors affect this perception, they say. Their research aimed to analyse the moderators and critical factors that affect early childhood education.

Mobile language learning (MLL) is an emerging field of research, and many MLL applications have been developed over the years. In the following paper, by Bimal Aklesh Kumar and Munil Shiva Goundar (Fiji National University, Lautoka, Fiji), a systematic literature review was conducted to establish a body of knowledge on the development of MLL applications. They analysed forty-seven papers from seven different digital libraries reporting on the development of MLL applications to consolidate information on: requirements elicitation, design and implementation, and evaluation processes.

Thitima Srivatanakul (York College of The City University of New York, United States) then writes on an introductory first-year students programming course using blended learning. In this paper, the author discusses evidence-based pedagogical approaches that were used to teach students in an introductory computer programming class at York College, CUNY, where blended learning was used. Student perceptions of learning experience and obtaining coding skills in both online and in-person environments are also presented. The findings from the survey suggested that students benefited from face-to-face interactions and feedback, while those who preferred an online environment liked the flexibility that online components offer.

Students process qualitatively and quantitatively different information during the dynamic self-regulated learning (SRL) process, and thus they may experience varying cognitive load in different SRL behaviours, point out Tingting Wang (McGill University, Montreal, Canada), Shan Li (Lehigh University, Bethlehem, USA), Xiaoshan Huang (McGill University, Montreal, Canada), Zexuan Pan (University of Alberta, Edmonton, Canada) and Susanne P. Lajoie (McGill University, Montreal, Canada). There is, however, limited research on the role of cognitive load in SRL. This study examined students' cognitive load in micro-level SRL behaviours and explored how cognitive load affected metacognitive judgments and SRL performance.

Using commercial videogames as learning objects for the development of 21st century skills in secondary schools has been a relevant topic of study in recent years, and the aim of the next article, by Carlos Merino-Campos and Héctor del-Castillo (Universidad de Alcalá, C/ San Cirilo, Madrid, Spain) and José-Amelio Medina-Merodio (University of Alcalá, Ctra. de MadridBarcelona, Madrid, Spain) was to explore how elements like technological competence, game-based learning, accessibility, and enjoyment are relevant factors that influence the acceptance of the use of video games as a learning aid in the context of physical education, as well as their influence on academic performance in the subject itself.

During the COVID-19 pandemic, the authors: Zelha Tunç-Pekkan, İbrahim Burak Ölmez and Rukiye Didem Taylan (MEF University, İstanbul, Turkey) founded an Online Laboratory School (OLS) under the roof of a university in Turkey to support students from public schools who were not technologically prepared for an online

education and to provide an opportunity for pre-service teachers to continue their internship by teaching online. The purpose of this research, consisting of two studies, was to examine experiences of first, third and fourth-years students during the OLS period of 8 weeks and how the OLS affected their mathematics teaching anxiety during 2020.

The popularisation of an active lifestyle and sports is a hot topic today. Countries activate the interest of the population in physical culture by introducing creative training activities in sports. The following research, by Zhou Xing and Yue Qi (Lishui University, Lishui, China) highlights the importance of developing creative thinking in physical education teachers. The main research goal was to analyse the influence of interactive technologies used to develop creativity among physical education teachers. The researchers use tablet computers with a video communication function for the experiment.

Tai-Kuei Yu and Cheng-Min Chao (National Quemoy University, Kinmen, Taiwan) then argue that the ease of using information technology tools, the explosive growth of smartphone applications (apps), and the rise of learning communities on social media, and the acceptance of learning communities has become one of the most significant challenges for higher education institutions in Taiwan. In order to better understand teachers' collaborative performance in learning communities, this study employed the cognitive dimension (opportunism) and internal tension dimension (e.g. rising expectation, relationship burden) as restrictive factors. It used emotional support, sense of belonging, and interpersonal altruism as facilitating factors, and community interaction, relationship performance, and collaborative performance as endogenous factors.

In response to the wide-ranging concern of online academic futility, the next study, by Qiang Wang and Xin Song (Capital Normal University, Beijing, China), Jon-Chao Hong (National Taiwan Normal University, Taiwan), Shuang Li (Capital Normal University, Beijing, China), Mengmeng Zhang (Minzu University of China, Beijing, China) and Xiantong Yang (Beijing Normal University, China) aimed to explore the independent variables and mediating variable from a novel perspective of parents during COVID-19. Based on the social comparison theory and the control-value theory of achievement emotions, social comparison and tutoring anxiety were incorporated into an integrated model as predictors and mediator, respectively.

To explore the effect of active social media use (ASMU) on the mechanisms of flow experience (FE), questionnaires incorporating an active social media use-scale, academic self-efficacy (ASE) scale, and flow experience scale were collected from college students. This study, by Shenghui Yao, Lifen Xie and Yiji Chen (Jiujiang University, Jiangxi Province, China) is expected to enrich flow experience theory and provide a foundation for follow-up studies.

The next reported research aimed to improve the oral retelling skills of primary school third grade students by using augmented reality-based reading environments. The research was carried out by Hakan Çetin (Siirt University, Siirt, Turkey) and Mustafa Ulusoy (Gazi University, Ankara, Turkey), on primary school third grade students studying in the city centre of Siirt. Purposeful sampling method was used in the selection of students. The main purpose of the formative experiment design was to bridge the gap between research and practical application. In this design, an

intervention program is applied to the individual, and during implementation, factors that increase or decrease effectiveness of the intervention are determined and the intervention program is rearranged considering these factors in order for the research to be more effective.

Syahrul Alim, Sirirat Petsangsri and John Morris (King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand) next write on whether use of a video camera, along with class involvement, affects student achievement. In synchronous learning, participants interact by viewing each other directly. Deactivation of the video camera and low student involvement can be interpreted variously, including learning seriousness or lack of it, physical presence in the virtual classroom, etc. The researchers studied the connection between video camera use, class involvement and student achievement in a one semester psychometry class.

Defining 'plagiarism' is not simple, write Moohebat Shoyukhi (Larestan University of Medical Sciences, Larestan, Iran), Paul Hubert Vossen (Edumetrics R&D, Niederstetten, Germany), Abdol Hossein Ahmadi (Islamic Azad University, Larestan, Iran), Reza Kafpour (Shiraz University of Medical Sciences, Shiraz, Iran) and Kyle Albert Beattie (University of Alberta, Edmonton, Canada), and its complexity is seldom appreciated. This article offers a comprehensive plagiarism assessment rubric from a four-year study of analysing students' plagiarism. From qualitative analyses of students' paraphrase samples, they identified seven plagiarism dimensions and employed a five-point Likert-scale to rank each dimension's severity. They then enlisted editors, reviewers, and research supervisors to refine the severity of the plagiarism dimensions to articulate a plagiarism spectrum.

The aim of the next paper was to examine the relationship between the time that higher education students spend playing video games during exam periods and their average grades in one Eastern European country, and comes from Tijana Savić Tot and Slobodan Adžić (University UNION – Nikola Tesla, Belgrade, Serbia), Vilmoš Tot (University Educons, Sremska Kamenica, Serbia), Maja Aleksić (University Novi Sad, Serbia) and Nebojša Zakić (University Union – Nikola Tesla, Belgrade, Serbia). The authors wanted to explore the differences among students regarding age, gender, year of study, and employment status in relation to video game-playing habits.

A paper by Marina Lebedeva, Marina Taranova and Vladimir Beketov (I.M. Sechenov First Moscow State Medical University (Sechenov University), Moscow, Russian Federation) then analyses a teaching experiment regarding the use of mobile apps in the assessment of student learning. The study involved survey and self-description methods offered to students and instructors to assess the effectiveness of using mobile apps in learning. It was conducted among students of the I.M. Sechenov First Moscow State Medical University and instructors during the academic semester.

The increasing attention to Machine Learning (ML) in K-12 levels and studies exploring a different aspect of research on K-12 ML has necessitated the need to synthesize this existing research, say Ismaila Temitayo Sanusi (University of Eastern Finland, Joensuu, Finland), Solomon Sunday Oyelere (Luleå University of Technology, Skellefteå, Sweden), Henriikka Vartiainen (School of Applied Educational Science and Teacher Education, Joensuu, Finland), Jarkko Suhonen (University of Eastern Finland, Joensuu, Finland) and Markku Tukiainen (University of Eastern Finland, Joensuu, Finland) in the article that follows. The study systematically reviewed how

research on ML teaching and learning in K-12 has fared, including the current area of focus, and the gaps that need to be addressed in the literature in future studies.

Hang Khong (Monash University, Melbourne, Australia), Ismail Celik (University of Oulu, Finland), Tinh T. T. Le (The University of Danang, Vietnam), Van Thi Thanh Lai (Monash University, Melbourne, Australia), Andy Nguyen (University of Oulu, Finland) and Hong Bui (The University of Danang, Vietnam and Birmingham City University, UK) remind us that the COVID-19 pandemic has led to rapid digitalisation in education, requiring educators to adopt several technologies simultaneously for online learning and teaching. Using a large-scale survey, this study aimed to construct a model that predicts teachers' extensive technology acceptance by extending the Technology Acceptance Model (TAM) with their technological pedagogical content knowledge (TPACK) and innovativeness.

The next study, by Ronen Kasperski (Gordon Academic College of Education, Haifa, Israel and Shaanan Academic College of Education, Haifa, Israel) and Ina Blau (The Open University of Israel, Ra'anana, Israel), examined whether and how an online mentoring social network (SN) assists students with special needs: Intellectual Disabilities (ID) or Autism Spectrum Disorder (ASD), in coping with their disabilities and accumulating bonding and bridging types of social capital. The study used a qualitative research paradigm—Netnography to crosscheck observations of the participants' online activities with content analysis of their posts and a network analysis of the participants' interactions with four mentor types – students with disabilities, high-school students, undergraduates and teachers.

The affordances of Open Educational Resources (OER) have resulted in various initiatives around the world, but most of them cease to exist once the initial project funding stops, say Marjon Baas (Leiden University, The Netherlands, and Saxion University of Applied Sciences, Enschede, The Netherlands), Robert Schuwer (Fontys University of Applied Sciences, Eindhoven, The Netherlands), Ellen van den Berg and Tjark Huizinga (Saxion University of Applied Sciences, Enschede, The Netherlands), Roeland van der Rijst (Leiden University, The Netherlands) and Wilfried Admiraal (Oslo Metropolitan University, Norway). Communities might be a means to create sustainable practices, yet such communities can only function if their members perceive these communities as valuable. In their research they applied the value creation framework of Wenger, Trayner, and De Laat to examine the value teachers ascribe to their engagement with an inter-institutional community on OER.

An article by Kyle R. Vareberg (Northeastern State University, Tahlequah, USA), Olivia Vogt (North Dakota State University, Fargo, USA) and Maranda Berndt (The Pennsylvania State University, State College, USA) then explores the impacts of emojis on students' impressions when used in a course welcome email. They adopt a 4×3 factorial design to determine how different emojis impact students' impressions of credibility, immediacy, and liking. Data from students indicates emoji choice does impact impressions. Consistently, instructors' emoji use resulted in decreased perceived competence and trustworthiness but increased perceived caring, immediacy, and liking.

Emmanuel Boakye Omari, Joana Salifu Yendork and Ebenezer Ankrah (University of Ghana, Accra, Ghana) write on how the advent of COVID-19 changed how education is carried out at the tertiary level in Ghana. Despite the launch of emer-

gency remote teaching at the University of Ghana in 2020, little research has been done on students' experiences. This study explored students' experiences regarding the benefits, challenges, and the influence of emergency remote teaching on their self-esteem, academic confidence, and performance.

In recent years, computational thinking (CT) initiatives have been increasing in both research and practice, and Nilüfer Atman Uslu (Manisa Celal Bayar University, Manisa, Turkey) writes on this in the next article, indicating that although the importance of students' resilience and computational identity in the CT development process is recognized, more research is needed on their role on students' CT skills. Little is known about whether differences in students' CT performance and CT self-efficacy are related to computational identity and academic resilience for programming (ARP). This study aimed to understand how secondary school students' latent profiles are distributed according to computational identity and ARP using a person-centred approach.

Technological advances have the potential to support educational partnerships between schools and parents, Murni Sianturi, JungSook Lee and Therese M. Cumming (The University of New South Wales, Kensington, Sydney, Australia) argue. While the positive benefits of technology for these partnerships have been reported in the literature, there is still incomprehension about how to best use this technology to meet the needs of Indigenous parents. Given the intergenerational impacts of colonisation, socioeconomic stress, structural barriers in schooling, and other critical challenges experienced by Indigenous parents, the use of technology as a tool for partnering with Indigenous parents requires careful consideration of their experiences. So the aim of this narrative review was to describe key attributes of the use of technology in home-school partnerships with Indigenous parents.

In the last article of this issue, Musabah Al Breiki (Universiti Sains Malaysia, Penang, Malaysia), Abdullah Al Abri (University of Technology and Applied Sciences (UTAS), Nizwa, Oman), Abdul Mutalib Al Moosawi (Muscat Al-Madinah International University, Kuala Lumpur, Malaysia) and Adnan Alburaiki (Universiti Putra Malaysia, Selangor, Malaysia) write on adoption of virtual reality by science teachers. Their study investigates the relationships between the social and personal factors and behavioural intention to use virtual reality. It examines the links between perceived characteristics of virtual reality and attitude, and the moderating role that can be played by perceived skills readiness between those links.

Articles in this month's issue came from researchers in: Australia, Canada, China, Ecuador, Fiji, Finland, France, Germany, Ghana, Greece, India, Indonesia, Iran, Israel, Libya, Malaysia, México, Morocco, Norway, Oman, Philippines, Portugal, Russian Federation, Rwanda, Serbia, South Africa, Spain, Sweden, Taiwan, Tanzania, Thailand, The Netherlands, Turkey, UK, USA, and Vietnam.

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