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Editorial for EAIT issue 6, 2023

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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.

The first article in this issue is by Yu-Chun Kuo (Rowan University, NJ, USA), Yu-Tung Kuo (North Carolina A&T State University, NC, USA) ND Issam Abi-El-Mona (Rowan University, NJ, USA). It investigates pre-service teachers' perceptions of using iPads in teaching, with a focus on motivation to adopt iPads, iPad-integration self-efficacy, and intention to adopt iPads for future teaching. Changes of pre-service teachers' perceptions of using iPads over time as well as the relationships of motivation, self-efficacy, and intention for iPad adoption were examined. Participants were pre-service teachers from a university in north-eastern United States.

An investigation of sports rehabilitation training among students majoring in rehabilitation at Soochow University and children with motor disorders from a rehabilitation centre were the subjects of the next study, by Yingyuan Zhang, Weiguang Li and Jianwei Yang (Hebei Normal University of Science and Technology, Qinhuangdao, China), Zhishuang Liu (Hebei Institute of International Business and Economics, Qinhuangdao, China) and Linna Wu (Hebei Normal University of Science and Technology, Qinhuangdao, China). Their objective was to specify a framework of cutting-edge approaches and innovations in the training of rehabilitation physicians, investigate existing innovative technologies, and get an insight into the motivation of

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students majoring in rehabilitation when working with the Gross simulator in sports rehabilitation of patients.

The next paper proposes the BP-CM teaching model to solve the problems of lagging classroom feedback, poor learning initiative of students and students rapidly forgetting what they have learned in Internet of Things (IoT) hardware technology courses. It was contributed by Rongjun Chen, Xiaomei Luo, Qiong Nie, Leijun Wang, Jiawen Li and Xianxian Zeng (Guangdong Polytechnic Normal University, Guangzhou, China). This BP-CM (BOPPPS, PAD, cyclic memory, memory system) teaching model is based on BOPPPS (Bridge in, Objective, Pre-assessment, Participatory learning, Post-assessment, and Summary), PAD (Presentation, Assimilation, and Discussion), and the memory system model. This paper compares the BP-CM teaching model with the traditional teaching model by having research participants teach and learn separately in each teaching model.

Musa Saimon (Johannes Kepler University, Linz, Austria and College of Business Education, Dodoma, Tanzania), Zsolt Lavicza (Johannes Kepler University, Linz, Austria) and Thierry (Noah) Dana-Picard (Jerusalem College of Technology, Jerusalem, Israel) then write that development of technology has changed the way people communicate in academic contexts as well as working places. This includes print messages becoming screened messages, and face-to-face classroom and office meetings becoming virtual classes and offices. Their study aimed at exploring how to enhance the 4 C's (critical thinking, communication, collaboration, and creativity) among the college students of the Communication Skills Course in Tanzania through the Project-Based Learning model.

A study by Jen Chun Wang (National Kaohsiung Normal University, Taiwan), ChiaYen Hsieh (National PingTung University, Taiwan) and ShihHao Kung (National Kaohsiung Normal University, Taiwan) investigated the effects of smartphone use on the perceived academic performance of elementary school students. Following a derivation of four hypotheses from the literature, descriptive analysis, t-testing, one-way analysis of variance (ANOVA), Pearson correlation analysis, and one-way multivariate ANOVA (MANOVA) were performed to characterize the relationship between smartphone behaviour and learning effectiveness in academic performance.

Despite e-learning's rapid growth and significant benefits, especially during the COVID-19 pandemic, retaining students in this educational environment is a critical challenge in the post-corona era say Morteza Akbari and Mozhgan Danesh (University of Tehran, Iran), Hadi Moumenihelali (Tarbiat Modares University, Tehran, Iran) and Azadeh Rezvani (The Queensland University of Technology, Brisbane, Australia). Their research was conducted to explore how to promote the continued use of e-learning (CUEL) platforms. More specifically, this study examines how identity, inertia, and computer self-efficacy affect CUEL.

Frances Wijnen and Juliette Walma van der Molen (University of Twente, Enschede, The Netherlands) and Joke Voogt (University of Amsterdam, The Netherlands) then discuss how critical thinking, creative thinking, problem solving, and other so-called higher order thinking skills are regarded as crucial for students to develop, as research shows that technology can be used as a tool to stimulate students' higher-order thinking skills. In this study, they explored these teacher attitudes

by identifying teacher profiles based on primary school teachers' attitudes towards using new technology and stimulating higher-order thinking.

The technology of augmented reality in education is a significant attempt to reform the training mode and develop education in general, says Yiqun Chen (Tourism College of Zhejiang, Hangzhou, China). Piano training usually includes using well-known computer means of teaching music on-screen and hardware, and augmented reality (AR) integrated with the Internet of Things (IoT) is a promising solution for interactive piano learning. This study investigates the impacts of an AR and IoT assisted system for piano education on learners' musical literacy and piano skills (resonance, rhythm, coherence, pace, fingering, playing with both hands and legato playing).

Yang Wang (Nanjing Normal University, Jiangsu, China) then writes about consequences of online learnings' emergence as a solution to continue teaching and learning during the COVID-19 pandemic. Teaching online consumes considerable time and puts pressure on teachers' daily lives, and the internal mechanism of preservice teachers' intention to teach online is analysed in this study. One hundred and seventy-six Chinese preservice teachers and two hundred and forty-one American preservice teachers participated in this study.

Students at the Monastir Faculty of Dental Medicine were required to remain inside during the COVID-19 pandemic for their own safety and in accordance with official directives, point out Emna ElGolli-Bennour, Asma Kassab and Samia Dabbou (University of Monastir, Tunisia). Learners' perceptions are a recognized indicator of the efficiency of any teaching approach, so the authors study focused on students' input on the validity of online biochemistry laboratories to assure their preferences with the 'finest' teaching approaches. The study included undergraduate dental students from the Faculty of Dental Medicine of Monastir.

Taras Panskyi and Ewa Korzeniewska (Lodz University of Technology, Poland) decided to investigate the impact of the pandemic period and the resulting limitations in Polish primary school online security education. The first part of the study investigates the impact of the COVID-19 pandemic on students' educational learning outcomes in information and Internet security. The second part focused on students' perception and self-awareness of cyberspace problems. Their results illustrate the positive tendency toward the students' self-awareness and self-confidence of online security problems and e-threats before, during and after the challenging pandemic period.

Improvement of digital learning with Artificial Intelligence has attracted a lot of research, as it provides solutions for individualised education styles which are independent of place and time say Konstantina Chrysafiadi and Maria Virvou (University of Piraeus, Greece), George A. Tsihrintzis (University of Piraeus, Greece) and Ioannis Hatzilygeroudis (University of Patras, Greece) in the next article. This is particularly the case for computer science, as a tutoring domain, which is rapidly growing and changing and as such, learners need frequent update courses. In this paper, they present a thorough evaluation of a fuzzy-based intelligent tutoring system (ITS), that teaches computer programming.

The replacement of existing technology or the introduction of novel technology into the day-to-day routines of higher education institutions is not a trivial task indi-

cate Aron Fink (Goethe University Frankfurt, Germany), Christian Spoden (University of Applied Science Emden/Leer, Germany) and Andreas Frey (Goethe University Frankfurt, Germany), and many higher education institutions are faced with the challenge of replacing existing procedures for administering written exams with e-exams. This paper proposes the novel technology-based exams acceptance model (TEAM) and empirically evaluates its model structure and usefulness from the perspective of higher education teachers.

Mehmet Donmez (Middle East Technical University, Ankara, Turkey) next writes on a systematic review about how eye-tracking is employed in special education. While presenting the use of eye-tracking technology, the research considered some eye-tracking-related aspects, such as its potential to facilitate the education of children with special needs, investigation of disabilities through eye-tracking technology, and the relationship between learning outcomes and eye-tracking measurements in studies including children with special needs.

This next article, by Muharrem Aydin and Hasan Karal (Trabzon University, Turkey) and Vasif Nabiyev (Karadeniz Technical University, Turkey) examines studies relating to the adaptability for educational games in terms of adaptation elements, components used in creating user profiles, and decision algorithms used for adaptation. According to the results, adaptive educational game design relates to a wide variety of fields such as programming teaching, physics, mathematics, computational thinking, and logic. It is seen that Bayesian networks, artificial neural networks, fuzzy logic, deep learning, item response theory, and decision tree methods are preferred as decision systems in the adaptation process.

Learning Design (LD) research accounts for several design support tools, or LD tools, employing representations for learning designs to facilitate the "teachers as designers" thinking while preparing learning experiences. This paper is by Eleni Zalavra (University of West Attica, Athens, Greece), Kyparisia Papanikolaou (School of Pedagogical and Technological Education, Athens, Greece), Yannis Dimitriadis (Universidad de Valladolid, Valladolid, Spain) and Cleo Sgouropoulou (University of West Attica, Athens, Greece). They aimed to develop an LD tool following a Design-Based Research approach involving practitioners.

This next study, by Yangyang Li (Central China Normal University, Wuhan, China), Chunlian Jiang (University of Macau, China), Zengzhao Chen, Jing Fang, Chenyang Wang and Xiuling He (Central China Normal University, Wuhan, China) was conducted to examine peer tutoring models in collaborative learning of mathematical problem solving in flipped classrooms and their effect on group achievement. The results of the study suggest that training provided to peer tutors should focus more on how to stimulate high-level cognitive thinking skills than on organisation skills.

Enwei Xu, Wei Wang and Qingxia Wang (Xinjiang Normal University, China) then argue that computational thinking is considered to be an important competence in the intelligent era, and the incorporation of computational thinking as an integral part of school education beginning in childhood has been proposed. How computational thinking can be taught more effectively in the context of in K-12 programming teaching, however, remains unclear. This paper reports the results of a meta-analysis of empirical studies on K-12 programming teaching published in international educa-

tion journal to determine which teaching methods and programming tools are most effective in promoting the computational thinking of K-12 students.

Automated Writing Evaluation (AWE) is one of the machine techniques used for assessing learners' writing, point out Fatima Abdullah Yahya Al-Inbari (Najran University, Saudi Arabia) and Baleigh Qassim Mohammed Al-Wasy (Sana'a University, Yemen). This technique has been widely implemented for improving learners' editing strategies, and several studies have been conducted to compare self-editing with peer editing. This study implements AWE software, WRITER, for peer and self-editing. For this purpose, a pre-post quasi-experimental research design with convenience sampling was done for automated and non-automated editing of cause-effect essay writing.

M. Munshi (Government Polytechnic College, Madhya Pradesh, India), Tarun Shrimali (Career Point Technical University, Udaipur, India) and Sanjay Gaur (JECRC Engineering College and Research Centre, Rajasthan, India) point out that data mining approaches have been widely used to estimate student performance in online education, and various Machine Learning (ML) based data mining techniques have been developed to evaluate student performance accurately. A novel hybrid Elman Neural with Apriori Mining (ENAM) approach is presented in this article to predict student performance in online education.

The next article is a literature review of how digital technologies have brought changes to the nature and scope of education and led education systems worldwide to adopt strategies and policies for ICT integration. The authors are: Stella Timotheou and Ourania Miliou (CYENS Center of Excellence & Cyprus University of Technology (Cyprus Interaction Lab), Cyprus), Yiannis Dimitriadis, Sara Villagrá Sobrino and Nikoleta Giannoutsou (Universidad de Valladolid (UVA), Spain), Romina Cachia (JRC - Joint Research Centre of the European Commission, Seville, Spain), Alejandra Martínez Monés (Universidad de Valladolid (UVA), Spain) and Andri Ioannou (CYENS Center of Excellence & Cyprus University of Technology (Cyprus Interaction Lab), Cyprus). The study results shed light on how ICTs can positively contribute to the digital transformation of schools and which factors should be considered for schools to achieve effective and efficient change.

Ruofei Zhang and Di Zou (The Education University of Hong Kong, China) write on L2 writing education, which is the act of expressing oneself in written form in a language other than one's native tongue. Technology-enhanced peer feedback (TEPF) activity has been increasingly investigated in L2 writing education. They reviewed 40 relevant articles from 2001 to 2021, following activity theory. The findings showed that most TEPF activities were based on network-based social computing to enhance academic performance in English as L2 writing.

WuYuin Hwang (National Central University, Taoyuan, Taiwan), Muhammad Irfan Luthf (National Central University, Taoyuan, Taiwan and, Universitas Negeri Yogyakarta, Indonesia), Uun Hariyanti (Universitas Brawijaya, Malang, Indonesia) and Ratna Wardani (Universitas Negeri Yogyakarta, Indonesia) contributed the article that follows. Authentic context is a physical environment reflecting the knowledge application in the real world, and in this study, the authors developed a tablet-based application, Ubiquitous Fraction (U-Fraction) to help fractions learning with authen-

tic contextual support. Three topics were designed to learn fractions concept, fractions simplification, and fractions addition/subtraction.

The next study is motivated by Tory Higgins's self-discrepancy theory and the objectification theory. It comes from Oqab Jabali, Munther Saeedi, Maha Rabayaa and Nihad Othman (An-Najah National University, Nablus, Palestine) and aimed to investigate university staff members' perspectives towards zoom dysmorphia while involved in e-teaching during the Covid-19 Pandemic in terms of its popularity, causes, and instructors' experiences with the healing or eliminating mechanisms. The researchers aimed to identify the impact of the pandemic on body image and the long-term repercussions of e-teaching on instructors' quality. The study results also showed that sufferers of zoom dysmorphia warranted that their appearances occasionally made them feel insecure and occupationally unstable.

A growing body of research has examined the relations of dispositions toward information and communication technology (ICT), to intercultural competence among university students, say Xiaotian Zhang and Mingming Zhou (University of Macau, China), but there is little research exploring the associations between ICT-related dispositions and intercultural competence among adolescent students. From a self-determination theory perspective, this study investigated the relationships of perceived autonomy, competence, and relatedness in ICT usage with global competence, intercultural knowledge, skills and attitudes among 15-yearold students from Hong Kong, Macau and Taiwan in PISA 2018.

Open educational resources (OER) can be cost-effective alternatives to traditional textbooks for higher education faculty to decrease student spending on textbooks, point out Hengtao Tang (University of South Carolina Columbia, USA) and Yu Bao (James Madison University, Harrisonburg, USA). To further advocate college instructors' use of OER, understanding their value belief towards integrating OER in teaching is necessary but currently absent. This study thus analysed college instructors' value beliefs about using OER in college teaching by applying a psychometric model known as diagnostic classification models (DCMs).

Teaching and learning Computational Thinking (CT) is at the forefront of educational interest claim Christina Tikva and Efthimios Tambouris (University of Macedonia, Thessaloniki, Greece), and in the process of teaching and learning CT, learning strategies and tools play an important role. This study aimed to investigate the effect of scaffolding programming games on the development of middle school students' CT. In addition, it explored the effect of students' programming attitudes in their CT development.

Cyberbullying is widely acknowledged as a serious public health problem affecting adolescents and youth, and Willone Lim and Bee Theng Lau (University of Technology, Kuching, Malaysia) and Fakir M Amirul Islam (Swinburne University of Technology, Melbourne, Australia) write about digital and non-digital interventions that have been developed to minimize cyberbullying occurrences, considering the negative social and psychological effects of cyberbullying on youths' development. To gain deeper insight into the existing intervention programs, this review examined the intervention programs for youth published up to 2022. Studies have shown that while some programs were designed to create awareness and prevent cyberbullying,

others were designed to interfere with cyberbullying, and others were designed to accomplish both.

Before the COVID-19 pandemic, schools in many parts of the world had been adopting digital instruction. The concept of digital literacies has also been evolving in complexity alongside the digital technologies that support it, and Mary F. Rice and Mark Bailon (University of New Mexico, Albuquerque, USA) write on this in their article. Little is known about what guidance is available to support various levels of government in supporting digital literacies alongside digital instruction in local schools. The purpose of their study was to determine what guidance for digital literacies U.S. state departments of education had made available through their websites to local schools just prior to the onset of the pandemic.

As part of the maker movement, 3D printing technology has received considerable attention in education, point out Ye Chen, Li Cao and Yinning Zhang (University of West Georgia, USA). But although this technology has become increasingly available in schools, K-12 teachers often struggle with integrating 3D technology into classroom teaching and learning. It is clear that professional development support is needed to help teachers develop the unique technological pedagogical knowledge and skillset in designing and implementing maker-centered instruction. Taking a make-to-learn training approach, this study examined characteristics of the 3D model-based lessons that K-12 teachers designed for classroom teaching.

With the start of the COVID-19 pandemic and the resulting contact restrictions, conducting field trips to hydrological research basins became close to impossible note Paula Farina Grosser, Zhongxin Xia, Jannik Alt, Uwe Rüppel and Britta Schmalz (Technical University of Darmstadt, Germany). As hydrological field knowledge is an essential part of hydrological education and research, to impart this knowledge to students of hydrological engineering subjects in times or situations where on-site exploration is not possible, the VR4Hydro tool was developed. VR4Hydro is a virtual reality platform built from 360° panoramas that allows users to interactively explore the Gersprenz River basin in Germany. The following study seeks to investigate the applicability of performing virtual field trips in the context of hydrological education by evaluating user experience.

The study that follows, by Wahid Bakar Hamad (Institute of Social Work, Dar es Salaam, Tanzania) evaluates students' behaviour intention toward the use of a student information management system (SIMS) at the Institute of Social Work located in Dar es Salaam, Tanzania. The study extends the original Technology Acceptance Model (TAM) with the SIMS usage experience as an external variable. An online questionnaire was employed for data collection and a quantitative method was used for data analysis. Questionnaires were prepared and distributed using the KoBo Toolbox. The participants of this study were third-year students from all academic departments at the institute of social work. The findings of this study revealed that the original TAM construct positively affects the behavioural intention to use SIMS.

Grading assignments is inherently subjective and time-consuming and automatic scoring tools can greatly reduce teacher workload and shorten the time needed for providing feedback to learners, say Ruibin Zhao (The Education University of Hong Kong, China and Chuzhou Univeristy, China), Yipeng Zhuang, Di Zou, Qin Xie and Philip L. H. Yu (The Education University of Hong Kong, China) in their article

which follows. The purpose of their paper is to propose a novel method for automatically scoring student responses to picture-cued writing tasks. A popular paradigm for language instruction and assessment is a picture-cued writing task typically requiring students to describe a picture. Automatic scoring methods must then measure the link(s) between visual pictures and their textual descriptions, and to achieve this the authors designed a picture-cued writing test and collected responses from K12 students.

The next study investigates the role of female teachers of childhood education in directing children towards the effective use of smart devices in developing their learning experiences. It was written by Ali Ahmad Al-Barakat (University of Sharjah, United Arab Emirates), Omayya M. Al-Hassan (The Hashemite University, Zarqa, Jordan), Rommel Mahmoud AlAli (King Faisal University, Kingdom of Saudi Arabia), Mu'aweya Mohammad Al-Hassan (Ministry of Education, Irbid, Jordan) and Ramzia Ali Al sharief (Yarmouk University, Irbid, Jordan). The sample of the study consisted of female teachers in the northern region of Jordan. The results shown that childhood education female teachers achieved advanced roles in directing children towards the effective use of smart devices, where effective direction towards the use of smart devices was represented in: directing children to self-organize their learning during using smart devices, directing children to acquire digital social interaction skills and directing them to learn innovation during using smart devices, with the importance of directing them to avoid the harms of using smart devices through preventive guidance.

Norma Ghamrawi and Rana M. Tamim (Qatar University, Doha, Qatar) then write on how they investigated a digital reform initiative, rated excellent by the government, of one higher education institution in an Arab State in the Gulf. The focus of the study was to develop a digital typology, while exploring the leadership attributes that characterised the core leadership team, as they accomplished the migration towards a digital culture in one year, within a context where faculty members showed resistance against digitalization.

University students are a high-risk population with problematic online behaviours that include generalised problematic Internet/smartphone use and specific problematic Internet uses such as social media or gaming. Magdalena Sánchez-Fernández and Mercedes BordaMas (University of Seville, Spain) next write on this. Study of their predictive factors is needed, they argue, to develop preventative strategies. This systematic review aimed to understand the current state of play by examining the terminology, assessment instruments, prevalence, and predictive factors associated with problematic smartphone use and specific problematic Internet uses in university students.

The increasing daily use of Online Social Networks (OSN) around the world leads to more issues related to user privacy behaviour in this attractive environment, write Shafq Ul Rehman and Selvakumar Manickam (Universiti Sains Malaysia, Penang, Malaysia) and Ahmed AlCharchafchi (University of Baghdad, Iraq). While users can get many benefits by using OSN services, they have many concerns regarding their information privacy. Despite their privacy concerns, users are still using these platforms and still sharing more personal information or self-disclosing. The main objective of this research was to propose a conceptual model that is built based on a

cost–benefit analysis of the privacy calculus theory to explain user privacy behaviour in the OSN environment.

Abhidipta Mallik, Dongdong Liu and Vikram Kapila (NYU Tandon School of Engineering, Brooklyn, NY, USA) point out that rapid advances in science and engineering, and pervasive adoption of resulting technological products, are influencing every aspect of human living and fuelling a growing demand for a workforce that is adequately prepared for the emerging occupations in STEM fields. To prepare high school teachers for incorporating robotics in their students' education and promoting their understanding of engineering concepts and technology applications, a four-week long robotics workshop was designed and conducted annually for three summers. Their article describes this.

The study that follows, by Igor Balaban, Danijel Filipović and Miran Zlatović (University of Zagreb, Croatia) relates to identification of groups of students enrolled in the emergency remote teaching online course based on the various course-related data collected throughout the first year of COVID-19. Research was conducted among students enrolled in the course "Business Informatics" at the Faculty of Organization and Informatics of the University of Zagreb in the academic year 2020/2021.

Ghada ElSayad (Technology, Arab Academy for Science, Technology and Maritime Transport, Heliopolis, Cairo, Egypt) then points out that researchers continue to extend the community of inquiry (COI) framework, highlighting its utility for providing a successful learning experience in online and blended learning environments. Recent studies have added the learning presence dimension to the classic COI framework which contains teaching, social, and cognitive presences, to represent online students' traits of self-regulation. This study examines the statistical structure of the extended COI framework (integrating the classic COI presences with the additional learning presence) as well as the structural path between the four presences, using confirmatory factor analysis.

An article Maria Prokofieva (Victoria University, Melbourne, Australia) addresses a research problem of mapping data analytics to audit tasks and develops a framework aligning audit phases and Artificial Intelligence (AI) and using data analytics in teaching audit with AI. External audit is undergoing rapid changes where more and more routine tasks are automated with analytics and AI instruments. The paper contributes to the literature on using data analytics with AI in knowledge specific areas and particularly critical for emerging audit analytics, which is data analytics in external financial audit application.

The bloom of technologies has witnessed the urgent need to develop high quality STEM (science, technology, engineering and mathematics) education claim Jiawei Zhang, Mingming Zhou and Xiaotian Zhang (University of Macau, China), leading to increasing emphases on understanding what STEM teachers perceive about STEM education, which would directly influence their classroom processes. Scholars have designed and implemented interventions aiming at promoting STEM perceptions of teachers at different teaching levels, but a synthesis of these studies is necessary to provide an overall evaluation of the effectiveness of these interventions to help both teachers and teacher educators make better decisions in STEM implementation.

This qualitative case study, by Jillian Ives, Brian Drayton, Kathryn Hobbs and Joni Falk (TERC, Cambridge, MA, USA), examined how a multimodal professional

network environment (STEM for all Video Showcase) affected five STEM educational researchers' capacity to engage in grant funded research at U.S. Historically Black Colleges and Universities (HBCUs). Guided by the social capital and professional network literature as a conceptual framework, the authors analysed data from surveys, interviews, and online discussion posts, aiming to understand HBCU-based researchers' supports and barriers in writing and/or conducting grant funded research in STEM education, and ways in which the multimodal professional network experience supported their research and professional networking, if at all.

The next quasi-experimental study, by Joey Jia Qi Chong and Vahid Aryadoust (Nanyang Technological University, Singapore) aimed to determine the relationship between oral language ability and emotions represented by facial emotions, and modality of assessment (audios versus videos) and sentiments embedded in each modality. Sixty university students watched and/or listened to four selected audiovisual stimuli and orally answered follow-up comprehension questions. One stimulus was designed to evoke happiness while the other, sadness. Participants' facial emotions during the answering were measured using the FaceReader technology.

Learning path recommender systems are emerging, and Nur W. Rahayu (Universitas Islam Indonesia, Yogyakarta, Indonesia and Universitas Gadjah Mada, Yogyakarta, Indonesia), Ridi Ferdiana and Sri S. Kusumawardani (Universitas Gadjah Mada, Yogyakarta, Indonesia) write about this as follows. Given the popularity of ontology/knowledge-based systems in adaptive learning, this work reviews learning path in ontology-based recommender systems. The review covers recommendation trends, ontology use, recommendation process, recommendation technique, contributing factors, and recommender evaluations.

National Policies on Education (NPE) are made up of government laws and guidelines that form basic operational principles of education in a country, say Madanjit Singh, Munish Saini, Sulaimon Oyeniyi Adebayo, Jaswinder Singh and Manevpreet Kaur (Guru Nanak Dev University, Amritsar, India). These policies are aimed at improving the overall quality of education. In this study, they performed a comparative qualitative content-based analysis on all four versions of the Indian National Policies on Education (NPE) as a case study, specifically aiming to get insights into the contents of these NPEs, compare their evolution in terms of topics and themes covered in them, and extract their relationship and evolution alongside technology.

Online learning has significantly expanded along with the spread of the coronavirus disease (COVID-19), write Tasnim M. A. Zayet, Maizatul Akmar Ismail, Sara H. S. Almadi, Jamallah Mohammed, Hussein Zawia and Azmawaty Mohamad Nor (Universiti Malaya, Kuala Lumpur, Malaysia). Personalization, however, becomes an essential component of learning systems due to students' different learning styles and abilities. Recommending materials that meet the needs and are tailored to learners' styles and abilities is necessary to ensure a personalized learning system. The study conducted a systematic literature review of papers on recommendation systems for e-learning in the K12 setting published between 2017 and 2021 and aimed to identify the most important component of a personalised recommender system for school students' e-learning.

Students are commonly in a high cognitive load state when they encounter sophisticated knowledge, point out Wei-Tsong Wang, Ying-Lien Lin and Hsin-En

Lu (National Cheng Kung University, Taiwan). Whether novel augmented reality (AR) technology can be utilised in an online learning course to explain complicated scientific concepts in a more understandable manner to students during the COVID-19 period is an unaddressed issue, so this study aimed to investigate the influences of reducing the physical touch or face-to-face teaching/learning practices via using mobile augmented reality learning systems (MARLS) on students' perceived learning effectiveness.

Programming and creative thinking are important skills for the twenty-first century, and Gabriella Tisza and Panos Markopoulos (Eindhoven University of Technology, The Netherlands) and Heather King (King's College London, London, UK) write next on this topic. A large body of evidence suggests that a playful approach to learning helps children engage deeply with programming, improves their creative thinking skills, and shapes a positive attitude towards programming, but this research rarely considers how differences in socioeconomic background impact the way children experience such programming activities. The theoretical perspective of science capital suggests that children from high income families will hold more positive attitudes towards science and technology and will perform better in programming than children from lower income families. To examine this assumption, they designed and implemented single-occasion programming workshops lasting two hours that followed the Lifelong Kindergarten Approach and investigated differences in children's attitudes, their learning outcomes, and the fun they experienced during the workshops.

Professional development programs for teachers in higher education are often characterised by top-down approaches, which fail to make appreciable differences in teaching practices, say Magda Pischetola (University of Copenhagen, Denmark), Jeppe Kilberg Møller and Lone Malmborg (IT University of Copenhagen, Denmark). This study uses a qualitative approach to explore activity-oriented design (AOD) as an instrument for collaborative learning in higher education teacher professional development. They examine Teknosofikum, an ongoing project developed in Denmark. Their study applied the methodology of design-based research.

Shariful Islam Shakeel, Md Abdullah Al Mamun and Md Faruque Ahmed Haolader (Islamic University of Technology, Gazipur, Bangladesh) then remark that almost every educational institute in Bangladesh undertook a strategic move to begin offering online or blended learning courses to mitigate the challenges created by the COVID-19 pandemic. The TVET sector, particularly the polytechnic institute of Bangladesh, endeavoured to explore the blended learning approach as an immediate and long-term solution to address the educational dislocation caused by the pandemic. This study attempts to conceptualize a pedagogical design based on the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation) and rapid prototyping model to make a reliable and robust instructional design to be used in the blended learning context.

Since the COVID-19 pandemic, there has been a growing need for learning experience of instructional designers. As a result, online courses on user experience (UX) designed for learning are in demand to prepare those much-needed professionals. This paper, by Meina Zhu and Ke Zhang (Wayne State University, Detroit, USA), reports the first circle of educational design research (EDR) on such a completely

online problem-based course using group contracts and peer evaluations to promote collaborations.

Orhan Karamustafaoğlu (Amasya University, Turkey) and Hüseyin Miraç Pektaş (Kırıkkale University, Turkey) write that there is a great need for applied studies at the K-12 level on how creative problem-solving skills can be developed in out-of-school environments and what kind of learning activities can be used. In their study, the effects of inquiry-based STEM (Science, Technology, Engineering and Mathematics) activities on students' STEM awareness and creative thinking skills in an out-of-school learning environment were investigated and the advantages and disadvantages of inquiry-based STEM activities were determined with student opinions.

Eye tracking technology is increasingly used to understand individuals' non-conscious, moment-to-moment processes during video-based learning, note Ruiqi Deng (Hangzhou Normal University, China) and Yifan Gao (Zhejiang University, Hangzhou, China). This review evaluated 44 eye tracking studies on video-based learning conducted between 2010 and 2021. Specifically, the review sought to uncover how the utilisation of eye tracking technology has advanced understandings of the mechanisms underlying effective video-based learning and what type of caution should be exercised when interpreting the findings of these studies.

In the final article in this issue, Qinglong Li (Chongqing Normal University, China, and Chongqing Aerospace Polytechnic, China), Yonggang Wei (Chongqing Normal University, China), Yanqi Peng (Chongqing Normal University, China, Chengdu Third Kindergarten, China), Lin Su (Chongqing Normal University, China, and Chongqing Industry and Trade Polytechnic, Chongqing, China) and Haidan Song (Chongqing Normal University, China, Chongqing Industry and Trade Polytechnic, Chongqing, China), write about Touchscreen Devices. These devices have become the mainstream terminals for human-information interaction and have great appeal to children, but scholars still have disputes on the effects of touchscreen learning in young children aged three to six. This study aimed to investigate whether touchscreen devices can promote young children's learning achievements, and to explore the mechanism triggering young children's touchscreen learning.

Articles in this month's issue came from researchers in: Australia, Austria, Bangladesh, China, Cyprus, Denmark, Germany, Greece, India, Indonesia, Iran, Israel, Jordan, Malaysia, Palestine, Poland, Qatar, Saudi Arabia, Singapore, Spain, Taiwan, Tanzania, The Netherlands, Tunisia, Turkey, UK, United Arab Emirates, USA, Yemen.

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