

**Abstracts
and
Conference Materials
for the
20th European Conference on
e-Learning**

**A Virtual Conference hosted by
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Abstracts of Papers

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ECEL Preface

These proceedings represent the work of contributors to the 20th European Conference on e-Learning (ECEL 2021), hosted by ACI and the University of Applied Sciences HTW Berlin (Hochschule für Technik und Wirtschaft) Berlin, Germany on 28-29 October 2021. We, Prof. Dr.-Ing. Carsten Busch and Prof. Dr. Tilo Wendler, have the honour to act as the Conference Chairs. Prof Dr. Regina Frieß and Martin Steinicke are the Programme Chairs.

ECEL is now a well-established event on the academic research calendar and now in its 20th year the key aim remains the opportunity for participants to share ideas and meet the people who hold them. We would have loved to welcome you, but due to the global Covid-19 pandemic the conference was moved online to be held as a virtual event. All four of us have a long-standing interest in e-learning and the digitisation of learning scenarios with a focus on game- and “Mixed Reality”-based learning. The pandemic has shown us how much Germany can learn from other countries in implementing innovative ways and formats of learning on- and offline. But on the bright side, this sometimes distressing view of the German educational system in times of stress also set things in motion that will bring new opportunities but also challenges. All of these need to be faced on solid scientific ground thus making the sharing of ideas and results all the more important. The subjects covered and the scope of papers in this year’s ECEL illustrate the wide range of topics that fall into this important and ever-growing area of research and will ensure an interesting two days – to which we look forward.

The opening keynote presentation is given by Dr Dan Remenyi, Extraordinary Professor at the University of the Western Cape, South Africa, on the topic of *University of the Future*. The second day of the conference will include an address by Prof Shawren Singh, University of South Africa, Pretoria, South Africa, entitled *Reflecting on Higher Education Examinations*.

With an initial submission of 141 abstracts, after the double blind, peer review process there are 68 Academic research papers, 8 PhD research papers, 2 Masters Research papers and 3 work-in-progress papers published in these Conference Proceedings. These papers represent research from Australia, Austria, Belgium, Canada, Chile, China, Cyprus, Czech Republic, Czech Republic, Denmark, Estonia, France, Germany, Greece, Hong Kong, India, Ireland, Italy, Japan, Kazakhstan, Malaysia, Nigeria, Norway, Oman, Poland, Portugal, Romania, Russia, Saudi Arabia, Singapore, Slovak Republic, South Africa, Spain, Sweden, Turkey, UK and USA.

We hope you enjoy the conference.

Prof. Dr.-Ing. Carsten Busch, Prof. Dr. Regina Frieß, Martin Steinicke and Prof. Dr. Tilo Wendler

University of Applied Sciences HTW Berlin (Hochschule für Technik und Wirtschaft Berlin), Germany

October 2021

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Biographies

Conference Chairs



Prof. Dr.-Ing. Carsten Busch studied computer science at TU Berlin. In his doctorate he investigated metaphors in computer science. In 1995 he took up a position as a research assistant and university planner at the Universität der Künste Berlin. Carsten Busch has lectured at many universities, including as a visiting professor in Poznan and Moscow. From 2002 to 2019 he was also a Managing Partner of the Institut für Marken und Medien (Institute of Brands and Media). In 2006 Carsten Busch was appointed as a professor for the International Media and Computing study programme at HTW Berlin, where he also took over as the Director of the Creative Media research group. He has been the President of HTW Berlin since April 2019. <https://www.htw-berlin.de/hochschule/personen/person/?eid=3030>



Prof. Dr. Tilo Wendler studied mathematics and physics as well as computer science and did his doctorate in the field of applied statistics. From 1997 to 2012 he worked in the banking and information technology sector. In 2013 Tilo Wendler was appointed as a professor for quantitative methods at HTW Berlin. From 2015 to 2019 he held the position of Vice-Dean and Dean of the HTW Berlin Business School. Since April 2019, Tilo Wendler has been the Vice-President for Studies, Teaching and International Affairs. <https://www.htw-berlin.de/hochschule/personen/person/?eid=8865>

Programme Chair



Martin Steinicke is a researcher in professor Carsten Busch's R&D group Creative Media at the University of Applied Sciences HTW Berlin. He works in the application centre „creative Applied Interactive Technologies“ to support SMEs in tackling the challenges of the digitization as well as the opening up of new markets and technologies. Furthermore, he primarily does research on the application of game concepts (Gamification) and technologies (APITs) as well as their synthesis in digital game-based learning (DGBL). In his courses “Game & Interaction Design” and “Digital Game-based Learning” Martin guides his students on their epic quest to create digital (learning) games and interventions. <https://www.htw-berlin.de/hochschule/personen/person/?eid=4407>



Regina Friess has been Professor for Media Conception at the Digital Media Department of the University of Furtwangen, Germany, since 2011. Before, she was Lecturer for interactive media at the University of Arts in Berlin. She has worked as graphic designer, 3D-modeler and as concept developer since 1993. Her academic interest focusses on the reflection and design of interactive narration in audiovisual media.

Keynote Speakers



Dan Remenyi has been a Visiting Professor specialising in research methodology at seven universities in four countries over the past 20 years. He continues to write, teach and research in both research methodology and the sociology of research. He conducts seminars on topics related to improving effective academic research and obtaining better research results. One of his areas of specialism is qualitative research and how it may be enhanced using a Grounded Theory approach. He is on the editorial board of a number of academic journals. He is also on the executive committees of several European and International conferences. His research has been published in some 50 peer reviewed papers and he has had some 30 text books published. Some of his books have been translated into Chinese, Japanese and Romanian. He holds a B Soc Sc, MBA and PhD.



Shawren Singh PhD, is an associate professor in the School of Computing at the University of South Africa. He has spent more than 20 years teaching and researching in the Information Systems space. In 2014 he obtained his PhD, based on research into eGovernment in South Africa, from the University of the Witwatersrand. His current research has focused on digital scholarship and e-Government, his research has been published internationally and he has presented papers at several conferences. He is currently supervising several post-graduate candidates and he is the Chair of Information Systems in the School of Computing at the University of South Africa.

Mini Track Chairs



Abbas Fadhil Aljuboori is working currently at the University of Information Technology and Communications, College of Engineering, Baghdad, Iraq as a faculty staff member. He has a Ph.D. in Computer Science from Dongguk University, South Korea. Fulbright Visiting scholar – University of Central Oklahoma, USA. International Advisory Board Member for CT University in India. He worked as a Vice President for administrative affairs and Head of Smart Cities Center at UoITC, Researcher and Manager in the Advanced Institute of Convergence Information Technology (AICIT), South Korea, Head of Computer Science Department, University of Kerbala. Vice President of Iraqi Universities Accreditation and Quality Assurance Council for Computer Science and IT. His field of Interest are in Data Mining, Web Applications, Big Data, Data Security, Information Systems and Smart Applications. He is a member of several academic and professional societies. He is an Editor, Committee Member and Reviewer of many eminent International Journals and Conferences worldwide.



Ayanda Pamella Deliwe holds a Ph.D. from the University of KwaZulu Natal. Her Ph.D. was on Measuring e-learning systems at higher education institutions. She is an academic at Nelson Mandela University. She has 10 years' experience working in the public sector, 2 years of tutoring experience and 3 years of lecturing experience. She is the coordinator of undergraduate modules and a supervisor to postgraduate students. She is involved in the internal and external examination of MBAs. Dr. Deliwe has published several papers on e-learning in academic journals and conference proceedings. She serves in the school research committee and faculty teaching and learning committee of her university. Her main research interests are e-learning and blended learning and new pedagogies.



Asmaâ Retbi is an Associate Professor at the Department of Computer Science, Mohammadia School of Engineers (EMI), Mohammed V University in Rabat, Morocco. She is also a member of the RIME "Networking, Modeling and e-Learning" research Team since 2010. She received her Ph.D. in Computer Science from EMI, Mohammed V University, and Computer science engineering degree from Institut National des Postes et Télécommunications, Rabat, Morocco. Her main research areas are related to technology-enhanced learning like social learning, game-based learning, recommender systems in eLearning, mECEL 2020 First CFPobile serious game modeling.



Eleni Rossiou is Principal in Experimental School of the Aristotle University, Greece and teaches Computer Science. She is certified teachers' trainer, reviewer in international journals and conferences Proceedings and member of scientific Associations. She has authored and co-authored various papers in International and European conferences and journals; Her research focuses in blended learning, game-based learning in all levels of Education and educational leadership.



Sheryl Williams is a renewable energy specialist, Senior Fellow of the Higher Education Academy and an award-winning Distance Learning Manager. Her Doctorate in Electronic & Electrical Engineering focussed on the performance of photovoltaic devices and she has participated in the EU funded IP PERFORMANCE PV and PVCAtapult WP9: PV performance prediction. Sheryl leads flexible and distance learning programme in Wolfson School. She won the 2015 e-Learning Excellence Award at the 14th European Conference on e-Learning for the Photovoltaic Remote Laboratory. She pioneered innovative use of ICTs in MSc in Renewable Energy System Technology via distance Learning; and mentored and trained staff.

Workshop Facilitators



Federico II.

Stefano Perna has a PhD in Information and Communication Design, conducted research at intersections of design, new media and humanities at University of Salerno, taught New Technologies for Art at the Academy of Fine Arts of Naples. He is a faculty member of the Apple Developer Academy at University of Naples



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Moritz Philip Recke studied Media Technology and Next Media at Hamburg University of Applied Sciences, conducted entrepreneurship policy research at UNSW Business School in Sydney and focused on entrepreneurial ecosystems, public policy discourse and sociotechnical imaginaries for his PhD. He is a faculty member of the Apple Developer Academy at University of Naples

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Sara Bandar Alharbi is a PhD student in the Department of Informatics at the University of Sussex. She has a BSc in Computer Science from Umm Al-Qura University and a MSc in Advanced Computer Science from Essex University. Her research in the area of mobile learning development integrating Universal Design for Learning principles and digital storytelling.

Paulo Alves – has received his Ph.D. in Technology and Information Systems from University of Minho, Portugal, and Master in Multimedia Technology from the University of Porto. He is integrated member of the Research Centre in Digitalization and Intelligent Robotics (CeDRI). His research interests include intelligent systems, big data analytics, e-learning, web development and multimedia.

René Holm Andersen: René is an associated professor at University College of Northern Denmark. His research is based on the use of podcasts as a learning medium for adult learners at higher education institutions.

Eskil Olav Andersen is a PhD researcher at Aalborg University Business School. His research is focused on emerging ecosystems of educational technology in higher learning institutions. His main research approach is quantitative, utilizing programming languages (Python), Natural Language Processing (NLP), and Machine Learning/Deep learning.

Maria Lourdes Bacud holds one master's degree in Public Management from Philippines and another in eGovernance Technologies and Services from Tallinn University of Technology, Estonia. Her primary research and project implementation focus areas are public sector capacity building, cybersecurity awareness, game-based learning, human development, eGovernance, and users' experience.

Wendy Barber is an Associate Professor in the Faculty of Education at Ontario Tech University in Oshawa, Canada. She is the recipient of Teaching Awards of Excellence in Health and Physical Education, Teacher Development, Resilience, and

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Yongmei Bentley is Principal Lecturer in Logistics and Portfolio Lead of international partnership programmes at University of Bedfordshire, UK. She has worked on several projects funded by European Union and British Council with colleagues and partners from Europe and China. She has published academic journal papers related to her teaching and research.

Lisa Binkowski studied business mathematics and numerics. She works in the field of basic mathematical education at HTW Berlin.

Mie Buhl is Professor in Visual Culture, IT and Learning design. Head of research Center Visual Studies and Learning Design, (ViLD) Department of Communication and Psychology, Aalborg University Copenhagen. Research Interests: Visual Culture, Media and ICT with an emphasis on University Education, Teacher Training, Primary School and with the focus on visual learning. She has several publications in this field.

Tim Cappelli has worked with educational technology for over 20 years, from setting up work-based learning centres to introducing blended learning initiatives to HE. He was responsible for the first large-scale deployment of iPads in HE, the development of a new learning platform in WordPress and the creation of a Curriculum Mapping Tool.

Felix Chao is Senior Lecturer at the Independent Learning Centre of the Chinese University of Hong Kong, the institution from which he received a PhD in Chinese language and literature. His academic and research interests include classical Chinese literature, Chinese grammar, Chinese communication skills, Chinese language education and independent learning.

Paula Charbonneau-Gowdy: Graduate (McGill University). Associate professor of education (Universidad Andres Bello, Santiago, Chile. Formerly Senior Advisor in Learning and Technology for the Government of Canada, she also has work experience in Europe and Chile. Main area of interest is the socio-cultural implications of emerging technologies on teaching, learning and learners at all levels of the educational system.

Lee Yen Chaw is an assistant professor at UCSI Graduate Business School, UCSI University, Malaysia. Her research interests include blended learning practices for university students, mobile applications, and tourism management.

Sakshi Chhabra is currently serving as an Adjunct Professor at CMS Business School, Jain University. She has recently submitted her Ph.D thesis on “Promoting Women entrepreneurship in Indian MSME’s” at BITS Pilani, Pilani Campus. She holds a publication in *Emerald & Springer* for her research work. Her main research areas are women, sustainable and innovation entrepreneurship.

Adam Christopher is a Senior Lecturer of English. He received his PhD in computer sciences from Kagoshima University in 2009. His main research areas are Applied Linguistics, Computational Linguistics, CALL, Curriculum Development, EAP, Foreign Language Acquisition, Intercultural Communication, Comparative Culture

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Mariella Farella, is a research fellow at Institute of Educational Technology of the National Research Council of Italy and she is attending a PhD course in Mathematics and Computational Science at the University of Palermo in Italy. Her main research activity focused on the development of Augmented and Virtual Reality systems in educational contexts.

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Sonja Gabriel works as a professor for media literacy at University Teacher College Vienna/Krems (Austria). Her primary focus of research is on doing research of the consequences of Covid-19 measures at university on teaching and learning. She also researches using digital media for learning and teaching, with a special focus on digital game-based learning.

Caroline Galdames, a Preschool Educator. In 2011, she received a Master's degree in Innovation in Early Childhood Education (2011, Universidad Central Chile). Since 2014, she has worked in Online Education as Academic Vice-Rector at a technical higher education institute in Chile. Currently a PhD student in the Education and Society doctoral program (Universidad Andres Bello, Chile).

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Konstantinos Kotsidis has been teaching in Primary Education since 2003. He is a Ph.D. holder from the University of Crete, Department of Education. His Dissertation is titled “The Significance of “Social Media Networks” and their role in the Process of Teacher Training”. He participates in training sessions on the use of ICT in the Educational Act and implements training programs in collaboration with the eLearning Lab of the University of Crete

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Keynote Outlines

Keynote Outlines

The following are outlines for the Keynote Speeches which will take place at ECEL 2020.

Reflecting on Higher Education Examinations

Led by: Shawren Singh, University of South Africa

‘even successful, able and committed students – those who become university teachers – have been hurt by their experiences of assessment, time and time again, through school and through higher education’ (Boud. 1995, 35)

Covid-19 has forced the higher education system into overdrive. Universities have been caught wanting on several levels. While universities have developed a reasonable approach to the examination of postgraduate degrees, there has been little progress made on how we examine our undergraduate candidates in the absence of traditional venue-based assessment. This keynote will reflect on the nature of examinations and how we as academics have approached them. The concept of digital scholarship will be introduced in the context of the undergraduate journey. A rich description of the distance education context will be provided which will lead to why undergraduate candidates can be considered digital scholars. We then reflect on the ritual of examinations and online examinations. In this keynote, seven uncomfortable truths will be considered.

Research Paper Abstracts

A Competency-Based Approach to Support e-Learning During the Covid-19 Situation

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Abstract: The Faculty of Education and Lifelong Learning of the University of Strasbourg implemented a competency-based approach during the academic year of 2020-2021. This study presents empirical research on students' perspectives of their self-regulation and self-direction in learning as one of the first feedbacks on this project. This research was conducted in an online course organised during the Covid-19 pandemic. It was hypothesised that the competency-based approach positively impacted students' self-direction within the course and their self-regulation in an online learning context. Anonymous pre- and post-surveys were conducted. The results confirmed the research hypothesis. The design of the course presented could serve as a valuable input to define appropriate learning scenario to increase students' self-regulation and self-direction in e-learning.

Keywords: competency-based approach, e-learning, self-regulation, self-direction, instructional design

Dilemmas in Designing e-Learning Experiences for Professionals

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Abstract: The aims of this research are to enhance industry-university collaboration and to design learning experiences connecting the research front to practitioners. We present an empirical study with a qualitative approach involving teachers who gathered data from newly developed advanced level courses in artificial intelligence, energy, environmental, and systems engineering. The study is part of FutureE, an academic development project over 3 years involving 12 courses. The project, as well as this study, is part of a cross-disciplinary collaboration effort. Empirical data comes from course evaluations, course analysis, teacher workshops, and semi-structured interviews with selected students, who are also professionals. This paper will discuss course design and course implementation by presenting dilemmas and paradoxes. Flexibility is key for the completion of studies while working. Academia needs to develop new ways to offer flexible education for students from a professional context, but still fulfil high quality standards and regulations as an academic institution. We suggest a student-first approach to solve these and other dilemmas, which involves changes in teacher roles, culture, and processes. The findings will be relevant for teachers designing and running courses aiming to attract professionals. They will also be relevant for university management, building a strategy for lifelong e-learning based on co-creation with industry.

Keywords: lifelong learning, higher education, e-learning, online learning, industrial co-production

Remote Learning: Students' Satisfaction and Perspectives in Higher Education

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Abstract: The Covid-19 pandemic has brought unexpected difficulties to higher education, which have been overcome by investing in training and reinforcing the use of digital tools. Considering the students' needs and interests in the pandemic context, the main objectives of this work were to: identify the perception of the use of digital tools by higher education students in the context of remote learning; evaluate the degree of satisfaction of higher education students with remote learning; analyze the perspectives of higher education students regarding the use of learning environments and tools in a post-pandemic scenario, and verify if there are significant differences regarding the students' curricular year and the variables associated to the use of digital tools and virtual learning environments. A study of an essentially quantitative nature has been developed using a sample of 677 students from a Portuguese public higher education institution. The results highlight that the digital tools that had greater awareness from the students were Zoom and VLE (virtual learning environment). The VLE tools that were used most frequently were Resources and Activities. Inferential statistics were used to make comparisons between the scores obtained for each variable in the groups related to each curricular year that students attended. In general, students' appreciation for emergency remote learning was considered positive. Regarding the prospects for using digital tools, it appears that they will continue to privilege the tools used during the pandemic, with an emphasis on the institution's VLE.

Keywords: remote learning, virtual learning environments, digital tools, higher education, Covid-19

Remote Teacher Training During COVID Lockdown by e-Learning Lab (University of Crete)

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Abstract: The need to limit the spread of Covid-19 led to measures that had a significant impact on education. The closing of schools at the beginning of spring 2020, highlighted the need for School Distance Education (SDE) to make up for lost teaching time and to maintain pupils' contact with the educational process and other members of the school community. Nevertheless, teachers did not have previous experience in SDE and as a result, they were in need of support in this urgent situation. The Laboratory for Advanced Teaching Technologies for Lifelong Learning and Distance Education (E-Learning Lab) of the University of Crete, attempted to contribute with its own means to the support of teachers who struggled to respond to the challenges of distance teaching resulting from the suspension of schools. Within the above framework, fast track distance seminars were designed and implemented, aiming at the support of teachers on pedagogical issues of Distance Education. During the period from 19 March to 29 April 2020, 20 distance training seminars were conducted, in which more than 40.000 teachers of primary and secondary education from around Greece participated. The overall presentation and assessment of the training actions showed not only the enormous interest of the teaching community but also the need for such training actions with particular emphasis on the principles and the methodology of SDE, on synchronous and asynchronous learning environment as well as the designing or planning of teaching scenarios based on the pedagogical approaches compatible with Distance Learning.

Keywords: teacher training, school distance education, COVID-19

A Review of Podcasts as a Learning Medium in Higher Education

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Abstract: Podcasts and podcasting have emerged as widespread methods for providing learning at different levels in higher education. The podcast has become a learning media that provides students with more flexibility and opportunities to learn and reflect on course content. Given that podcasts as a learning medium are relatively new, few studies have investigated their use and effectiveness on learning. Previous studies, mainly case studies, have provided insights into a specific field of practice. This study combines the best available evidence to provide an overview of the state of the art of the current research regarding the benefits, challenges and current design tenets to use podcasts and podcasting as a learning medium in higher education. Following the preferred reporting items for systematic reviews, we included 15 studies from 2016 to 2021. These studies were analysed to respond to our research objectives. One of the key findings was that existing research indicates optimism towards podcasting as a learning medium in higher education, supporting more flexible, reflective and engaging learning environments. However, there are still several practical and pedagogical challenges in the use of podcasting in higher education. One of the difficulties of using the podcast as a learning medium is the lack of interactions. Learning via the interaction between students themselves, the course content, peers and course educators is essential for transferring podcast content. To overcome these challenges, different didactical and pedagogical designs have been used to harvest the benefits that podcasts can provide. It is concluded that most of the existing literature examines case studies, both quantitative and qualitative. These studies have focused mainly on descriptions of students' experiences. Furthermore, podcasts and podcasting have only been used as a supplement within certain learning activities. Empirical studies are still in their infancy, and more research is needed into different pedagogical and didactical scenarios. Additionally, more longitudinal studies with a focus on podcasts' impact on students' learning outcomes are needed.

Keywords: podcast, review, higher education, learning, learning media

Going Online: Student Perspectives in a Problem-Based Learning Environment During the Pandemic

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Abstract: The purpose of this article is to present the key findings from a survey performed across the faculties at Aalborg University (AAU) on students' transition to online education, during the Danish quarantine in spring 2020. We highlight important takeaways that are deemed relevant to the ongoing digital transition process at AAU and the evaluation thereof, discuss students' experiences in the locally anchored settings and compare findings in a broader context. For our analysis, we utilize NLP transformers and topic modelling to present an overview of themes discussed by the students. Further, we perform bibliometric analyses to gain insights on similar studies published during COVID-19. The study highlights central themes, challenges, and opportunities from a student perspective, and evaluates these within the scope of the PBL model. The study highlights the complex structure of student bodies, showing diverse preferences and effects of moving education online. Social aspects of learning suffered for most, posing challenges for both teaching and group work. Students generally reported positively on the use of recorded lectures, providing opportunities for future blended/flipped learning environments. We discuss the implications for creating hybrid/blended approaches that integrate online and physical learning spaces.

Keywords: PBL, social learning, blended/hybrid learning, higher education, topic modelling

Game-Based Learning for Cybersecurity Awareness Training Programmes in the Public Sector

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Abstract: This paper aims to identify an effective and sustainable learning experience by designing a users' experience model on the cybersecurity awareness for public sector using game-based learning. Efforts driven to build cybersecurity awareness to community is as important as strengthening the public sectors' (government) capacity in dealing with cybersecurity threats. Public sectors' capacity to use electronic systems should move in parallel with the awareness and ability to protect these. In most organizations, if not all, the topic of cybersecurity awareness is the initial touch point to educate employees on various fields. Learning from a cybersecurity awareness training can only be effective if done in a safe environment where repetitive failure is seen as input for learning optimization. A simulated environment for practice can facilitate the transfer of learned theories to practice. Reinforcing the learning content with innovative learning experience and digital technologies like (serious) games can make learning more effective and engaging. This study provides a survey of online serious games used in cybersecurity awareness and analysis of the motivational core drives used in the game mapped through the Octalysis framework. While the Octalysis gamification framework is widely used in the design of serious games, it is still rarely implemented to tackle cybersecurity challenges. This paper demonstrates the connection of cybersecurity awareness trainings to motivational factors and the help of a systematic approach, such as Octalysis framework, in comparing the various aspects of different awareness programmes. The paper also presents results from the key informant interviews from experts and implementors of cybersecurity awareness programmes, and serious games on key consideration to integrate the cybersecurity awareness initiatives and game-based learning to improve learning outcomes. The study gathers user journey experience from public sector to sustain their learning experience. Finally, the study presents a users' experience design which can optimize learning and sustain learning experience in cybersecurity awareness with game-based approach.

Keywords: cybersecurity awareness, game-based learning, serious games, Octalysis, simulations for e-learning, public sector capacity building

Building Better Online Communities in the Post Pandemic World

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Abstract: Recent world events have shifted our educational focus to a greater emphasis on online learning and working environments. Given the immediate and emergency moves to online learning, the effectiveness of these shifts has come into question in many institutions of higher education. What has become clear is that the longer the pandemic lasts, the more ingrained and assimilated virtual learning will become in our educational institutions. We argue that this crisis, while tragic, has also simultaneously created opportunities that would not have presented themselves in a slower, more controlled transition. The rapid changes caused by the pandemic continue to be a catalyst for the evolution of online education, in positive ways; through an unanticipated world event, acting as an essential precursor to disruptive, progressive innovation. This paper examines the critical elements of effective, online learning communities. The Organization for Economic Co-operation and Development (OECD) (2017) calls for immediate paradigmatic shifts in the way employment skills are addressed in educational institutions and society in general. These urgent demands derive from a wide variety of local, regional, national, and international sources, including the Conference Board of Canada (2016), and United Nations Educational, Scientific and Cultural Organization (UNESCO) (2017). These sources recommend increased emphasis on skills development in complex problem solving, critical thinking, creativity, negotiation, people management and collaboration. Our health as individuals and communities exists within a future that continues to be fraught with complexities related to pandemics, racial inequalities and unrest, climate change, and a digital news media laden with artificial information, misappropriation of facts and

manipulation of knowledge to benefit those in power. We are at a critical juncture, and this paper describes key features of effective online learning communities to ensure better, stronger digital learning and working spaces.

Keywords: online learning communities, post-pandemic, digital learning

Challenges in Educating Student Art Teachers in Technology Comprehension

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Abstract: This paper focuses on a study of what teaching competences technology comprehension requires (TC) for teacher education. The background for the study involved a national initiative about developing TC as a teaching subject and integrating it into the existing Danish school curriculum. To follow up on a large-scale national experimental project in primary schools, the ministry launched a small-scale qualification project to promote this integration and develop teacher educators' competences. The project involved teacher educators representing several school subjects, including visual arts, which was the scientific object of the study in this paper. The qualification project was framed as a network process with research input and peer discussions of learning designs among a group of 20 researchers and 40 teacher educators. The teacher educators applied their produced designs as a part of the ordinary curriculum for teacher education, with two interventions at their home university and shared experiences with the group. This paper reports these interventions. The theoretical framework of the study drew on subjects related to visual arts education, TC theory and social material insights. As part of the larger qualification project, the methodological approach employed design-based research (DBR). The study demonstrated how the implementation of TC in an existing teaching subject became a negotiation between the teaching subject, the students and the teacher regarding how to integrate a new aspect of professionalism into visual arts education. When incorporating elements from computer science into visual arts education, the

levelling of two different paradigms are crucial. Although digital technology has been a tool for practicing visual arts for 20 years, both students and teachers found it difficult to implement programming and computational thinking elements and maintain the art focus. This created a new challenge for the art teacher, who was forced to develop re-conceptualisation skills by converting programming into hacking activities and thereby facilitating the students' artistic approach to TC.

Keywords: technology comprehension, student teachers, visual arts, programming, teacher educators

Building Organisational Capacity for Blended Learning: An Evidence-Based Approach

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Abstract: Blended Learning has become a vital part of Higher Education's teaching strategy. The Covid-19 pandemic has demonstrated the need and demand to combine the best from online and face-to-face; synchronous and asynchronous. Simultaneously, it has exposed deficiencies in the sector's capacity to deliver high-quality and effective blended learning. As a consequence, universities need a mechanism for identifying i) current capacity to deliver blended learning, ii) the work required to achieve the ideal state, and iii) a reliable measure of their progress towards it. Many models of blended learning have been proposed in the literature, along with numerous examples of good practice. However, there is no single framework that defines all the elements required to deliver a blended learning approach and allows Universities to easily benchmark their organisation's capacity. This paper presents the rationale for such a framework together with a high-level design; it explores its possible use in the implementation and evaluation of an HE blended learning programme. By combining previous experience in use of an e-learning Maturity Model to assess organisational capability, with an extensive review of current literature, the authors propose an evidence-based framework for blended learning. The framework defines the key elements required, including the environment, the curriculum, the educators and the learners. By clearly defining the relationships between the elements, and capturing the attributes for each, the

model can be used to assess an organisation's capacity to deliver effective blended learning. The authors have curated and synthesised hundreds of good practice guidelines and quality criteria for blended learning and, drawing on their own experience in this area, have distilled them into a set of clear performance objectives for each element. This is presented as a checklist for organisations to determine their current state and provide clear goals to work towards. Regular monitoring and review of these objectives can be used to measure an organisation's progress and its relative maturity as a blended learning provider. The paper concludes with some early examples of its use to develop organisational capacity in a UK University, together with recommendations for future development and application in Higher Education quality management.

Keywords: blended learning, organisational capacity, implementation, blended learning framework

Connecting the Dots: Putting Instructional Design Theory to Practice in Online Courses

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Abstract: Many higher education (HE) institutions struggle to connect their lofty goals for exiting students with their operational decisions around programming, especially when those programs are offered fully online. Scholarship is showing that the root of this disconnect often lies in the instructional designs (ID) of programs and the teaching and assessment approaches these designs support. The study forms part of a larger study whose aim was to apply a macro/meso/micro-driven action research initiative to align ID models being used by instructors with 21st century goals and contemporary learning theories. The aim of the study was to determine the impact of this initiative on learner profiles. The study focussed on working adult students (n=2,300), the majority from socially and academically disadvantaged backgrounds, enrolled in a 2-year full time technical institute in Chile. An action-based research approach was used involving both qualitative and quantitative data collection tools including focus groups, extensive field notes, observations and surveys. The data collection took place over 8 months, between

2020 and 2021, during which time changes to the ID model, teaching approaches and virtual pedagogical resources were mediated. Perceptions of students and teachers of the changes were collected through pre, mid and post questionnaires and in-depth interviews. Results show a salient transition among students from thinking and learning autonomously, i.e. alone, in isolation, to self-directed behaviours that involve engaged participation in social collaborative learning opportunities within and beyond the virtual learning program. Importantly, evidence also revealed many students evolving from positions of disadvantage and lacking to ones depicting confident, communicative, involved and aspiring identities. These findings underline the potential that wider application of such ID models in online learning practice could have for educational development. The research could be a contribution to the emerging instances of online learning which are increasing rapidly in the wake of the COVID pandemic both in Chile and abroad. The results not only have theoretical relevance for e-learning research, but also provide empirical evidence for understanding and effective decision-making in a cross-section of institutions that offer programs through this modality.

Keywords: instructional design, higher education, distance learning, contemporary learning theories, 21st century learning goal, connecting theory to practice

Exploring the fit Between Learner Characteristics and Learning Environments

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Abstract: Learner characteristics differ in many ways, e.g. learning styles, learning needs, and motivation. Such diversity means that learning methods and effectiveness are likely to vary in different learning environments. Each type of learning environment, whether it is face-to-face classroom learning, blended learning, or online learning, offers distinct design elements and features that make them more suited to some learners' characteristics than others. Therefore, a good understanding of how learner characteristics may account for their preferences for certain learning environments is a highly relevant area of investigation for today's educational institutions. Employing a two-stage exploratory sequential mixed

methods research design, this study first conducted a qualitative study (i.e. focus group interviews) to understand learners' different reasons for liking or disliking a learning environment. These reasons provided the basis for the subsequent analysis of learner characteristics. A follow-up quantitative study (i.e. questionnaire survey) performed a factor analysis to further categorise these reasons into four learner characteristics: desire for direct support, digital readiness, learning independence, and online hesitancy. Another cluster analysis, based on the four learner characteristics, identified three groups of learners: classroom learners, insecure learners, and online learners. Analyses also found that learner demographics largely had no effect on their characteristics and their preference for a learning environment. This study helps provide some insights into why some learners perform well in certain learning environments, but others find it challenging. In addition, the findings can be useful for educational institutions when designing their learning environments to meet diverse learning needs.

Keywords: cluster analysis, higher education, learning environments, learner characteristics, learning needs

Comprehending Entrepreneurship Learning Through the Lens of Innovative Teaching Pedagogy: India Vs Germany

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Abstract: This paper aims to understand the innovative teaching pedagogies used for entrepreneurship courses in Indian and German universities and its role in imparting entrepreneurial competencies among university students. The paper adopts an exploratory research design capitalizing on authentic and reliable secondary data through exhaustive studies of reputed journals/literatures, data sources from several universities, and international bodies/organizations. The underlying aim of this study is to identify the commonalities and differences between the approaches used by India and Germany. The findings presented in this paper will list down the innovative pedagogies and learning methods used in entrepreneurial education in Indian and Germany and will map its usefulness in developing entrepreneurial competencies among university students. The study

will also present the comparative analysis between the various innovative pedagogies adopted by Indian and German universities for entrepreneurship courses. The value addition of this research lies in presenting a brief review on innovative pedagogy tools and techniques adopted by educational institutes in Indian and Germany. In addition, this study will also suggest the new learning methods that can be used for teaching entrepreneurship courses in universities. Furthermore, these methods can help in empowering students to be proactive and will help them to have an inclination towards entrepreneurial thinking. The review will be to the extent of considering research articles/journals/publications focusing primarily on innovative teaching, learning techniques/programmes run by educational institutes at University/College level for entrepreneurial education as primary focus of the study. Validation of Indian and German innovative pedagogical tools and techniques in a specific context can be studied further in order to understand that whether these approaches are 100 per cent transferable to different cultural contexts.

Keywords: innovation, pedagogy, entrepreneurial education, entrepreneurial competencies, entrepreneurship courses

Learning L2 Through the use of Technology Outside Class

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Abstract: With the development of information and communication technologies autonomous learning is increasingly a self-initiated process that is taking place in informal contexts not mediated by and without the knowledge of teachers. Thus, the current discussion on supporting structures for freedom of action demands a greater understanding of the complexity of learners' autonomous learning beyond the classroom. This paper explores student self-initiated language learning practices and their attitude towards out of class learning in order to support their foreign language learning process as well as their more general attitude towards out-of-class language learning. Since current research on computer-assisted language learning (CALL) has suggested a number of technological opportunities for language acquisition, students benefit from being encouraged to use technology for language learning on their own outside class. Therefore, the use of technology outside of the classroom by Japanese university students to self-initiate

their language learning is investigated by this paper. A questionnaire was sent to 150 students over the internet and followed up by 20 targeted in person interviews. The responses revealed that most students were actively engaged in the use of technology, however there were differences among the students including in their skills of language acquisition. Findings in turn leads to a better understanding of students' actual practices and learner use of English outside class to provide opportunities for teachers, policymakers, and the wider community to gain insight into this phenomenon for fostering learner autonomy in the EFL context.

Keywords: out-of-class learning, technology, self-regulated learning

Innovative Remote Laboratory to Enhance Remote Learning for HE Digital Electronics Subjects

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Abstract: The COVID-19 pandemic has forced engineering disciplines to rethink practical activities which are imperative for development of engineering skills in higher education. The main challenge is developing new practical activities that suit remote learning whilst maintaining the experiences of an in-person lab session. This paper outlines the development and implementation of a remotely accessible undergraduate laboratory exercise using off the shelf equipment and remote learning software. In the described lab, students learn the fundamentals of digital systems and the process of using software to design logic circuits, through to implementing and analysing these circuits on an electronic board. The remote lab was successfully implemented using a camera, NI ELVIS II device with a Digital System Development Board (DSDB) and programmed using NI Multisim. The paper describes the development and transition of a traditionally in-person lab to a remote application whilst keeping the same intended learning outcomes and making sure a blended approach can be used in the future. Students remotely trigger inputs (as they would do in-person) to see the cause and effect of their design on the real hardware by pairing visual switches on screen to the physical switches on the board. The students use the camera pointed to the device to see

how their designs behave when implemented on the real hardware. The designed lab has already been undertaken by more than 100 undergraduate students from a variety of engineering programmes over a series of multiple sessions. The paper discusses the feedback received from the use of surveys, semi-structured interviews and focus groups of students and academics involved in the development of these remote labs. The discussion focus includes the ease of use, relevance to core subject material and if the practical activities help with their understanding of theory. The paper then concludes by exploring future developments as well as the lessons learnt.

Keywords: remote learning, remote laboratory, digital electronics, blended learning, online delivery

Reflecting on the Experience of Forced Transition to Distance Learning During the COVID-19 Pandemic

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Abstract: The emergency transfer of the educational process to a distance format in March 2020 was stressful for all universities without exception. The Ural Federal University, being the largest educational institution in the region, has done everything possible to provide conditions for the implementation of educational programs in the distance format as soon as possible. The understanding of the need for a radical restructuring of the educational process, on the one hand, united the efforts of the university administration, faculty and students, and on the other hand, caused uneasiness among the participants of the processes and stress for the entire educational system. During the first wave of the pandemic, it was important for the university to ensure the continuity of the educational process, to conduct exams and an admission campaign in an online format. Reflection the first experience of distance learning and the university's systematic approach to the introduction of digital technologies made it possible to overcome the identified

problems and adjust the actions of participants to preserve the quality of education during the second wave of the pandemic. The aim of this paper is to study the attitude of the main participants of the educational process to the distance format. The article presents a comparative analysis of the results of surveys of faculty members and students of the Ural Federal University conducted at the beginning of the emergency transition to distance learning and a year later. The research allowed us to study the experience of switching to distance learning at the largest Russian university, as well as to trace changes in the assessments of participants in the educational process of the opportunities and limitations of e-learning and distance learning technologies. The results of the study can be used by other universities to improve the model of the educational process in a distance format.

Keywords: COVID-19, higher education, forced distance learning, UrFU, organization of the learning process

The Fourth Industrial Revolution and Higher Education in Africa: A Systematic Review and Implications

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Abstract: The fourth industrial revolution is upon us with several countries being in the preliminary stages. It is said to change the way we live and the way we work. The fourth industrial revolution is about digitalisation and automation of work and is viewed by many as the most important societal and economic trend in the world. This is a trend that will change the nature of work, societies, and businesses in the coming decades. The fourth industrial revolution has a significant impact on education systems around the world which is why Africa needs to continuously research how best they can incorporate the fourth industrial revolution into their current education systems. The Covid-19 pandemic has led to a massive impact on people in all industries and sectors around the world including the education sector. Furthermore, the Covid-19 pandemic is forcing most universities to use online distance learning and e-learning as this has increasingly become important in maintaining prominent levels of adaptation in the future. This is one of the reasons why the fourth industrial revolution has become an important subject. This paper looked at the fourth industrial revolution and what it means for higher education in Africa. The methodology includes reviewing of 42 scholarly journal articles. The main purpose of this study was to get an understanding of the

emerging technologies in industries and education and the threats and opportunities that are posed by the fourth industrial revolution in Africa. The paper concluded by reviewing journal articles on how best African universities can create capacity for the fourth industrial revolution.

Keywords: fourth industrial revolution, emerging technologies, creating capacity, higher education, trends, coding

Developing Training Materials for Entrepreneurial Skills: Identifying Processes, Principles and Core Skills Through Case Studies

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Abstract: The study reported in this paper aims to address the challenge of entrepreneurial skills shortage by sharing the experience and findings of developing entrepreneurial skills for women and young graduates in the agri-food and creative sectors through effective online training material development and implementation. To achieve this aim, this paper analyses four projects, and identifies common themes in terms of projects, processes, principles, and core skills for developing online training materials. All four projects provide online training materials combined with multiple complimentary support schemes. Using the projects as case studies, this paper examines in particular the projects' aim and training objectives, processes and the core skills covered in the training modules. The findings of this paper are used to propose a framework for projects, processes and design principles, with the aim of enabling the development of entrepreneurial skills through effective online training design and implementation.

Keywords: entrepreneurship, entrepreneurial skills, online training, case study

An Augmented Reality Mobile Learning Experience Based on Treasure Hunt Serious Game

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Abstract: One of the playful activities used in education is the treasure hunt, a serious game that allows students to work cooperatively. This activity stimulates different cognitive processes connected to accurately reading the clues and understanding them, and extremely effective to elaborate a collaborative strategy necessary to find the hidden objects. Augmented Reality is an innovative technology with a growing potential in promoting new scenarios to support teaching and learning processes. In this paper we present a learning activity based on a treasure hunt serious game developed with ARLectio[®]. ARLectio[®] is an augmented reality authoring tool aimed at supporting the creation of educational resources that leverage the AR technologies to improve students' engagement. ARLectio[®] is characterized by an intuitive user interface that supports educational content creation based on different media types, such as: text, images, video, and 3D model, that will be accessed through mobile AR applications. From the architectural perspective, ARLectio[®] consists of a web-based AR authoring tool addressed to teachers for the creation of educational contents, and a mobile App in which the content is consumed by students within AR based educational activities. In the scenario described in this paper, ARLectio[®] is used by teachers to design an educational treasure hunt activity that will be accessed by students through their mobile devices. The topic of the treasure hunt is "Climate change and environmental sustainability". In a pilot study presented in this paper, students were divided into small groups, and they collaboratively interacted to solve some treasure hunt enigmas. The clues and enigmas are related to the school curriculum. For example, clues include the solution of simple mathematic and linguistic problems as well as historical references and notions of geography. The results of

the pilot demonstrated a positive effect of the use of AR technologies in the level of engagement of students in the learning activities.

Keywords: augmented reality, treasure hunt, mobile learning

Distance Higher Education Learning and Professional Pedagogy: Training the Trainers

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Abstract: The global disruption of all physical educational activities due the covid-19 pandemic impacted among others also professional development (PD) activities of higher educational faculty members and staff. Teaching and learning had to be organized exclusively online. This transition is not straightforward as it often requires a different way of facing new challenges, or even a cultural change in all involved stakeholders. Hence, instructional designers, but also instructors and researchers need to consider multiple factors related to online education instructional design. In this empirical study, we present in detail the views and needs of twenty-three higher education faculty members, on their preferable pedagogy for distance training that had to replace a face-to-face one, in the frame of a multinational capacity building project. The core research question was “what are higher education instructors’ views and educational needs toward meaningful and effective pedagogy of PD teaching and learning activities both in a face to face and an online training process”. A mixed research method was employed in the form of a 22-item questionnaire (pilot survey) combining qualitative and quantitative data in the form of open and closed questions, respectively as well as observation. The examined research indicators were the preferable training form, methodology, assessment, and feedback. Findings suggest that in online PD, a flipped learning approach can accommodate the needs of academics where online meetings can be dedicated mainly to critical discussions and practical applications

based on prior asynchronous individual study of theoretical material. Based on polarizing perceptions regarding assessment and grading, participants' PD work was evaluated qualitatively for positive motivation through critical reflection and feedback towards excellence. This knowledge can be useful and support continuous professional development initiatives in the design and implementation of effective e-learning strategies.

Keywords: distance training, higher education, professional development, capacity building, instructional design

Onboarding Challenges in Online and Blended Courses: Reviewing Virtual Cross-Country Collaboration of Student Teams in Higher Education

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Abstract: The proliferation of international online collaboration in higher education as part of the curriculum raises questions of how to successfully start these online courses and prepare student teams to effectively work on a project over the course of the semester in a virtual environment. Our paper aims to analyse the possibilities of onboarding student teams to an intercultural virtual course and what teachers need to be aware of when designing such learning environments. Using a literature review (Tranfield, 2003) as a basis for our research, the results show the importance of the following aspects, when designing the onboarding process of intercultural student teams in virtual courses: meaningful use of technology, precise and communicable course objectives, group formation process, focus on socializing activities and community building as well as common collaboration rules, and general aspects like a clear definition of the teacher's role and intercultural training. The results suggest links for teachers, developers and researchers of onboarding possibilities for intercultural virtual teams.

Keywords: virtual collaboration, onboarding tools, intercultural teams, higher education

Conceptual Recommendations for Collaborative and Experience-Based Learning in Virtual Environments

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Abstract: This paper presents conceptual reflexions and technological recommendations for the development of virtual environments (VE) in the context of collaborative and experience-based learning. During the COVID-19 pandemic, the need for remote collaborative virtual reality environments (VRE) in the educational sector significantly raised, therefore the ongoing research and development efforts increased especially on VRE for student learning groups. Hence, we reflect on social presence as a key factor for the design of virtual laboratories to support experience-based learning in groups. The concept of social presence is an important factor for trust in remote teams as a basis for meaningful experiences in learning labs. In this context, we develop conceptual structure to design a VR-Lab by following three steps. First, discussing theoretical and empirical findings on social presence with respect to learning processes and group work. Concerning these findings, we explore the relevance of design components for social presence in VRE. Second, we derive an analysis grid of components and their dimensions of design concepts for social presence in VRE. Additionally, we rate their potential to support collaborative and experience-based learning. Third, based on the evolved analytical framework we discuss existing technological concepts, prototypes and use cases to implement collaborative VRE with regards to their effect on social presence within learning processes. Summarizing all these findings leads to a set of conceptual recommendations for the design and realization of a VR-Lab for learning groups with a focus on social presence.

Keywords: collaborative learning environments, social presence, virtual environments, technological modalities of virtual environments, avatar, interactivity

Social Presence in Times of COVID-19 Distance Teaching

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Abstract: This paper presents a qualitative research study at an Austrian teacher training university. After having a look at the basic terms of Emergency Remote Teaching (ERT) and the concept of social presence, the study which was carried out from April to November 2020 is presented. Pre-service teachers were interviewed at two points of time (spring and fall 2020) about their experience with regards to switching all courses to Emergency Remote Teaching (which means changing from classroom teaching to online-teaching due to Covid-19 regulations). The interviews focused on the experience of social presence which means the perception of other people (university teachers and students) as individuals. The results show that students experienced changing to distance teaching as quite positive at the beginning. However, they suffered from lack of synchronous exchange. This is especially due to the fact that not all university teachers could cope with ERT and were not tangible for the students. Although the results are not representative, they give some interesting insight into the conditions under which online learning can be successful.

Keywords: emergency remote teaching, qualitative research, social presence, distance learning, Covid-19

Narratives in Gamification: Considerations for Supporting Digital Literacy of the Elderly

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Abstract: Many publications have been published on gamification in recent years, especially in the educational context. Research suggests that gamification can

positively impact the learning experience and increase learner engagement. So far, gamification elements have been used or examined primarily to signal performance and progress. However, immersion-oriented elements or mechanics, such as narratives and storytelling, have been examined in research studies less frequently. Previous studies on gamification neglected the group of senior learners, although gamified systems hold a motivating potential for all ages. Therefore, this publication presents considerations for a narrative as part of the gamification approach for senior learners in the ePA-Coach project. The project aims to develop an e-learning environment for the elderly to improve their digital literacy in the context of the German electronic health record (EHR). Based on the review of the current literature, this paper provides an overview of different definitions, types, frameworks, and application examples. On the basis of this overview, we derived an approach and requirements for designing narratives in the context of gamification. Furthermore, we outline considerations for designing a narrative for senior learners with focus on learning outcomes in the field of digital literacy related to the use of the electronic health record. This narrative includes the mission called *Find & Fill the Golden Record* in which senior learners visit different places in a virtual small town. We describe options for design of the narrative including the stations as part of the learner's journey. The narrative was developed based on the derived requirements for designing narratives, the reification generic template by Mader et al (2019), the brainstorming design-thinking method, and qualitative feedback from experts. The narrative approach described in this paper offers a first conceptual approach for the development of narratives for gamified digital learning applications for the elderly that other researchers and designers can use and extend. The paper ends with conclusions and next steps in the research and development of a narrative as part of the gamification approach in the ePA-Coach project and proposes recommendations for further research.

Keywords: narrative, gamification, learners' journey, e-learning, electronic health record

On-Demand Placement Test Options Within a Moodle Environment

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Abstract: Members of a private Liberal Arts College in Japan have administered a placement test for new, returning, and transfer students at the beginning of each academic year for more than ten years. The placement test until the onset of COVID-19 in 2020 had been a 57-item test composed exclusively of material from Cengage Learning for use with the World Link textbook series, the series of choice for all first-year students. Since 2020 and the onset of the COVID-19 pandemic, the placement test has changed from an in-house sit-down event to an online, On-Demand format. Audio questions were removed, and questions with meaningless Facility Index rankings were removed to be replaced with original items. The once 57 item test became a 40 item, smartphone-friendly test. The same 40 item test from 2020 was administered again in 2021 to a cohort of 504. Four hundred eighty-one took the test, leaving 23 non-participants to be placed manually. A mean score of 51.24% was observed with a more or less normal bell curve. Students spread across eight departments need placement in level-appropriate, uniformly sized classes. Recent years have shown that score clustering occurred where classes needed dividing. Clusters refer to identical scores that group students into subgroups making line-drawing a subjective, time-consuming task. The trouble score clustering had to be addressed given the time constraints for announcing class memberships and being ready to answer allegations of unfair or capricious approach to class membership creation. In answer to this, the test items were re-weighted from a uniform weight of 1.00 to weights within a set range (1.00 - easy to 1.09 - difficult) to ensure greater score diversity and hence ease with student ranking. The 2020 40 Item test's Facility Index was used as a guide for setting the weights for the 2021 test. This paper will share the process undertaken to avert score clustering and enable class creation in an informed, principled manner, all within a matter of hours from data download with benefit to all concerned.

Keywords: ESL program, leadership, matriculated students, placement test, placement procedure, ranking, testing

Student Perspectives on the Digital Learning Experience During COVID-19 Lockdown

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Abstract: As a result of lockdowns due to the COVID-19 pandemic, students and lecturers in higher education worldwide had to move from campus-based teaching to digital learning environments. Almost over-night, lecturers and students had to adjust to teaching and learning through live streams like Zoom as well as video recordings of lectures. Several differences from campus teaching were immediately apparent. As an example, many lecturers experienced less interaction with their students during lectures, as most students were reluctant to speak or turn on their web cameras. This paper presents a study exploring the learning experiences and overall situation as seen from the student perspective. 15 participants were recruited among first- and second-year bachelor students enrolled in IT studies at a Norwegian university college. A qualitative approach was taken, and the students were interviewed in a semi-structured manner. This research reveals that the individual experiences differ greatly among the students, due to personal circumstances like family and living situation. However, challenges related to self-discipline, motivation and communication seem to be experienced by most of the participants. Our findings suggest that when facilitating for courses with a larger amount of the content delivered online, one should have particular focus on how to guide the students to be more independent and self-motivated, in addition to helping them develop a daily routine. For instance, the role of live lectures, as opposed to pre-recorded videos, may be a way of scaffolding the digital learning environment. Furthermore, there should be increased focus on how to support the students to meet with their peers. Measures could be social or informal gatherings, meetings in smaller groups, or group assignments demanding collaboration.

Keywords: higher education, COVID-19, digital learning environment, zoom, student interaction, qualitative study

Enhancing Pedagogy to Andragogy in the Redesign of Teacher Training Courses on Programming

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Abstract: Many countries have a new policy with an aim of involving computer programming earlier in the compulsory school curricula. In Sweden this should be implemented as a part of secondary school mathematics and technology. This reform has created a nation-wide need for teacher professional development with programming courses given by universities. For the universities this is a new learner group with a higher average age and different learning needs than the traditional younger students. The aim of the study was to identify and discuss opportunities and barriers for increasing the pass rate and learner satisfaction in programming courses for secondary school mathematics and technology teachers. Main research questions in the study were, 1) Which factors for increased pass rates and participant motivation could be identified for teacher training courses on programming? and 2) How might these identified factors be related to course participants learning needs? This study was carried out as a case study involving triangulation of multiple data sources. Data has been gathered in a combination of self-assessment questionnaires, course evaluations and essays written by course participants from three different course instances. A content analysis was conducted to find and group themes in the data that are relevant to answer the research questions. The analysis has been partly inductive, and partly deductive with adult learning as the theoretical lens. The study identifies 8 main themes that are important to consider as factors for course pass rate and participant motivation. The identified themes are: 1) Exchange of experience, 2) Practical work, 3) Help and support, 4) Alignment to prior knowledge, 5) Required time and commitment, 6) Level of difficulty, 7) Clarity and structure, 8) Participant expectation. Dependent on how these are addressed in teacher professional development courses, they can be opportunities or barriers for increased pass rate. The next step will be to apply and evaluate the identified themes in future course re-design.

Keywords: adult learning, andragogy, programming, teacher training, teacher professional development

Speculative Design as a Method of Inquiry in an Online Workshop Setting

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Abstract: This paper presents an empirical study and the resulting insights from a speculative design process in online workshops with students from a K1–12 teacher education programme. The empirical investigation consisted of five online workshops with the purpose of exploring Augmented Reality. Each workshop had a duration of 2.5 hours, with three to six participants per workshop. The theoretical frame was speculative design workshop and methods of inquiry inspired by Dewey, as well as the utilisation of storyboard and design tools for personal reflection. This paper explores three interrelated research questions: What are the implications of conducting an online speculative design workshop? How can speculative design be used as a method of inquiry? What are the potentials and challenges of the tools and exercises used? The research investigates the knowledge that speculative design workshops bring into play, as seen from two perspectives: the participants' learning process and the knowledge the workshops bring to the research field. It also investigates the implications of conducting speculative design workshops in an online setting, where it becomes essential to apply structured facilitation, and provide common tools that allow for creative and material exploration. Though the literature argues that speculative design provides an opportunity where the potentials uncovered are less influenced by the current implementations of the context under investigation. This research shows that working with speculations on preferred futures in various contexts is a challenging endeavour. The findings also show that the format can bring new insights for the participating students, and that it is essential to consider participants' well-being, learning frustrations, and keeping participants on track during the workshop.

Keywords: speculative design, online workshop, inquiry

Creation of Interactive Educational Trail by Secondary Education Students

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Abstract: The article is focused on modernizing and increasing efficiency of teaching process within environmental education in upper secondary education. It deals with application of several pedagogical approaches (interdisciplinary learning, cooperative education, outdoor education, mobile learning, location-based learning, e-learning) and necessary phases in the creation of an interactive educational trail by students themselves. The aim of the paper is to present the possibility of implementing environmental education for secondary schools, taking into account the above-described pedagogical approaches in order to make environmental issues more attractive. The described proposal was verified in practice through the project E.T. in Nitra (Edu trail in Nitra).

Keywords: environmental education, information and communication technologies, interdisciplinary learning, cooperative education, outdoor education, mobile learning, location-based learning

Future Teachers' Attitude Toward Using Digital Technology in Instruction: Questionnaire Survey Results

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Abstract: The role of digital technology in education is more important than ever. Due to the pandemic and the integration of digital technology into various areas of human activity (the so-called Fourth Industrial Revolution or Industry 4.0), teachers are required to adapt their teaching methods and to focus on helping their students develop digital literacy, which is one of the crucial skills in today's information society. In the light of societal changes, teacher education programs need to be modified. At the Pedagogical Faculty of the University of Ostrava, every future teacher is required to take the course Information and Communication Technology in Education. In the course, students learn how to use ICT in education. They familiarize themselves with the basic types of ICT tools, different educational programs and applications, online educational tools, and how to use the Internet for educational purposes. They also learn how to use the most common tools used in schools. The goal of the course is to teach students how to use digital technology in instruction to achieve educational goals. That is the only way digital technology can be beneficial to students rather than a distraction. Aside from choosing the appropriate technology, the teacher also needs to be able to use that technology in an effective manner. Because it is the teacher who is the key element in determining the success of using digital technology in instruction. When used effectively, digital technology can improve the education process and motivate students to become more engaged. However, the inappropriate use of technology could result in far-reaching consequences. Therefore, teachers should strive to improve their digital literacy and digital skills. The modern teacher should not only be an expert in their own field and be familiar with basic pedagogical and psychological principles, but they should also have digital skills. That is the only way one can be an effective teacher. Students from different programs are likely to have not only different levels of digital literacy, but also different attitudes toward digital technology. That is why a questionnaire survey was conducted to determine students' attitude toward digital technology and their level of digital literacy. The

paper centers on teacher education at the Pedagogical Faculty of the University of Ostrava, specifically on using digital technology in instruction. It also presents the results of the questionnaire survey. The results should help identify areas where student knowledge is lacking, allowing teachers to adapt their courses so that even students with limited knowledge can achieve the required level of digital skills and knowledge.

Keywords: future teacher, digital technology, education, digital competences, digital skills

Inclusive Multimodal Designs in Language Classroom: Three Empirical Studies

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Abstract: Few empirical studies have tried to integrate remedial functionalities in foreign language classrooms to enable inclusive practice, combining Universal Design for Learning and Computer-assisted Language Learning. To fill this apparent dearth in research, the author set out to study the affordances of remedial functionalities used in mainstream language classrooms. In three empirical classroom studies involving three interventions, the author tested the learning affordances of three Ebook prototypes with pedagogically informed remedial scaffolds in different mainstream language classrooms with subsequent semi-structured interviews consenting interviewees (n = 32). The author aimed at verbatim transcription of interviews, annotating paralinguistic features like laughter and circumstantial information, when needed for comprehension as well as prosodic features like emphases and rising nuclear intonation. Protocols were coded iteratively in a flexible-deductive way in which major coding categories and themes, when identified, entered into a dialogue with previous research, giving rise to further iterations and identification of subthemes. The studies of this paper are the first to attempt to explore in detail how remedial meaning-comprehension scaffolds are used by individual learners from struggling levels to top performance categories of proficiency. The three interview protocols suggested that learners in general used scaffolds for assisted self-regulation and self-efficacy but also for heightened engagement in acquiring receptive and productive lexical competences. Language teachers as well instructional materials designers can use

these results to inspire pedagogical and instructional designs. Today's nations across the globe need skilled labour forces speaking a foreign language and possessing 21st- century skills and therefore teaching designs that can reach out to the whole classroom to impart such skills can contribute to satisfy this need.

Keywords: universal design for learning (UDL), CALL, foreign language teaching, remedial, English as a foreign language (EFL), inclusive practice

Peer Observation and Evaluation of Synchronous Online Tutorials

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Abstract: The COVID-19 pandemic has resulted in Higher Education Establishments across the world moving a large proportion of their teaching online. This has required a rapid upskilling of academic staff who were required to learn how to use online learning environments and in particular synchronous delivery tools for the delivery of online lessons. In the process of upskilling to meet the demands of delivering lessons online, traditional teaching paradigms needed to be altered in order to fit with online delivery approaches. In order to deliver rapid online learning compromises had to be made as the online tools were used to implement traditional teaching paradigms. Concurrently new approaches for online lesson delivery were being developed which strived to make use of synchronous tools to support students in their learning. Moving forwards, it looks like online learning will constitute a significant part of future learning for many students in Higher Education. Traditional Face to Face delivery uses Peer reviewing as a means of supporting staff in the delivery of lessons across a range of interaction modes. This paper seeks to identify how supportive peer reviewing can be used to support and develop academic staff as they continue to deliver lessons online. The paper will draw on the work of Lambie and Law (2018), Law and Lambie (2020) which sought to identify best practice in running online synchronous learning events and will identify self-assessment criteria and a supportive peer review framework which will

help academics assess their online synchronous delivery. The paper will discuss an evaluation approach based on a Likert type scale for evaluating the delivery of an online tutorial session and will discuss how this pro-forma could be used in the peer review process.

Keywords: peer review, quality, synchronous, online, tutorial

Self-Paced Learning in Virtual Worlds: Opportunities of an Immersive Learning Environment

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Abstract: Digitalisation in education is inevitable and must be driven forward even more consistently. Accordingly, the current COVID 19 pandemic further underlines and accelerates this necessity. Instead of persistently philosophising about infrastructure and learning platforms, teachers and students are suddenly confronted directly with digital teaching and e-learning. Among technologies for digitalization there is one with a huge potential in the course of digitalisation in education, namely Virtual Reality (VR). VR can be applied as a powerful and multifunctional tool for accessing problems usually considered as hard to taggle. For education, VR can create a connection between abstract theory and real-world scenarios and makes the presentation of facts and applications tangible for students. In addition to a theoretical and literature-based consideration of VR in the concepts of e-learning and blended learning, this paper presents the integration of learning content based on VR through the LMS platform OPAL and discusses the achieved results. Linking to this, an additional chapter will discuss the promotion of the learning process through an immersive learning environment, i.e., what opportunities and challenges arise. The idea and implementation of a virtual research lab modelled based on the physical Industry 4.0 research lab by Professor Christoph Laroque and his Team Industry Analytics is intended to highlight the possibilities and potential of an immersive environment and provide an outlook for

future work. This paper addresses the questions to what extent and in which context an immersive learning environment can be more effective than traditional face-to-face learning environments in courses and seminars. Furthermore, challenges and difficulties regarding the use of immersive learning environments from the projects experience will be described. Thoughts and ideas on how these challenges and difficulties can be overcome sum up the considerations within this paper.

Keywords: virtual reality, immersive learning environment, learning concepts, simulation-based learning

IT as a Career Choice for Girls: Breaking the (Self-Imposed) Glass Ceiling

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Abstract: The lack of workforce in IT is a global phenomenon. According to Informatics Europe, the lower numbers of females studying IT at universities are evident in all Europe (in Master studies, the leader is Estonia with 38%, while in Bachelor studies the level is even lower - the top country is Romania with 30%). Awareness and training programs are offered for increasingly younger people (examples include the Hour of Code, or the ProgeTiiger in Estonia) and they bring in many young talents, but they tend to be predominantly male. IT-related competitions (including robotics, programming, and cybersecurity) pull in much more young men than women (as seen at e.g. World/EuroSkills, Robotex, European Cyber Security Challenge, and various olympiads). How and when girls should be reached to introduce IT careers is a big question with no clear answer so far. It has been suggested that the most crucial career choices are made either in late basic school or secondary school - but is it true? We have carried out four surveys in Estonia during the 2020/2021 academic year, three of which involved students - the CyberCracker survey for Grades 4-6, and the combined CyberPin (Grades 1-6) / CyberDrill (Grades 7-12, also involving a separate study for teachers). The total number of participants exceeded 22000, showing the difference of interests by gender already from Grades 3-4. The actual IT skills and problem-solving capabilities start to differ at Grades 5-6, and by the 7th, girls have fallen about 20%

behind boys. Moreover, in readiness to study IT in one's leisure time and seeing one's future in IT, boys are ahead for 35-40%. In the article, we will study the results and propose solutions for schools to avoid girls being left behind in IT. We also suggest some national activities that should already start in primary school. For the discussion, we will look at whether, how much, and how is it ethical to influence the career choices of young people at an early age - at the same time recognizing that if this is not done, the proportions will grow worse still, as the dominant mentality still seems to uniformly direct boys towards robotics and girls towards dancing.

Keywords: pedagogy, teacher training, digital literacy, informatics strategies, gender challenges

Factors Impeding South African Libraries, Archives and Museums From Collaborating for Digitisation Purposes

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Abstract: Academics can argue that without digitisation, e-learning cannot take place. This study aimed to determine the factors that prevent South African Libraries, Archives and Museums (LAMs) from collaborating to digitise their collections. The study aimed to fill a gap identified in another study, which unfolded that even though LAMs in South Africa understood the benefits of collaboration for digitisation purposes, these collaborations were not occurring. As such, the study's objectives were "to determine the factors impeding South African LAMs collaboration, and to determine what LAMs should do to overcome impediments to collaboration". To fulfil these objectives, a literature review was utilised together with non-standardised, semi-structured interviews. The study's sample size included 21 participants stationed at 16 different LAMs in South Africa. Following transcription, ATLAS.ti assisted with analysing the data collected. Some of the findings were that even though the ground staff is open to collaboration, there are various impediments to collaborating with other institutions. One impediment was the lack of buy-in from upper management. Another impediment being the lack of collaboration due to the shortage of staff found in South African LAMs, which leads to the overworking of staff and not having the time to collaborate. In adding to the value of the study, it was also essential to determine what LAMs could do to

overcome the identified barriers to collaboration. This paper can thus be utilised to help raise awareness of the hindrances to collaboration for digitisation purposes. Additionally, the study identifies ways to overcome some of these hindrances and foster more collaborations between South African LAMs for digitisation purposes. Conducting this study was essential, as these three institutions are houses of indigenous knowledge. Hence, the digitisation of their collections is critical for facilitating e-learning for the public space.

Keywords: digitisation, e-learning, collaboration, LAMs, impediments

Features of e-Learning in the System of Studying Social Responsibility of Students

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Abstract: The article discusses the features of e-Learning in the system of studying the social responsibility of students in the framework of the scientific project IRN No. AR09058126 "Social responsibility of students in the conditions of professional training in universities of Western Kazakhstan", funded by the Committee of Science of the Ministry of Education and Science of the Republic of Kazakhstan since 2021. Scientific works on corporate social responsibility contributed to the development of this research (F.Rosati, R.Costa, A.Calabrese, J.Lee, M.Cho, etc.). Of scientific and methodological value is the work of S. L. Davis, L. M. Rives, and S. Ruiz-de-Maya on the need to develop a concept of social responsibility that includes behaviour of the individual as a modern citizen. The study of J. C. R. Sousa, E. S. Siqueira, E. Binotto, L. H. N. Nobre on the perception of the subjects of the educational process of social responsibility, depending on the degree of discussion and the level of socialization of students, is significant. C.Roofe believes that the problem of social responsibility is not given much attention, which leads to a

constant decline in the moral and spiritual component of education in the country. The testing tool included one author's questionnaire, revealing the degree of awareness, personal attitude of teachers to the problem of the lack of social responsibility of students. The questionnaire "Ideas about social responsibility" was validated by specialists of the Biostatistics sector. The sample consisted of 103 respondents in random order, regardless of the age and teaching experience of the participants, as well as the academic disciplines taught. Next questions - 1, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15 when rounding, we gave the value of Alpha-Cronbach-0.7 (Alpha-Cronbach: 660927 and Standardized. Alpha: 669767), which corresponds to the required norm and confirms the validity and reliability. The features of e-Learning allow us to adjust our activities in a timely manner to achieve the goals set in the system of studying the social responsibility of students. We believe that e-Learning contributes to the personal development of students, thereby optimizing their process of developing social responsibility.

Keywords: university student, distance learning, e-Learning, responsible education, personal social responsibility, social responsibility of students

Analysis of the Curriculum of Secondary Technical Education Based on the Reflection of ICT Competencies

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Abstract: The paper presents the results of the analysis of the assessment of the acquisition of digital competencies of students of secondary vocational schools with a focus on the field of engineering in terms of: their importance for meeting the profile of the graduate; employability of graduates in the field; requirements of Industry 4.0; the difficulty of their acquisition at a secondary vocational school. The research team performed analysis of the implementation of the Framework Educational Program for the field of education 23-41-M / 01 Mechanical engineering in the conditions of secondary vocational school. The main tool of the quantitative research survey was an online questionnaire distributed to the

principals of secondary vocational schools with a focus on the field of engineering. The research survey took place in February and March 2021, the respondents were school principals and other persons responsible for the implementation of the school curriculum. The ICT competence of students is given very strong attention by teachers of secondary schools of engineering. They consider the acquisition of this competence to be the third most demanding in terms of its complexity. They consider ICT competence to be the most connected of all the requirements of Industry 4.0. ICT competence of graduates may be the second most important for employers and it is the second competence contributing to fulfilling the profile of a school graduate. ICT education is the fourth most important educational area in terms of engineering practice. And it is the most popular area for students. Two thirds of secondary schools rate the equipment with digital technologies as favorable and fully compliant. Analysis will enable us to provide FEP publishers, FEP implementing schools, graduate customers and the general professional public with supporting documents for negotiations leading to the optimization of educational documents in new and increasingly changing production and socio-economic conditions.

Keywords: secondary technical education, ICT competencies, framework educational program, education in ICT, Conditions for the implementation of the curriculum

The Changing Landscape of Digital Technologies for Learning

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Abstract: Digital technologies are and will continue to be changing the way we learn and teach today and in the future. This includes not only offering every learner and teacher equal access to these technologies, but it also involves completely new forms of content delivery. Additionally, digital skills must be fundamentally strengthened as a basic human skill that is urgently needed today. It is therefore essential that learners own or have easy access to the necessary digital technologies to participate fully in the digital education era. How learners concretely use them in diverse and creative ways is of particular interest not only for educators. In this regard, we sought to study the changing landscape of technology ownership and use by students for both learning and leisure. To accomplish this, we designed and conducted three surveys. After an analysis of related work, we present a comparative, quantitative analysis of the survey results from 2013 ($N_1=275$), 2015 ($N_2=336$), and 2020 ($N_3=481$). It investigates the evolution of ownership and use of digital technologies over the years. Then, we explore the extent to which the use of different digital technologies has changed during this period, and the purposes for which technologies are now used in enhancing and supporting student learning. We also present a qualitative evaluation of the learners' responses. The aim is to determine how digital technologies are used and how they may depend on specific learning contexts. Finally, we give some recommendations and suggestions for further research.

Keywords: digital technologies, technology ownership, technology use, digital learning, learner's digital behaviour

Improved Students' Intake and Better Conceptualization in a Flipped Classroom on-line

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Abstract: In this article I present parameters around 'babbling up' to improve learning in breakout rooms and assignment completion in a flipped classroom. Group discussions and activities were intended to instill interest and engagement and create communities of practice. As well, as we are mandated at university to cater to students in an EDII (equity, diversity, inclusion and indigenization) approach without yet any clear direction as to how to proceed, we devised group work for well-being and an evaluation scheme using follow-through, i.e. constant support during students' completion of assignments. The study is empirical as it is based on an instructor's journal notes. It is of a qualitative nature, as it is the best approach to uncover detailed information (Creswell & Poth, 2018) based on an analysis of instructional and observational notes. First we proceeded by trial and error; however overall results were positive showing that a number of factors contributed to success. Whereas, activity completion in breakout rooms showed the need for more structure and more stringent timelines as well as creativity, the 'babbling-up' of conversations had a positive effect on well-being. Final assignments showed that all students obtained high grades. Nevertheless, some students were not well organized and only completed their work at the last minute, proceeding more slowly than expected, due perhaps to cultural differences, subject background, individual needs, or just taking advantage of the positive climate created. Therefore, the conditions and structure of assignments was changed. Results show that a gaming aspect attached to work caused more engagement, for instance having groups prepare quiz questions for others. To enhance interest, instead of just assigning materials and providing links, it worked to encourage students to find other readings on assigned topics for them to explore, perhaps more suited to their individual styles and the instructor would follow-up in class, also checking contents of student proposed readings and provide corrective feedback. Successful applications useful in any on-line teaching are presented, based on relevant research in the field and findings from analyzing observational notes. Corrective measures taken are noted with their positive results.

Keywords: on-line learning, interactions in the flipped classroom, designing activities for improvement, intake, concepts

The Development of Critical Thinking Disposition During two Online Styles of Learning

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Abstract: The critical thinking ability learning process of two styles of learning was analysed. The difference in progress between conventional blended learning and fully online courses was discussed. The purpose of the course was to develop the critical thinking disposition (CTD) of freshman during 15 weeks of bachelor level classes. The number of valid participants for the blended course was 229, and for the fully online course the number was 162. The effectiveness of some factors of individual characteristics such as personality, cognitive style and literacy of science and technology (LST) on learning CTD skills was considered. Since LST factors may influence learning, cluster analysis using four factor scores was performed, and four clusters were extracted. In the results of a comparison of the participant's characteristics in the four clusters, final scores for CTD depended on the cluster, and personality and information processing style may have also contributed to the development of CTD. Though the CTD development process was studied by evaluating personality and LST, the contribution of the style of learning was limited to the relationship between reviews of peer's essays and overall assessment scores.

Keywords: fully online learning, blended learning, critical thinking, student's characteristics

Designing Rubrics for Consistency of Marking in Large STEM Classes

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Abstract: *Context:* In science, technology, engineering, and mathematics (STEM) subjects, project-based assessment has been a key component of the assessment landscape, due to its authenticity and effectiveness as a learning approach. *Problem:* Large classes require marking of student assignments to be distributed among several markers. This raises the problem of consistency among markers, who may interpret assignment requirements and marking scales differently. *Approach:* We tried two approaches to rubric design, in attempt to provide markers with clear guidelines for assigning marks, and thereby yield consistent results among markers. The first approach, employed to mark final reports submitted by engineering students in a capstone project class, used a 10-point qualitative scale that markers used to mark components of an assignment. The second, employed in marking a series of deliverables submitted by students as a group project in a Master's level computer science project class, used "Yes/No" questions to assess components of each deliverable. These were then aggregated, and converted into scores on the same 10-point qualitative scale. *Results:* We found that both approaches facilitated speedy but thorough marks: the 10-point rubric allowed markers to mark an entire final report in 60 minutes or less, while the "Yes/No" rubrics required between 10 and 20 minutes per deliverable, depending on size. Consistency was good for both approaches, with the "Yes/No" approach producing higher consistency at the expense of greater up-front effort. Also, while markers appreciated the speed of marking enabled by "Yes/No" rubrics, some were frustrated that there was no middle mark that they could apply to certain components. The 10-point rubric was easier to create, but produced lower initial consistency, which then had to be resolved in post-marking discussions between markers. *Conclusion:* Both approaches enable acceptable consistency when different markers mark the same subset of student assignments. The 10-point rubric takes little time to prepare and deploy, but requires more effort on the part of markers to produce acceptable consistency. The "Yes/No" rubric is easier for the markers to use, but requires more initial effort to create. Thus, the choice between one or the other is a trade-off between when effort is available to expend on consistency.

Keywords: rubrics, reliability, e-assessment, STEM, assessing large cohorts

Creative Audio-Visual Approaches Applied in Online and Hybrid Educational Designs

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Abstract: This research deals with creative audio-visual approaches applied in online and hybrid formats to support learning and inquiry in higher education. The objective of this study is to describe, explore and evaluate an educational design in which the students are introduced to creative approaches, to design and to the use of video activities, through visual facilitation, sketching, personal narratives and collaborative video production. The educational design is centred around inquiry processes and project- and problem-based learning. The empirical data consists of teaching observations, students' video productions and students' reflection entries in the Learning Management System during the course and written evaluations after completing the course. The analysis outlines the development of the educational design based on previous online teaching sessions and feedback from students. The findings show that while some students were initially challenged by the unusual teaching format, most appreciated the creative audio-visual approaches and high degree of experimentation. They responded positively to the use of various tools and collaborative activities and expressed that they have applied or plan to apply elements from the educational design to their own practices.

Keywords: visual facilitation, personal narrative, video sketching, collaboration, educational design, online

Art-Inspired Instructional Strategies in Online Education

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Abstract: Background: Art-infused learning provides a transformational experience for online students. Arts such as poetry, photography, and music can be incorporated into learning to achieve in-depth reflection, introspection, self-discovery, and knowledge generation. This scoping review answers the following questions: 1) what is the extent, quality, and foci of scholarly literature on the topic of arts-inspired instructional strategies in online education; 2) what are the themes common in published scholarly research related to the use of arts-inspired instructional strategies in online education; 3) what gaps exist in the published research on use of arts-inspired instructional strategies in online education; 4) what research methods have been used successfully in studying the use of arts-inspired instructional strategies in online education; and 5) what concepts and theories on the topic of arts-inspired instructional strategies in online education could be used as a conceptual framework to study arts-inspired instructional strategies as a disruptive pedagogy in online education? Purpose: This paper summarizes evidence from peer-reviewed literature related to arts-inspired instructional strategies in online education. The review offers insights into utilizing art as a disruptive pedagogy in online teaching. The outcome of including arts is adaptable, cost-effective, innovative, and effective learning environments that educate learners through creativity, leadership, and risk-taking. Methods: A four-stage algorithm was used with 128 references. The inclusion, exclusion, and screening process yielded 17 references which allowed the authors to compare themes during analysis. An inter-rater reliability check was conducted. Conclusion: The four themes are: 1) art-inspired teaching strategies facilitate transformational learning; 2) art-inspired teaching strategies offer a unique pedagogical strength in post-secondary online classrooms; 3) art-inspired approaches cultivate a sense of personal empowerment in students; and 4) art-inspired learning requires educators to utilize an intentional and skilled approach. Theoretical foundations supporting art-inspired pedagogy as a disruption in online education are discussed. The term Artistic Pedagogical Technology (APT) was discussed as an overarching concept incorporating art-inspiring and art-based teaching.

Keywords: art-inspired teaching, arts-based learning, online pedagogy, transformational learning, online learning

Using Arts-Based Instructional Strategies in Hybrid, Face-to-Face, and Online Nursing Courses

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Abstract: Background: Student disengagement is a far-reaching problem negatively affecting the educational environment and learner success. Educators need to be deliberate in their efforts to enhance learner engagement, beginning by using teaching strategies that help to create inspiring learning environments. Purpose: This paper explores the research question, What is the effect of arts-based instructional strategies on nursing student engagement in hybrid, face-to-face, or online learning environments from the instructors' perspective? Methods: A convenience purposive sampling process was used. We selected potential participants from a list of academics who had recently published articles in peer-reviewed journals on topics related to using arts-based instructional strategies in nursing education. Of the twenty-five potential participants contacted via email, 4 responded, provided informed consent, and were interviewed. Data were collected through one-to-one Skype or telephone interviews. The interviews were audio and/or video recorded, transcribed, and thematically analysed. Specifically, the interview transcripts were read several times by members of the research team. Fragments of sentences (or groups of sentences expressing a key idea) were highlighted by each team member independently. Team members then grouped these to identify core themes. Once the thematic analysis was completed by research team members independently, they compared themes identified and looked for commonalities and outliers. Through a process of discussion and negotiation, themes identified were merged, collapsed, and or renamed until team members agreed that the final themes were representative of the participants' comments. Conclusion: Associations were found between the use of arts-based

instructional strategies and educator reports of a more inspiring humanized learning environment, enhanced trust between students and the instructor, connection among participants in the learning community, and increased opportunities for learner self-expression. From the perspective of the instructors, these outcomes led to enhanced student engagement. Interestingly, instructors reported that when students were more engaged, they were similarly motivated and engaged in the teaching process.

Keywords: art-inspired teaching, arts-based learning, instructional strategies, nursing education, learning environment, learner engagement

Learning Through Social Distancing: WhatsApp as a Community of Inquiry

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Abstract: Once upon a time, researchers believed that the effective use of an online social media network to support a virtual community is dependent on the participants' interest in the context within which the community exists and the willingness of the participants to be part of mobile instant messaging groups. But I thought that interacting via WhatsApp groups will enable them to accept differing views and opinions as part of the group activities. This could ensure effective group engagement and co-creation of learning. I taught a 45 to 60 minute lesson every week to first-year students. The group was divided into smaller sub-groups and assigned individual and group tasks. I analysed the messages that they sent in the form of answers, responses and feedbacks. Four questions aligned to the community of inquiry framework, form part of this study: (1) Social presence - How has WhatsApp contributed to student's learning? (2) Teaching presence - Has the selected mode of engagement attracted students? (3) Cognitive presence - What kind of messages were conveyed? (4) Academic performance - Has it been beneficial towards their learning and in achieving learning outcomes? Data were collected during weekly lectures to first-year students using WhatsApp as a mobile instant messaging (MIM) platform and were analysed through WhatsAnalyzer. Finally, a matrix was proposed for the analysis of various aspects of communities of practice. I discovered that WhatsApp facilitated high levels of interactivity within the groups during the COVID19 lockdown, which will change the future of remote or online teaching. However, more research needs to be carried out to understand the reasons why some students learn better than others.

Keywords: WhatsApp, online teaching and learning, community of inquiry, student engagement, mobile learning

Student Perception of Learning During On-Site and Online Internships

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Abstract: The COVID-19 pandemic resulted in the instant digital transformation of regular, campus-based courses in higher education. Although this was an energy-consuming challenge, it was a familiar process to many universities. However, courses often include elements of skills training and internships. In many cases, these elements had to be re-planned or replaced. In other cases, it was possible to transform them to enable students to have internships by participating in workplace settings remotely. Consequently, universities have to evaluate and develop knowledge on student learning in this new setting. Therefore, the purpose of this study is to investigate student perception of the development of generic skills during internships. This qualitative study has focused on comparing the views of two student groups: one group that did their internships digitally and one group that did the same course, but on site at a physical workplace. The data collected and analysed comprised self-evaluations from 61 Swedish university students on a course in information systems development. The material was processed using directive content analysis guided by a predefined set of IS graduate core competencies from theory. The results from the study indicate that students who did an online internship perceived their development of *problem-solving skills* as being both deeper and broader when compared to the other group. Although there were more similarities in terms of *learning*, it was possible to distinguish different ways of learning due to the different circumstances. However, the most obvious difference in the analysed material relates to skills in *tolerating change*. Students who did their internships on site tended to perceive changing conditions as problems and obstacles, while students in the other group expressed the same aspects as learning opportunities.

Keywords: online internship, generic skills, student perception, COVID-19, information systems education

The Concept of Qualitative Analysis of Students' Behaviour in Learning Analytics for the Wiki and e-Learning Courses

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Abstract: E-Learning is often associated with Learning analytics (LA) as a tool used to determine the actual extent to which the students use the content. Traditional LA is able to provide data on the number of visits and retrievals of a given website or parts thereof. When using common LA tools (e.g. web metrics systems), it is usually possible to reliably measure data relating to the entire website or its individual parts. The analysis of log files (e.g. from LMS systems), on the other hand, allows for the identification of visits and retrievals for individual logged-in users. Both of these approaches to LA can be described as quantitative. However, quantitative metrics are often too vague and general to offer a better insight into the approach, behaviour, and perception of educational content. Such metrics measure the content in terms of quantity and frequency, overlooking the details of the individual students' approach. Therefore, we focused on the possibility of a more detailed method to monitor the students' activities in the course. We used a record of individual student visits which included recording of mouse cursor movements, insertions of content in forms, visited web pages, scrolling on these pages, and visits of external hypertext links. We have thusly obtained a large amount of qualitative video data concerning the students' movement in two e-Learning courses (e-Learning and wiki course) taught at our workplace. We created the records for individual students, so it is possible to monitor their progress through the course on various devices. We used these records to perform an analysis of student behaviour (coding, summarisation), which is presented here on selected examples together with the conclusions. Such qualitative LA allows us to have a different look at the students' perception of the course content and to find possible issues and areas suitable for a subsequent quantitative analysis.

Keywords: learning analytics, qualitative research, wiki, LMS, e-Learning

We Also Remain Active Online: Solving Global Waste Problems by Secondary School Students

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Abstract: The paper describes the environmental education teaching model, in which students actively participate in solving global environmental problems directly during formal secondary education. Education is based on the principles of personal commitment of students; effective interconnection of online and outdoor education; linking environmental education with current sustainable development goals; combining individual work of students with group problem solving; use of diverse ICT in individual phases of teaching. The model is based on interdisciplinary collaboration and connects outdoor education, information and communication technologies, individual and collaborative work of students and can be used in traditional and online education.

Keywords: environmental education, global environmental problem, waste, online education, information and communication technologies

Effective Learning Tools in e-Learning

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Abstract: Through the example of a university course in accounting, the article describes the results of using electronic space in the educational environment of a Russian university. The purpose of the article is to study the effectiveness of a new methodological approach with the use of digital technologies and an electronic educational resource developed on the Hypermetod platform by the author of the

course in the educational process for studying the discipline “Accounting” at the Ural Federal University. Based on an empirical study, the author shows how blended learning can solve many problems related to the quality of university graduates training. The problem of the quality of training of future accountants includes the formation of such competencies as self-organization and independent knowledge management, the ability to search for new information and ways of processing it. The article provides an analysis of student’s performance when studying accounting with and without the use of blended learning, as well as the results of a survey of students (N = 173) studying the course. The survey showed that almost half of the respondents saw undoubted advantages in the blended model of training: improved teacher-student interaction and the possibility of learning in an individual mode. However, some students do not see the difference between the traditional classroom form of presentation and assimilation of material and the use of electronic resources. As it turned out, these students are reluctant to solve practical problems that require comprehensive knowledge and are not fully aware of the possibility of further application of their skills. Based on the obtained results, the author further determines the initial conditions for the use of blended learning when teaching accounting, comparing foreign and domestic e-learning models. The study will be useful for teachers in the field of economic sciences, who reconsider their curricula in the conditions of digitalization of universities, as it can help them to create their teaching models or to improve existing ones.

Keywords: efficient technology, teaching accounting, digitalization, blended learning, Hypermethod platform, electronic space

School Leadership Strategies Facilitate the Emerged Transition From f2f to Blended Learning

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Abstract: In the unprecedented circumstances following the pandemic from March 2020 onwards, novel challenges appeared regarding both the effective Schools leadership and management and the accomplishment of pedagogical and learning objectives from distance. This new reality pushed for the adoption of innovative practices but at the same time uncovered underlying weaknesses. The teachers’ role, students’ and parents’ presence in the digital context environment has been

redefined at the Experimental School of the University of Thessaloniki (PSPTH), Greece. Under the School's coordination and the teachers' collaboration, the school community members had to work together to (co)design the e-school's virtual framework in the best possible manner. Distributed leadership supported overcoming obstacles, giving school members a sense of belonging to a community that was left with no option. Pre-existing relationships and strategies related to blended learning at school, helped in building the distance (for a long period) of emotional connection and laid new foundations. The authors explored the factors that shaped the transition from the face-to-face School to the Virtual School community taking into consideration school staff's and students' expectations, intentions and strengths and weaknesses as well. They based on an empirical research with observation and data collection, both from the school principal's diary as well as other quantitative and qualitative data, they have recorded the transition from f2f-education to blended learning (BL) with synchronous and asynchronous distance education. Moreover, they identified the need to overcome the new obstacles. The effective use of ICT, the level of familiarity with web-based platforms, the adoption of participatory processes and exploitation of collaborative e-tools for communication, training, studying, and teaching and learning with the continuous training, were the crucial points that shaped the new educational reality. A well-organized strategy emerged as a prerequisite for achieving the goals of the administrative, organizational and educational coordination and leading of schools from distance.

Keywords: school leadership, shared leadership, Covid19, emerged blended learning

Educational Videoblog as an Auxiliary Learning Resource: Opportunities and Limitations

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Abstract: The main idea of the paper is inspired by the author's desire to clarify the balance between effects and risks of using of educational videoblogs as one of the resources for organizing of the learning process. The format of educational videoblogs, which has been intensively developing on popular video hosting sites in recent years, has turned out to be popular among the mass audience. Using of educational videoblogs for the purpose of learning provided the teachers potential

opportunity to speak about complicated scientific topics in a simple and clear language. So, it is not surprising that the fashion for active using of educational videoblogs in the process of learning appeared in universities and colleges long before the beginning of the Covid-19 pandemic and the total quarantine. And it is possible to assume that sharp digitalization of education system in the situation of strict quarantine measures will make this fashion even stronger. However, there are still a lot of complicated questions about using of educational videoblogs in the process of learning. What are the real opportunities and risks of using of videoblogs in the process of learning? What educational tasks can be solved by using of videoblogs and which of them should be solved by other tools? Are there any negative consequences of using of videoblogs in the process of learning? This paper is devoted to the description of a sociological research, which was conducted for clarification of these complicated questions. The research was conducted by the author in 2020 and was organized for the clarification of real possibilities and limitations of using of educational videoblogs as an auxiliary learning resource. The initial hypothesis of the research was that the intensive use of educational videoblogs not only opens wide opportunities for the education system, but also creates several serious risks and problems. Using the data of his own research, the author tests this hypothesis and describes the specific possibilities and limitations of the use of educational videoblogs in the process of learning.

Keywords: videoblog, vlog learning, YouTube, digitalization, questionnaire survey

Using Gamification and Flipped Classroom for Remote/Virtual Labs for Engineering Students

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Abstract: Providing students with a virtual and remotely accessible version of in-person labs as well as virtual and interactive tutoring is a continuous challenge during the pandemic. The paper outlines the design, development, and implementation of 6 virtual experiments for mechanical engineering students, which combines gamification principles and flipped classroom. The virtual labs

allow the students to measure the data from the experiment as they would in reality. Instead of having a lecturer showing how to calculate the results based on an example, the students are guided through the theory like a computer game. The game has a step-by-step process which allows the student to find the correct solution themselves. The more they progress through the game the fewer guides and hints they receive. While at the beginning the students answer simple multiple-choice questions, later the students' progress to "minigames" where they place building blocks into the correct position to build an equation or a Freebody/kinetic diagram. The paper evaluates the feedback received from the students as well as compares this with the in-person version of the lab. The paper explores the option to adapt existing software to create a low-cost gamification and flipped classroom experience.

Keywords: gamification, flipped classroom, virtual labs, remote lab, virtual lab, enquiry-based learning

Network Interaction as a way of Innovative Development of the University: Case of Ural Federal University

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Abstract: Commitment to academic leadership and university's ambitions to occupy its niche in the global educational space, on the one hand, are an engine of the rapid digital transformation of the university. On the other hand, this requires the university to find new ways of innovative development and new opportunities for implementing advanced digital technologies in the educational process. In response to the global challenges Ural Federal University (UrFU) made two important decisions. The first one is to increase networking with the world's leading universities for providing digital content of high quality. The second one is to expand educational opportunities for students by using external educational resources ensuring individualization of their learning paths. Following these targets Ural Federal University has launched a project "Coursera for Campus" and granted access for students to a special university learning program which included more

than 150 online courses and about 40 specializations from Russian and foreign universities. This program met the needs of educators in modern digital content for using in existing curricula for credits and allowed student to master online courses for self-development. In this paper we present the results of the project including the description of a model of using online courses in the educational process and analysis of students' success, their difficulties and opportunities conducted with the help of Coursera analytics tools. Overall, the results have showed a sufficient online courses' completion rate (on average, 85% and 59% for compulsory and supplementary courses correspondingly), high test scores (average score is equal to 84 from 100) and considerable satisfaction of students. The main difficulties are related to accessing the learning program on Coursera, mistranslation of courses' content from foreign languages to Russian and insufficient level of students' time-management for completion courses on time.

Keywords: higher education, network interaction, educational technologies, online-courses, Coursera, individualization

Can Zoom Replace the Classroom? Perceptions on Digital Learning in Higher Education Within IT

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Abstract: The Covid-19 pandemic has forced institutions of higher education to create digital learning environments replacing physical classrooms. The transition to digital teaching has been both abrupt and challenging for many lecturers and students. While communication and interaction between lecturer and student or among students are possible digitally, there is a difference between sitting physically next to your fellow students versus staring into a "black screen". This paper investigates experiences of online learning among students in higher education during lockdown. We conducted an online survey (n=200) among students in Norway studying for a bachelor's degree in information technology (IT). We emphasize students' experience of the digital learning environment through questions on attendance and participation in live lectures, use of recorded videos,

use of chat and camera and their motivation for digital learning. The findings show that students to a large or very large extent (85%) follow live lectures, at the same time they also prefer that there are video recordings of the lectures. Furthermore, we see that the students are highly or very highly (65%) motivated for digital live lectures. Concerning student engagement, such as asking questions to the lecturer and answering questions from the lecturer in the Zoom-chat, we see that the answers vary greatly. They are distributed almost equally on the whole scale from a very small degree to a very high degree. Among our relevant contributions, we have learned that recording lectures is overwhelmingly considered positive among students and should be practiced when possible. Students rarely if ever turn on their cameras during lectures and do not expect others to show their faces. In general, among our respondents Zoom online lectures seem to work well, despite limitations to interaction and participation.

Keywords: digital learning environment, Zoom, live online lectures, higher education, online survey

OPSCCL: A Comprehensive System of Reviews for Chinese Learning Materials

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Abstract: The Online Platform for Successful Chinese Learning (OPSCCL) is an online platform providing reviews of Chinese learning materials, with a focus on those available online and for free. The platform is fully bilingual in English and Chinese and comprehensive in coverage. All learning resources are described using a detailed ontology of categories and labels. The categories are organised in a tree-like structure, with 5 categories (Chinese characters, Mandarin, Cantonese, Chinese culture, and Hong Kong culture) at the top and specific subcategories (such as ‘Mandarin » Reading comprehension » News’) at the bottom. Each review consists of an ‘objective’ and a ‘subjective’ part: The objective part lists information such as the name, link, category, price, romanisation, and a textual description of the resource, accompanied by screenshots. The subjective part includes our estimate in terms of language level (on an 8-level scale based on Europe’s CEFR) and a textual

assessment of the quality of the resource. The reviews are original and in-depth, not only describing each learning resource but also situating it (where applicable) in the context of related learning materials and Chinese language learning in general. For example, our reviews comment on whether standard conventions for romanisation are followed and whether the use of visuals in YouTube videos is effective for the given target audience ('foreigners' vs heritage learners vs speakers of other Chinese topolects), compared to similar resources. Our platform contains a search interface that lets users search for resources by any combination of criteria derived from our ontology (such as the type of romanisation used and the language level targeted by the resource). Students have the option of rating the resources and writing their own comments, thereby supplementing our official evaluation. We also provide a 'self-assessment system' for 3 of our 5 top-level categories (Chinese characters, Mandarin, and Cantonese), which consist of extended questionnaires with the option to upload writing samples, recordings, and videos. Their purpose is to let students voluntarily provide information to our teachers to facilitate the selection of suitable learning materials for further study. Overall, the platform was designed with the goal of promoting independent language learning in mind.

Keywords: language learning, Chinese language, Chinese culture, independent learning, classification of learning materials, user reviews

Studying Algorithmic Fairness in Moodle Learning Analytics Using Code Analysis

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Abstract: Online learning platforms gained popularity in recent years. These platforms often provide learning analytics, which offer educators prediction on students' progress. For this purpose, machine learning algorithms are employed. As machine learning reproduces bias from the training data, such systems can potentially deliver unfair or discriminatory results. If the system outcomes are used to provide assistance or guidance to learners or if they influence educators' grading decisions, biased predictions affect students notably. It is therefore necessary to assess the fairness of learning analytics systems, especially when they use machine learning. There are different ways to assess fairness of systems. In this paper, we

discuss fairness assessment using code analysis. While it has been shown multiple times using real world training data that machine learning systems are biased and potentially unfair the objective of code analysis without the use of training data is to show the fairness of a system and its limitations. Code analysis thus complements the existing data driven fairness metrics. We propose a code analysis procedure to study the algorithmic fairness that consists of acquiring code and documentation, identifying and description of relevant system components, and fairness risk assessment. We conclude that the use of code analysis for the purpose of fairness auditing requires specialized knowledge about the application domain, programming, and machine learning. It is very time consuming and dependent on quality of code documentation. We apply this approach on Moodle, a widely used open-source platform, and propose a code analysis procedure to study the algorithmic fairness of Moodle learning analytics. We identify relevant components (learning analytics is only a tiny fraction of the Moodle system), exam their role, and discuss the effect of data and user on fairness. Our analysis shows that Moodle learning analytics does not use protected attributes such as age, gender, or ethnicity. However, users must be aware of other potential fairness aspects. Furthermore, user's knowledge about machine learning, and evaluation metrics effects the fairness.

Keywords: Moodle, learning analytics, algorithmic fairness, code analysis, machine learning

Learning Analytics in Support of Video Corpus Construction and Exploration

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Abstract: The OpenMWS project applies learning analytics to university students' engagements with the videos hosted on social media platforms. Part of the online MWSWeb platform for Higher Education, OpenMWS is a specialised interface for video corpus construction and analysis that functions as an overall pedagogical support for video-based investigations into multiliteracies. At a basic level, it currently provides sequence-based viewings for YouTube videos. It splits these videos into sequences by interpreting the instructions contained in two uploaded Excel files, the first an Overview file containing a list of YouTube videos, the second,

a Transcript file, containing students' division of each video into time-based sequences that also include multimodal transcriptions and analyses of the characteristics of each sequence. A further level of engagement with videos is provided by tools for the online annotation of the each of the video sequences made available. The application of student-defined descriptors to these sequences creates a searchable corpus. Search tools then use these descriptors to identify sets of video sequences with similar characteristics. In this way, patterns are detected that highlight the presence (or absence) of specific sociocultural, methodological and genre features. Learning analytics help guide students through the various stages of corpus building. They also provide teachers and researchers with data about students' performance in the various tasks to be accomplished as well as indications of what additions and improvements are to be made to the individual corpora, and, more generally to the functionalities of the MWSWeb platform and its OpenMWS interface.

Keywords: OpenMWS; MWSWeb platforming analytics

An Innovative Platform to Promote Social Media Literacy in School Contexts

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Abstract: In spite of the impressive number of adolescents using social media, only a minority is aware of the risks associated with the use of the Internet. Hate speech, violation of personal rights, psychological attacks, deceiving people with fake accounts, as well as cyberbullying, harassment and insults are some examples of toxic content that can jeopardize adolescent well-being on the Web. Social Media literacy paths in school contexts provide students with the proper defence instruments to face these problems. Furthermore, it is important to underline the role of social media on both the intrinsic and extrinsic motivation of adolescents which has short- and long-term influences when using these virtual environments. However, traditional teaching approaches are not enough to engage students, and

the need for innovative learning activities and tools emerges. In this paper we present an online platform specifically designed to support the development of competences related to Information and Data Literacy, Communication and Collaboration and Digital Content Creation. These competences are connected to the most recent versions of the Digital Competence Framework for Citizens, and the Global framework of reference on digital literacy skills promoted by UNESCO. The platform is based on PixelFed, an open-source alternative to Instagram, so that adolescents can practice with an environment they are familiar with. Our platform extends the PixelFed environment with functionalities designed to implement use cases that make students aware of the mechanisms behind social media, such as the use of artificial intelligence algorithms to filter the content they have access to. This platform has been experimented during a pilot run with secondary school students, by proposing them educational activities based on our platform, aimed at educating and supporting students to increase their awareness and counteract the problems that arise within social media.

Keywords: social media literacy, social media risks, social learning environments

Media and Public Opinion About Online Learning During the Covid Pandemic: A Content Analysis of Newspaper Articles

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Abstract: Amid the Covid breakout in 2020, the Malaysian government was forced to temporarily close education institutions in the country to prevent the spread of the virus among students. All of a sudden, students found themselves struggling to accommodate to an online learning environment in which they no longer met their classmates and lecturers in person in a physical classroom. Instead, they needed to sit in front of a computer screen watching live-streamed or pre-recorded lessons, participating in online discussion forums, or submitting their homework to a virtual dropbox. Although some students might have had some experience with a blended learning environment, a complete online learning environment was entirely new to many. Apart from students, lecturers and education institutions from the primary

and secondary to the tertiary levels also had to cope with the changing circumstances and technical challenges of online learning. This study attempted to better understand people's discussions about teaching and learning in an online environment during the pandemic period, particularly the issues faced by students, lecturers, and education institutions. Using a text analytics software, this study performed a content analysis on a total of 322 newspaper articles that were published between January to September 2020 in the top three English newspapers in Malaysia. These articles covered issues pertaining to private and public education institutions from the primary to the tertiary levels. The findings show that the discussions can be categorised into twelve underlying themes, i.e. internet accessibility, learning continuity, learning environment, learning design, learning activities, learning resources, learning technology, learning performance, online learning benefits, online learning challenges, self-directed learning, and skill sets. The findings from this study can be useful to stakeholders in the education and training sector, e.g. students, parents, lecturers, governments, education institutions, etc., in different ways to further improve the overall teaching and learning experience in an online environment.

Keywords: content analysis, learning environment, teaching and learning, online learning, pandemic

Consistency is the key to Survival: LMS Design Principles in an Online Lower Limb Anatomy Course

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Abstract: In this case study style paper, we discuss an online lesson template created for a Learning Management System (LMS). This emerged from our need to convert a traditional face-to-face lower limb anatomy course to an online format for our Chiropody program. A recent search reveals a shortage of literature on the detailed components of an online lesson plan for an LMS. We present a novel template for an anatomy course that includes didactic asynchronous and synchronous lectures, a dry lab and a weekly live review session. Course content is divided into 13 units. Each unit consists of a repeating content template. This includes eight sections: an overview of the week's learning objectives, a weekly student "to do" checklist, live session details with supporting documents, a self-

study asynchronous lecture with supporting class notes, lab videos with worksheets and finally a summary of the week's key concepts and content resources including required readings. To increase learner engagement, knowledge check assessments are embedded into each self-study section using educational technology tools. Periodically we include course activities such as case-based discussion boards and formative knowledge application simulations. The use of a template organizes the population of content and strategically increases teaching effectiveness. The template helps to guide educators on the creation of learning material and activities. This approach maintains a welcoming standard teaching pattern for online courses to alleviate the uncertainty of teaching in an online environment. Based on anecdotal feedback, students were positive about their learning and the clarity offered by the online lesson template for course concepts. We plan to conduct future qualitative analysis to formally assess students' perceptions about the online lesson template.

Keywords: LMS organization, online anatomy course, online lesson template, student engagement, formative assessment

From Concept to Teaching Unit: Creating ICT-Supported Mathematics Teaching Units Based on Multicultural-Classroom-Aware Concepts

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Abstract: In many European countries, mathematics teachers feel the need for teaching materials being aware of and sensitive to the multicultural background of their classrooms (Favilli, 2015). A number of studies show that such materials should follow certain inclusive criteria (Favilli, 2013; Novotná, Ulovec & Moraová, 2020): Fostering tolerance, inducing interest, value diversity, emphasize cooperative learning, make use of different cultural backgrounds, use a variety of contexts and names from multiple cultures, avoid cultural stereotypes etc. Based on these criteria, the authors, in an international collaboration project, have developed a few exemplary teaching units (Novotná & Ulovec, 2020), as well as a

number of teaching unit concepts specifically designed for multicultural classrooms (Novotná, Ulovec & Moraová, 2020). In this paper, we demonstrate how – based on one of these concepts – teachers in the field can create their own fully-developed mathematical teaching units for their multicultural classrooms, making use of ICT tools and thereby following the recommendations of Ebenhofer, M. & Knierzinger, A. (2007). We use the concept of “How (seemingly) simple things can be very different (and difficult) in other places and cultures” to develop two teaching units: First, a teaching unit using Dynamic Geometry Software to analyse parabolas, and second, a teaching unit using CAS to analyse the relation between air pressure and the boiling point of water. These examples can then serve as guidelines for teachers on how to develop teaching units for other mathematical topics and different cultural backgrounds.

Keywords: ICT in mathematics education, multicultural teaching units, students with different linguistic and cultural backgrounds, intercultural classrooms

Learning Experience Design: A Framework for the Design of Online Guidance Components

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Abstract: Several factors, commonly referred to as threshold concepts, can act as barriers of entry for educators and students in an online learning environment. Additionally, many educators lack pedagogical training, and theoretical context, making it challenging to create effective online studies. Furthermore, they may lack personal experience in online learning. Thus, educators create courses based on physical classroom experience instead of an online learning experience, creating artificial learning thresholds. Identifying problematic areas and designing a suitable induction course can effectively introduce students to the learning environment, lowering dropout rates and decreasing online study anxiety. This study explores a process of identifying artificial learning thresholds and presents a learning experience design framework that can be utilised to overcome learning barriers while building courses in online environments. Online learning has specific

requirements to that of on-campus studies that can be challenging to identify by educators. It is particularly challenging to those educators who do not have a wealth of experience developing online courses. These problematic areas often only introduce themselves as issues when the student's grades are tallied, lack of engagement is experienced or when the student drops out. This is especially true now that an epidemic has accelerated the move to online studies, often with ill-prepared and pressured educators carrying the bulk of the frustrations that students might experience. Identifying potentially problematic areas and introducing the students to the experience early and effectively in a safe environment, will reduce anxiety and stress in the students and the teachers.

Keywords: instructional design, course development, learning experience design, learning thresholds, study anxiety, artificial learning thresholds, LXID framework, technology acceptance model

Trainee Teachers Preparation for Developing of Pre-School Children Information Literacy and a Computational Thinking

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Abstract: The development of information literacy and computational thinking, respectively algorithmic thinking, has become an integral part of the education for pre-school children in recent years. In this context, it is necessary to develop as well the relevant competencies by the students of pre-graduate studies in their field of studies. The aim of the study is to present the possibilities and ways of undergraduate students education through the theoretical analysis of information literacy and computational thinking. The study presents possible perspectives on the development of information literacy and computational thinking in the context of contemporary undergraduate students' education, thus it illustrates the possibilities in educating of pre-school children not only with using various teaching activities, robotic programmable toys or educational robotics.

Keywords: information literacy, digital literacy, computational thinking, algorithmic thinking, model of education, pre-school education

Teacher Motivation During the Corona Crisis, Facing "Black Screens" and Missing "Watercoolers"

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Abstract: There are several studies on how to motivate students. This is accomplished by flipping the classroom, by using student-active methods, games, simulations, etc. But how to motivate the teacher/lecturer in online education? It is often a very lonely experience to be an online teacher, as many students may not be comfortable interacting in this medium. Teachers and lecturers are obliged to keep up with the minimum standard of technology decided by their university/employer. But for teachers and lecturers, e.g., in music education, who are musicians, have degrees in history or a second language and are not tech geeks, or who are even close to using tech stuff other than their cell phones, TV set and the like, to keep up with education tech might feel like a daunting task. Regarding providing online education for them, it might be a matter of just connecting to an existing, well-tested system. However, the corona crisis has made many non-tech teachers and lecturers take the leap into a more online world of education. But with this, new issues arise, such as "black screens", from a classroom where one can ascertain to a certain extent whether the students are grasping the communicated lessons, to black screens where the lecturer needs to rely on the students' feedback to confirm the learning outcome. Nonetheless, for a various number of reasons, there are few students who respond. The way academics have seemed to lend a hand and share experiences, know-how and otherwise been helpful to each other, may have helped regarding the motivation to lecturing online, and to learn to handle more tools that are helpful for online education. Getting and feeling support from fellow teachers and lecturers can be a source of motivation. Yet, even the "watercooler" is no longer available. The paper shows research among the faculty staff at the Inland Norway University of Applied Sciences, Business School – Faculty of Economy and Social Sciences. The focus of the research has been what has

motivated them to make use of digital tools for lecturing, and what they are motivated to continue using after the corona crisis has finally passed.

Keywords: motivation theory, self-efficacy, black screens, e-learning, missing “watercooler”

On-line Learning for Addressing Challenges Associated to Business Models

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Abstract: Innovative business models are resources that support entrepreneurs in being more competitive on the market. Although there are different business models available to entrepreneurs, for many of them understanding their individual elements still poses a real problem. The findings from the research conducted in the European ERASMUS+ project — Understanding and Developing Business Models (ProBM2) — carried out between 2019 and 2021 in 7 countries (i.e. Poland, Italy, Malta, Portugal, Greece, Switzerland, and Romania) indicate that the implementation of business models is crucial for enterprises and the success and continuation of their operations, and thus in this article the author further discusses them, focusing in particular on the on-line educational and training platform supporting continuing education of entrepreneurs and helping them understand the importance of business models and their individual elements, developed and tested as part of the project in question. The insights provided are expected to be of value to both researchers and practitioners interested in the topic of business models.

Keywords: business models, on-line education, ERASMUS+, e-learning

Effectively Communicating the Written Assignment Brief: Comprehensiveness and Conciseness

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Abstract: As a key aspect of higher education programmes, assessment is both unavoidable and complex. Students must be assessment literate to achieve high grades. This paper will discuss a key finding from a Ph.D. study that set out to explore how written assignment briefs affect students' understanding of the requirements of assessment, and students' potential to perform effectively. Before the COVID-19 pandemic, the written word was the dominant mode of communicating assessment and for distance education students, it was potentially the sole form of communication. For online programmes, reliance on the written assignment brief is significant. While the impact of COVID-19 on the future of higher education is unclear, higher education institutions may continue to offer an online option, or retain some online elements; thus signalling the continued prevalence of written briefs. With a dearth of research focusing on the design stage of the written assignment brief, this Ph.D. set out to determine how the assignment brief influences effective communication. Consisting of three phases, this mixed-methods study combined quantitative and qualitative data gathered across three semesters (spring 2016, autumn 2016, and spring 2017). Following the University's assignment regulations, Hughes' *Assessment Task Design* (2009) framework, and Gilbert and Maguire's *Assignment Brief Guidelines* (2014), the researcher worked with four academics (one from each of the four faculties in the University) to design their assignment briefs. The third phase involved conducting focus groups with students and interviews with academics to discuss their experiences of the effectiveness of these briefs. This paper will examine the impact of one of the key findings: the need for comprehensive yet concise assignment briefs, and its relevance to planning an assessment strategy. This paper will recommend a potential solution to balance the tension of providing detailed assignment briefs while maintaining conciseness. The findings will be valuable to academics and instructional designers involved in designing assessment documentation or planning an assessment strategy.

Keywords: assignment brief, programme level assessment strategy, assessment, communication

Examining the Effectiveness Between Course Delivery Modes in a Teacher Training SPOC-Based Flipped Course

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Abstract: Purpose of the study. In response to the recent lockdown and social distancing, educators have been using the flipped learning approach (FCA) to transform their courses to maintain the quality of teaching and learning. While it is progressively adopted, scholars are interested in flexible learning strategies for accommodating the "New Normal" in the post-pandemic era. One of the elements to support FCA, is the Small Private Online Course (SPOC). It is a campus-based variation of a MOOC (Massive Open Online Course). In addition to standard course materials, it offers interactive courses with user forums discussions to enhance interactions among students and educators, as well as immediate feedback on short quizzes and assignments. This study aims to see how effective a SPOC-based flipped course can enable students to apply and reflect on their learning and teaching in different delivery modes. Using the experiential learning cycle (ELC), students learn how to apply the flipped classroom approach in their future instructional design and delivery by experiencing the flipped teaching and learning in the course. Course activities were mapped in the experiential learning model. **Methods.** A quasi-experimental mixed design was adopted. Variables such as course facilitators, and content were controlled. Participants were 130 research students from three semesters who were in face-to-face, online, or hybrid group. The impact of the different delivery modes on the course was assessed by students' course assessments and a feedback survey. **Results.** One-Way Welch's Analysis of Variance indicated statistically significant effects of delivery modes on students' participation and their reflective assignment. Students from each learning mode have relatively good performance in different assessments. No significant difference was found in students' total scores and teaching demonstration. Responses from the course feedback questionnaire showed positive attitudes specific to the learning modes they received. **Conclusions.** This study explored the

flexibility of delivering a SPOC-based flipped course. Regardless of delivery mode, by integrating the FCA with the experiential learning framework, it was found to be effective for students' reflective learning. However, because students' learning performance in specific assessments may vary depending on delivery modes, the design of the SPOC and the assessments should be adjusted. This study demonstrated how to use FCA and ELC to establish curriculums that will benefit students as they navigate the world's recent challenging educational transformation.

Keywords: flipped classroom, online learning, hybrid learning, blended learning, experiential learning

Exploratory Study of a 360-Degree Model in Environmental Engineering Education

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Abstract: 360-degree models are a variant of virtual reality and are software-generated from multiple images of a space taken by 360-degree cameras. 360-degree models allow viewers virtually walking through them by jumping to the various viewpoints of the model. In addition, 360-degree models may be augmented with further media, such as text, graphics, or videos. Augmented as such, 360-degree models seem to be promising learning tools as their design incorporates multiple principles of multimedia learning, such as the contiguity principle, as well as 360-degree models support various approaches of learning, such as explorative learning. Evaluating the notion of 360-degree model as learning tools, this paper presents an exploratory study of the 360-degree model of an innovative wastewater treatment system named P-Bank. Methodologically, participants (N=17) were asked to explore the P-Bank 360-degree model for acquiring knowledge, which thereafter was assessed in a post-test. After the post-test, a questionnaire surveyed the participants' motivation and emotion on the one

hand, and the usability of the model on the other hand. In addition, further aspects were determined qualitatively based on guided interviews conducted with each participant. In summary, the results are consistently promising: the usability of the 360-degree model was rated as good, motivation and emotion received excellent values and the learning outcomes were positive. The results of the interviews conducted provided information valid for further development of the 360-degree model. Overall, the study contributes to establishing 360-degree models as effective learning tools in environmental engineering education.

Keywords: 360-degree model, virtual field trip, virtual reality, higher education, engineering education

PhD Research Papers

Improving Student Engagement and Satisfaction Using Universal Design for Learning and Storytelling

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Abstract: The purpose of this research is to examine the effect of a mobile education application that uses Universal Design for Learning (UDL) and digital storytelling on student engagement and satisfaction while they learn how to read in the Arabic curriculum. For the purpose of this research, an interactive mobile learning application has been developed based on the idea of targeting learners' individual needs where students will progress from reading single words to sentences and creating their own stories and share them to a website which is developed for the purpose of this research. The participants of this study were second-year primary school children, their parents, and their Arabic language female teachers in the first semester from three different primary school classes in Saudi Arabia. Due to the closure of the schools in Saudi Arabia as a result of the novel pandemic (Covid-19), this study was conducted online. This study employed both qualitative and quantitative approaches to measure the effectiveness of the interactive tool for enhancing student engagement and satisfaction while reading in Arabic and to obtain general knowledge about students' background of using technology. The qualitative approach is based on online semi-structured interviews for the teachers and online observations of students while they interact with the novel mobile application. The quantitative approach is based on online questionnaires for both the students and their parents. The student survey obtains opinions about the system, while the parent survey examines the students' prior knowledge of using technology and home literacy environment. The aim of this research is to prove that such a proposed novel mobile learning application will increase and enhance student engagement. The results indicate that students show increased engagement and expressed satisfaction with the system. Therefore, a system based on UDL and digital storytelling can increase and improve students' engagement and satisfaction.

Keywords: e-learning, m-learning, mobile learning, digital storytelling, universal design for learning, student engagement

Playful Online Learning Environments Promote Student Teachers' Renegotiation of Their Learner Role

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Abstract: As part of a PhD project examining the integration of playful learning approaches and student teachers' use of digital artefacts and physical activity, this study investigated how student teachers approach playful learning in an online environment. A pilot test revealed some reservations that arose when student teachers were encouraged to make a Rube Goldberg machine as an alternative approach to curricula. The present study considered these reservations and focused on facilitating a space for exploring playful approaches. Insights from Gudiksen and Skovbjerg (2020) showed that feeling safe is prerequisite for being playful, and therefore creating a safe space is necessary. A design-based research approach was used to plan and conduct two parallel teaching modules in an online environment. The modules were developed to investigate the students' reservations, the reservations' connection to specific situations and the occurrence of new modes of playful approaches to learning. The theoretical framework drew on insights from Whitton and Moseley (2019), who argued that playfulness among students is often a state of mind and they must be willing to embrace the playful activity so that learning can emerge through an iterative process—one with no guarantee of success or a clear endpoint. Furthermore, Goffman's (1959) theory of front-, back- and off-stage, as well as Meyrowitz's (1986) work, contributed to understanding how students engage in playful activities in an online environment. A situational analysis of video recordings was used to understand how the students navigated in a learning environment that was open-ended and unfamiliar. This analysis determined any patterns in the students' positioning when engaged in playful activities in these online situations. The study confirmed that learning designs featuring a safe space facilitate students' playful approach. Furthermore, it showed that when moving from an educational setting with predetermined teacher and student positions and learning agenda towards open-ended learning situation, the majority of students developed failing, experimenting and hacking skills.

Keywords: learning design, online education, playful approach to learning, stage positioning, teacher education, hacking learning designs

The use of Programming Tools in Teaching and Learning Material by K-12 Teachers

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Abstract: The integration of programming in K-12 education (kindergarten to grade 12) can be viewed worldwide. Expected outcomes of the integration is that students will develop skills in problem solving, creativity, logical thinking, reasoning, and computational thinking. Previous research has identified several challenges for the integration of programming, such as lack of guidance, motivation, time and competence. The aim of this study is to examine the use of programming tools in teaching and learning material by K-12 teachers. The teaching and learning material analysed in this study were collected from a website (Lektion.se) where K-12 teachers can share their teaching and learning material with each other. A document review process, inspired by a systematic literature review process, was used to select the teaching and learning material to be included in the study. The selected teaching and learning material were later analysed through content analysis with deductive and inductive coding. In the study, four types of programming tools can be found in the analysed teaching and learning material: textual programming tools, block programming tools, tangible programming tools, and unplugged programming. The findings of the study indicate potential relationships between the use of different programming tools and school subjects and student grades. These findings can be drawn upon by teachers and other stakeholders in the decision on what programming tools to integrate in classroom practice and how they are to be used.

Keywords: programming tool, programming, K-12, teaching material, learning material

Utilization of Remote Access and Distance Control Technology for the Management of Virtual Classrooms, During the Covid-19 Pandemic, in Vocational Education and Training (VET) Specialties' Laboratories

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Abstract: Teaching in an electronics computer lab in a Vocational Education and Training (VET) environment, regardless of the subject matter, is a very demanding task, since it includes in addition to teaching, the individual support of each student or group of students per computer, the proper monitoring of the learning process, and the necessary demonstration of techniques or procedures to perform a task. The new reality of distance education during the covid-19 pandemic period, in addition to the above, requires a lot of changes in the structure, form, and content of teaching. On the one hand, the direct control of the course flow and on the other hand, the control of the virtual classroom in all phases of teaching, including the assessment process of the students. In this article, we focus on the use of Remote Access Technology (RAT) for the management of virtual laboratories in the context of distance education for the laboratories of the courses of Informatics and Electronics. The use of RAT in distance education enables teachers to a) directly manage the virtual classroom, b) provide immediate support for their distance learning students, c) have real-time instant feedback from the virtual classroom, d) receive the necessary snapshots of their virtual classroom in real-time, e) be able to supervise their progress exams, and f) to perform their educational work with relative completeness. To test the capabilities of RAT, we integrated a remote-control tool into the imposed due to Covid-19 Distance Learning circumstances and organized instructional scenarios for its implementation. Through virtual classrooms, we utilized the tool of remote support of teaching in distance learning circumstances for vocational specialties. A key direction of the research was to determine whether the process of remote control of virtual classrooms through Distance Learning provides opportunities for self-regulated learning and motivates

students for effective Learning. The effectiveness of this technology was investigated through the observation of virtual classrooms, through the correction processes of the original design and retrieval of control, and finally, using weighted questionnaires. Through the graded questionnaires of the intermediate and final evaluation, we tested the efficiency, usability, and pedagogical usefulness of the method in a distance laboratory. The additional benefits for students are related to cognitive and metacognitive skills from the use of advanced teaching methods.

Keywords: distance education, virtual classroom management, remote access technology

Towards a Framework for Teaching Secure Coding Practices to Programming Students

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Abstract: Internet presence in modern enterprises and government departments has led to the economy relying heavily on software applications in many sectors. This heavy reliance on software applications has increased the amount of sensitive information stored online, which has contributed to the growth of cyber-attacks posed to software application vulnerabilities. Exploits to these vulnerabilities have led to severe financial losses and has left these organisations with a bad reputation. The major cause of these software vulnerabilities is contributed to programmers' lack of the requisite knowledge relating to secure coding practices. These secure coding practices can be taught to programming students at universities, however, many programming lecturers also lack the knowledge relating to these secure coding practices, and how these can be integrated without adding more load to the lecturers and the students. This results to students not being taught these secure coding practices. This paper proposes a framework for teaching secure coding practices to programming students to help ensure an increase in knowledge and an improved adherence to secure coding practices. The proposed framework is based on experiences and lessons learnt at a South African university.

Keywords: secure coding knowledge, online learning, security behaviour

Linking Digital Technologies to Learning in Higher Education: Skills, Tools and Practices

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Abstract: The innovation and rapid growth of internet technologies and devices have brought changes to the higher education landscape. Technologies such as virtual learning environments, cloud services, synchronous and asynchronous communication tools that can be accessed via the Internet have gradually emerged and gained ground, reshaping students' academic practices in different ways. Despite that, research shows that the potential of internet technologies to enhance students' learning experience has not been fully exploited. Several studies have reported that internet technologies in academic settings are used for convenience rather than for strengthening students' academic study habits. Additionally, according to research, higher education students are not aware of the enabling capabilities of internet technologies and how they can be used in the context of higher education. This paper presents part of a design-based research study that aimed to develop an instructional intervention that enhances undergraduate students' internet skills in the context of higher education. The intervention was based on the internet skills indicators from the Internet Skills Scale (ISS) proposed by Van Deursen, Helsper & Eynon (2014), which was validated for the context of higher education. To guide the intervention, we have developed a framework that links internet skills to internet technologies and their educational affordances in academic settings. The framework refers to five types of skills: Operational, Information-Navigation, Social, Creative, and Critical. For each of the skills' type, several internet technologies have been identified together with their potential to support academic practice. The framework can serve as a tool to perceive the affordances of internet technologies for learning in higher education and prepare higher education staff to better support the effective and productive use of the Internet in academic environments.

Keywords: internet technologies, internet skills, academic practice, framework, educational affordances, higher education

Expansive Learning During Pandemic Teaching: Collaborative Digital Textbooks in Secondary Biology Courses

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Abstract: This paper presents partial findings from a larger mixed methods case study that explored a high school biology teaching team's pedagogical approaches to engaging with electronic textbooks (e-textbooks) in face-to-face, online, and hybrid teaching environments during the Covid-19 pandemic. Despite a growing body of literature on electronic textbooks, most researchers have used quantitative methods to understand users' implementation of and satisfaction with this technology, and have done so in higher education settings. Largely absent from the literature are accounts of how different affordances associated with e-textbooks are employed as pedagogical tools in general and their use in secondary schools more specifically. Conducted within the framework of cultural-historical activity theory, the project captured evidence of the tensions associated with three cycles with regard to the teachers' use of the e-textbook as classes moved from one learning environment to another. Data collection was conducted over an eleven month period that spanned two school years; data were generated through close- and open-ended questionnaires as well as document analyses. Two of the three documents occurred naturally in different phases of the teaching process while the third provided the historical context out of which one of the others developed and the social context in which it had been situated. The preliminary findings presented in this paper suggest that technical competence and content knowledge do not guarantee pedagogical prowess with education technologies, even those that teachers have used for years, as was the case in this study. The findings further suggest that there is a need for robust pedagogical practices that support the use of e-textbooks and their tools beyond replicating the use of physical textbooks. Such practices did not develop as a result of familiarity with the e-textbook or changes to the environment that positioned the e-textbook for a more prominent role, suggesting a need for specialised training.

Keywords: e-textbooks, tools, secondary school, teachers, activity theory, case study

Virtual Worlds to Teach Sustainability Topics in Distance Learning

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Abstract: This paper presents new results concerning experimentation focused on the theme of environmental sustainability, carried out during the COVID-19 pandemic, using a virtual world based on the 3D platform Opensimulator. An educational environment, the “Sustainability Hub” island, has been developed where students and teacher find paths relative to exploitation of georesources, climate change, environmental sustainability indicators, and circular economy. Four schools located in different Italian regions were involved, with a total of 650 students, with ages between 11 and 13 years. Students have been divided into two groups, each experiencing the virtual world using a different mode. Tests and questionnaires have been administered to evaluate the acquisition of knowledge about sustainability topics as well as the users’ level of interest for the activity and topics. From the analysis of data obtained from the teachers and students involved, we find that this virtual word was a useful and effective tool to teach sustainability in distance learning mode and, especially during COVID-19 lockdowns, it allowed the acquisition of new knowledge and interest among students. The need of a desktop or laptop personal computer, rather than tablets, and/or sometimes poor bandwidth of home internet connections, was found to be an important issue to consider for the development of distance learning activities.

Keywords: virtual worlds, teaching sustainability, distance learning, Opensimulator

Masters Paper

Studying the Impact of Gamification on Motivation in Remote Programming Education

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Abstract: With the increasing hybrid blend of face-to-face and remote study in the higher education, finding strategies to keep students motivated when working from home is pertinent. This paper describes gamification in online learning environments, from the viewpoint of individuals undertaking programming education. In this empirical study, both qualitative and quantitative research methods are employed to investigate the hypothesis that gamified motivational methods would increase students' motivation when learning programming remotely at a higher education level. This hypothesis was formed following an observed motivational drop regarding studies during the COVID-19 pandemic, combined with an observed consistency of engagement in the video games industry. An initial questionnaire with 90 respondents from multiple backgrounds explores game design elements as a concept and investigates the current or historical motivation of individuals working from home. Conclusions were drawn that participants' motivation working from home were mixed, and that formative feedback and game design elements were perceived to be motivating to a learner, and these results were used to inform the design of two learner-centred virtual learning environments. These virtual learning environments were designed to facilitate programming tasks online in two settings: one being a traditional academic setting with staged communication with a virtual tutor, and the second being a gamified setting, completing missions and gaining rewards in line with a storyline. These programming environments were then used in a practical, yet remote, experiment with 25 participants who were current university students, graduates or recent education-leavers. These experiments gained statistically significant results, showing that the gamified system and specific gamified elements were found to be considerably motivating to the learner. This work therefore makes the following contribution: that gamified elements such as badges, rewards and missions do increase students' motivation when engaging with virtual learning environments for programming. This work is relevant for programming and computing educators, digital education researchers and gamification researchers.

Keywords: gamification, programming, digital education, higher education, virtual learning environment, education

Data-Driven Understanding of Computational Thinking Assessment: A Systematic Literature Review

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Abstract: A movement to include problem-solving and computer science in k-12 education has sparked significant interest in introducing computational thinking (CT). CT education is mainly defined as teaching and learning problem-solving skills. CT is considered a 21-century skill, and like other essential skills aiming to educate students as efficient members of the technology-dependent society, CT learning and assessment are associated with the use of technology-enhanced learning methods and environments. Although most researchers categorize CT skills into three groups, including CT concepts, practices, and perspectives, there is no consensus view regarding CT assessment methods to evaluate these three CT skill categories. Addressing this gap, we explored key topics in the computational thinking assessment (CTA) literature using a data-driven approach for topic modeling. We analyzed 395 articles in CTA literature and identified 11 research topics of CTA. We also performed a network analysis to explore the key links between CTA's identified topics. Based on the results from topic modeling, we presented CTA methods and categorized the assessment tools based on their assessment strategy and the types of CT skills they aim to evaluate. Also, the paper analyzes the identified assessment methods based on the purpose of assessment and the different types of insights they provide for the evaluation of CT skills. The paper discusses the advantages of new forms of CTA through technology compared to traditional assessment methods and provides recommendations for further studies.

Keywords: computational thinking (CT), assessment, topic modelling, machine learning, data-driven, new media

Work in Progress Papers

Exploring the Most Effective Modality to Present Online Material to Language Students

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Abstract: This study seeks to identify the most effective way to present online content to language learners with the aim of maximising learning benefits and engagement. As teachers are the gatekeepers of content, we believe it is fundamental to understand how they, as well as learners, perceive the different modalities in which it is presented. This paper will present the preliminary results from a pilot study with learners of Spanish as a Foreign Language (FL) in Hong Kong and trainee teachers in Spain. The project has developed a FL online course to test different ways of presenting information to learners using a combination of modalities. The focus of the course is the marker “se”, a specific linguistic unit that is seldom taught explicitly in the classroom but that occurs frequently in both the written and spoken language, and is critical to the production and comprehension of nuanced Spanish. Our preliminary results suggest that trainee teachers prefer the video modality but consider the audio modality a novel way of presenting content. The textual modality, however, is considered as the most traditional and “boring” to learners. This is confirmed by the results from the Hong Kong learners who indicate that the audio modality was more rewarding and appealing than the textual one (the results from the video had not been received at the time of writing). These results are encouraging as they suggest an alignment of trainee teachers’ perceptions and actual learner engagement despite the cultural differences between the two groups.

Keywords: online content, teaching modality, teacher perception, learner engagement, input modalities, Foreign Language teaching

The Review of Dyslexic Humanoid Robotics for Reinforcement Learning

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Abstract: The research focuses on students with Dyslexia in higher education and the support. Additionally, this will include support for their learning for e-learning or face to face lectures. The problem statement for this research is It has been shown that students with Dyslexia benefit from a support system, could the conceptual design of introducing a Humanoid Robot as a support assistant and companion give a personal aspect to the student as well as have an enhanced impact on the student. This could also benefit lecturers who may lack an understanding of Dyslexia and the support it requires. The purpose of this research is to help support students with Dyslexia with their learning using a robot with reinforcement learning techniques. As there are six different types of Dyslexia, research has shown that universities, do not currently have the resources or the support available to help support the students. There is support available however, it is not enough to cater to the six different types of Dyslexia (Zoubrinetzky, Bielle and Valdois, 2014). A robot could be used as a support assistant to help improve the support resources within the university and enable the university to cater to the different types. The key purpose of this paper is to report the review of the conceptual design and preliminary framework with reinforcement learning. The methods and findings of this research will be reviewing current literature surrounding educational robotics and dyslexia, reinforcement learning and e-learning.

Keywords: dyslexia, humanoid robotics, reinforcement learning, learning and teaching, higher education, learning support, e-learning

Scratch Options! Using programming to Approach Social-Emotionally Challenging Situations in Grade 4 Classrooms

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Abstract: Even though fostering computational thinking (CT) and social-emotional skills has been an area of interest in educational research and practice for many years, the simultaneous support of CT and social-emotional skills has not yet been investigated. To address this gap, we developed a workshop to help Grade 4 students work on social-emotionally challenging situations using the Scratch programming language (scratch.mit.edu). Students are encouraged to create interactive stories around problematic situations that might occur in the classroom (e.g., bullying). Then, using cooperative learning methods, they are asked to elaborate different options for reacting to such situations. These options are then programmed by the students using Scratch. We apply a mixed-methods approach to assess (a) the workshop's feasibility, (b) students' acceptance of the concept, (c) the impact on students' CT and (d) the impact on students' problem solving in social-emotionally challenging situations. In this ongoing study, we thus use interviews and questionnaires with teachers and students, classroom observation, think aloud protocols, and screencasts for the students programming with Scratch.

Keywords: computational thinking, social-emotional skills, Scratch, programming, Grades 4 and 5

Late Submissions

Abstracts Only

Teaching Technology Toolkit (3T): An Online Interactive Guide for Faculty to Design Online Learning Strategy, Activity, Assessment and Selecting Appropriate Tools for an Engaging Learning Experience

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Abstract: With the advancement of learning technology and current demand in online delivery, educators are required to equip themselves with the knowledge in using appropriate learning strategies and tools in designing engaging online learning materials, activities and assessment. “Teaching Technology Toolkit” (3T) is a learner-centric guiding method used by the faculty to assist them in strategising the online learning, and finding the best tool to use with their selected learning strategy. This toolkit helps to promote the use of appropriate online tools, therefore increase the engagement of learning and better understanding of the knowledge. A combination of qualitative and quantitative methodologies has been adopted. Online questionnaires were completed by 25 members of academic staff from International Medical University, Malaysia. Interviews with academic staff has been done to complement the questionnaires. The results demonstrate 3T helps academic staff to easily find suitable strategy and appropriate tools in conducting or delivering the teaching and learning activities. 3T toolkit promotes engaged learning by guiding the educators to select appropriate strategy and tools for their teaching and learning session; formal or informal learning environment. The use of 3T should be promoted as an educator’s guideline in creating engaging online learning session for undergraduate and postgraduate students. With the implementation and application of learning technology, it appears to provide an unprecedented opportunity to improve learning and teaching within the higher education system. This toolkit provides not only text-based information but most of the information are enhanced by multimedia elements.

Keywords toolkit, teaching technology, interactive guide, e-learning

Experiences of two Runs of Digital Pre-Courses in Mathematics for First-Year Students

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Abstract: In March 2021, the second run of digital pre-courses in mathematics had been offered to first-year students at HTW Berlin. One aim of these courses is to close the knowledge gap between the mathematics taught in school and that required at universities. Another goal is to prepare students for a study in which mathematics will play an essential role. This is because mathematics is still considered one of the main reasons for students dropping out of university in Germany. First experiences of planning and implementing digital bridge courses in mathematics for new students at university were reached in the winter semester of 2020/21. In the beginning of both semesters, i.e., winter and summer term, two such mathematics courses had been offered. One for studies of economics and another for the studies with a focus on engineering and/or computer sciences. Both courses were offered in German language. Due to satisfactory evaluation results, this summer semester, for the first time, an English version of the mathematics pre-course for economics was offered to mainly international students studying international business. This work offers brief insights into the planning and implementation of the digital courses. Furthermore the evaluation of the two runs will be presented and compared to each other. This then will lead to discussions on possible improvements as well as adaptations for future implementation at our university. The evaluation results and the detailed presentation of the implementation of the courses also offer the possibility of transferring the course design to other universities. Both quantitative and qualitative methods were used and presented to evaluate the implementation of the mathematics bridge courses. The observed challenges regarding the course in English for international students are named and hypotheses and open questions are formulated according to the observations. Furthermore, the digital tools used to implement the courses are named and their use and benefits are critically examined.

Keywords: digital teaching, mathematics, bridge course, self-learning software, e-learning

The Effects of Asynchronous Learning in Blended Learning on Motivation and Performance of Adult Learners in IVET and CVET

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Abstract: This paper examines the effects of asynchronous learning in blended learning on motivation and performance of adult learners in IVET (initial vocational education and training) and CVET (continuous vocational education and training). The paper reports the findings in two European projects in CVET: BLEFT (blended learning in forestry training) and INLESSON (blended learning in hair and beauty). Results in these projects show effects through design and adaptive teaching on motivation and performance.

Keywords: blended learning, asynchronous, gamification, motivation, performance

Students' Asynchronous Learning Experience of MOOCs During Covid-19 Pandemic in the UK

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Abstract: Learning in the times of Covid-19 has moved online in order to support students' continuity of education. Since the outbreak of Covid-19, all UK universities have set up online e-learning platforms to facilitate students' learning and assessment and support them to successfully complete their scheduled curriculum as part of their educational pedagogy. E-learning takes in the form of synchronous and asynchronous learning. Alongside synchronous e-learning where learning takes place on the same platform and at the same time, asynchronous learning has been adopted by many institutions attributing to its advantages of being flexible and accessible without time and space constraints. With the

prevalence of asynchronous e-learning under Covid-19 pandemic, MOOCs (Massive Open Online Courses) have gained wide acceptance and adoption by educational institutions and industries worldwide. Different from traditional e-learning which are instructive, centralised and institutionalised, MOOCs are considered global and flexible. Moreover, the asynchronous nature of MOOCs are also considered for being more impactful and effective for its scalability of delivery, suitability for individual learning needs and infinite learning opportunity. LinkedIn Learning is one of the well-known MOOCs platform offering over 15,000 courses delivered by industry experts in 7 languages. It has been widely adopted by UK universities and played a significant role in the continuation of students' learning, particularly for international students who are affected by flight restrictions, time difference and location variance. This research investigates into the effect of LinkedIn Learning used as an asynchronous learning and teaching strategy under Covid-19 pandemic by a UK University. 200 students' asynchronous learning experience over a course of 8 weeks' independent LinkedIn Learning was examined. It aims to understand students' asynchronous e-learning experience and the effect of LinkedIn Learning MOOCs as an asynchronous teaching strategy which is likely to maintain high levels of adoption in future. Accordingly, it hopes to provide insightful pedagogical implications for educators who are likely to adopt asynchronous online learning approach or MOOCs under Covid-19 pandemic and moving forward.

Keywords learning and teaching strategy, learning experience, asynchronous learning, MOOCs (massive open online courses), LinkedIn Learning

North American University Writing Center Websites and International Student Support

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Abstract: The number of international students attending North American universities is phenomenal (Altbach & Knight, 2007; Chen & Zhou, 2019). As non-native English speakers, these students often require extensive academic support. A university's website tends to be international students' first destination when seeking information about academic assistance, especially during COVID-19 as universities shifted online. However, do writing center websites generally provide the information these students need? Two questions guide this study: (1) How

much of the information on writing center websites are geared towards international students? (2) What assumptions are conveyed by the writing centers through the inclusion of information for international students? We conducted an initial evaluation of writing support for students speaking English as a second language (ESL) via a multimodal discourse analysis and textual analysis (Blommaert, 2006; Fairclough, 2005) of writing center websites at 50 North American universities hosting increasing numbers of international students. This research contributes to systematic and ideological change in ESL academic support within higher education. Findings indicate that despite providing rich information and resources about academic writing, international students (1) are provided tailored information by only a few universities; (2) are often either redirected to universities' language programs or to a non-academic international center, leading to confusion about where to obtain academic assistance; and (3) have access to a limited number of ESL consultants. Among universities that mention specific support for international students, websites' content layout follows a common pattern. This study also discusses universities' assumptions about the structural outlook, policy, and management of academic writing support for international students. For example, once these students meet the language requirements for university enrolment, their academic language needs are presumed to be similar to those of native English-speaking students. Moreover, little ESL specialist support is offered despite universities hosting many international students. Additionally, when available, ESL specialists tend to be at the bottom of the university hierarchy (Wingate, 2016). Overall, university-based academic assistance geared towards international students calls for greater exploration.

Keywords: websites, writing centers, international students, North American university

The Micro-Credential Landscape 2021

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Abstract: The purpose of this paper is to inform participants with a strategic overview of the micro-credentials landscape to aid in possible implementations at their institutions. Europe brings a unique continental EU-wide approach to the micro-credentials arena, building upon the foundations of Bologna, the European Qualifications Framework, and other related networks and consortiums. A

snapshot will be provided of the different forms that micro-credentials can take, including badges, certificates, and nano-degrees. The presenter will discuss the opportunities and barriers to institutional implementation and conclude with a summary based on the discussion of the key elements and recommendations for planning and institutional transformation. For the most part, micro-credentials exist outside the formal qualifications frameworks of traditional HEIs, yet these frameworks provide formal guidance because learners will want them to be transparent and applicable to formal credentials. They may or may not be stackable towards higher qualifications and credentials, and in some cases may be accepted into formal certificate and/or degree credit programmes. Presently, micro-credentials provide recognition of skills for employers, give flexibility to the learners, and enable standards for society.

Keywords: micro-credentials, assessment, accreditation

EFL Reading Speed and Comprehension: Combining Three e-Learning Systems

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Abstract: This poster shows how our new project which makes full use of three original e-learning systems is trying to improve the EFL reading instruction in Japanese universities. We investigate the correlation between the reading speed and the accuracy of comprehension, paying attention to the scanning skill that is required to understand the gist of the target reading material. Appropriate reading practice materials written with words fitting the learners' vocabulary size are selected by the first system, DREC-J (Degree of Reading Ease Calculator for Japanese EFL Learners), which is specifically designed for the Japanese EFL learners. Based on a strict categorization of the vocabulary size of the level, it determines the degree of reading difficulty (not the degree of reading ease in a strict sense) of the target passage by calculating the ratio of words that are beyond the learner's vocabulary. Using eligible reading materials as its input, ERAMS (English Reading Ability Measurement system), which presents a passage followed by a multiple-choice question testing the scanning skill of the reader, measures the time a learner needs to read and grasp the gist of the passage. The correlation between the velocity and the accuracy is examined. The correct scanning skill is expected to guarantee the quick understanding of the gist of the target passage. The third

system, iBELLEs+ (interactive Blended English Language Learning Enhancement system Plus), is used to reveal the learners' reading process, especially the scanning of the entire passage on a real-time basis. iBELLEs+ simply prompts the learners to highlight keywords to which they paid attention during the reading. The system makes it easy for the teachers to observe graphically whether their students noticed correct spots of the passage by scanning it successfully. In the case when a student fails to spot appropriate keywords and misses the gist subsequently, the teacher can give an instruction on how to find the keywords more correctly by explaining, for example, the paragraph structure. The three systems would work together to improve the teaching method of EFL reading skill based on the quantitative analyses of the learners' scanning process.

Keywords: reading speed, comprehension accuracy, degree of reading ease, learning materials, scanning

A Teaching-Learning Sequence on Programming and Digital Electronics Concepts for Primary School

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Abstract: For decades, the Design Based Research movement has been working on the design of Teaching Learning Sequences (TLS). Meheut & Psillos (2004) define it as "A Teaching Learning Sequence is both an interventional research activity and a product, like a traditional curriculum unit package, which includes well-researched teaching-learning activities empirically adapted to student reasoning. Sometimes teaching guidelines covering expected student reactions are also included" (p. 516). These TLS have been developed using multiple strategies such as enquiry, problem-based situations and modelling, among others. In any case, there are common elements in the design of TLS. As Guisasola, Ametler and Zuza (2021) summarise: "they take into account research on students' alternative ideas, they carry out an epistemological analysis of the curricular content to justify the teaching-learning objectives, they have a social constructivist perspective on learning, they design the activities according to the results of the research and they present evidence of the learning achieved by the students". This contribution shows a TLS designed to address programming and digital electronics concepts for Primary School students. With the final objective of building a music score reader with infrared sensors, basic programming concepts such as the use of flowcharts to generate and organise

computer code, algorithms and loops, and electronics concepts such as analogue and digital signals, detection threshold, electrical circuits and data input/output are addressed. This sequence has been designed in coordination with teachers from a public school and explanatory videos have been produced (available at https://www.youtube.com/watch?v=PCcv_D_mjP0&t=2s). It has been put into practice in 4 successive iterations within the Educational Enrichment Programme for High Ability Students of the Community of Madrid (Spain), with a total of 75 students of 11-12 years old. The preliminary results of this intervention are shown.

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Méheut, M., & Psillos, D. (2004). Teaching–learning sequences: aims and tools for science education research. *International Journal of Science Education*, 26(5), 515-535.

Keywords: teaching-learning sequence, programing, digital electronics, primary education

STEAM-5E: Adapting the 5E Methodology to the STEAM Approach

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Abstract: The STEAM approach is increasingly popular in the field of education. However, several authors have highlighted several methodological problems. Thus, they point to a lack of real integration, of a clarification about the role of various disciplines, an analysis of the benefits of the different forms of integration (inter- or transdisciplinary) and a clarification of how creativity is understood within this approach and how it is developed and analysed (Toma & García Carmona, 2021). In essence, it is the foundations of the movement itself that are in question. This paper deals a proposal for adapting the 5E methodology (Bybee et al, 2006) to the STEAM approach that aims to overcome the difficulties indicated above. This proposal is based on working initially from each subject, seeking connections between them (interdisciplinarity) in order to face the final project (Elaborate

phase of the 5E) from a transdisciplinary perspective. This way of organising and sequencing the activities is based on cognitive theory (Willingham, 2008), fostering the development of higher thinking skills and a better transfer of learning. In addition, we include elements from other methodologies such as Project Based Learning, Design Thinking and Visual Thinking throughout the process, and we emphasise experimental and manipulative aspects, as well as dialogic learning and metacognition. In this way, different types of creativity can be developed both from different creative fields (Glaveanu, 2008) and taking into account cognitive and conative traits (Lubart & Thornhill-Miller, 2019). Finally, we show an educational project based on this methodological adaptation that has been developed for the 4th year of Primary Education in Spain (9-10 years) and the results of the pilot tests carried out.

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Willingham, D. T. (2008). What will improve a student's memory. *American Educator*, 32(4), 17-25.

Keywords: 5E, STEAM, primary education

Information Literacy, Online Knowledge Sharing Behaviour and Innovation Performance

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Abstract: As an important supplement to face-to-face teaching in the digital era, online learning has gradually become an important way for postgraduates to participate in knowledge construction, communication, and innovation. Such a change in learning paradigm has made information literacy a preparatory factor for postgraduates to participate in online learning and has attracted scholars' attention to examine the impact of online learning process on learning results. However, there is a dearth of research that explore the dynamics during the whole process of online learning. Based on Biggs's 3P (Presage-Process-Product) learning model, this study puts forward the research question "How do postgraduates' information literacy and online knowledge sharing behavior affect their innovation performance" and explores the relationship and influence path of the three factors. The results of a questionnaire survey of 501 Chinese postgraduates show that (1) In addition to information acquisition literacy, with the improvement of other three-dimensional information literacy (information awareness literacy, information discrimination literacy and information application literacy), postgraduates will obtain better innovation performance. (2) Different online learning processes will produce differentiated online learning results. Compared with the quantity-oriented, which mainly pursues the number of posts and activity of replies rather than information quality, the quality-oriented knowledge sharing behavior of "focusing on the value and innovation of shared information" is related to better innovation performance. (3) Quantity-oriented online knowledge sharing behaviour and quality-oriented online knowledge sharing behaviour play a parallel mediating effect between information literacy and innovation performance. Compared with former, quality-oriented online knowledge sharing behaviour is a more powerful mediating variable. Specifically, in addition to directly predicting innovation performance, the four dimensions of information literacy can promote better innovation performance through quality-oriented online knowledge sharing

behaviour. While quantity-oriented online knowledge sharing behaviour only plays a mediating effect between information application literacy and innovation performance. The findings provide a reference for higher education practitioners to improve the quality of online learning and cultivate high-quality students for the future.

Keywords: digital society, information literacy, online knowledge sharing, innovation performance, talents cultivation

Innovations in Synchronous Virtual Learning

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Abstract: Learning radically changed as of March 16, 2020 when COVID-19 forced everyone to teach synchronously. What became evident was that for the past two decades the entire e-learning space focused exclusively on asynchronous learning (all participants learn/meet virtually at different times without a facilitator) and never really contemplated the need for “synchronous learning” (all participants learn/meet together virtually with a facilitator). COVID-19 forced all of us to rapidly adopt synchronous learning and meetings without any back-up alternatives. Fortunately, the Zoom, MS Teams, WebEx, etc. technologies were available (and easy to learn/use) so creative facilitators rapidly redesigned their classroom sessions to highly effective synchronous learning experiences. This presentation focuses on innovative techniques used to deliver highly interactive virtual synchronous programs that receives the same exceptionally high ratings (4.9 and 5) from participants as classroom learning. The argument is that if synchronous virtual learning can be equally effective for most group learning/meetings as classroom learning then the synchronous learning advantages of being less expensive, less time consuming, less costly creates a compelling case for a new default in learning to proceed with synchronous learning and meetings even after we return to the new normal (after COVID-19).

Keywords: synchronous learning, virtual learning, innovation

Additional Materials

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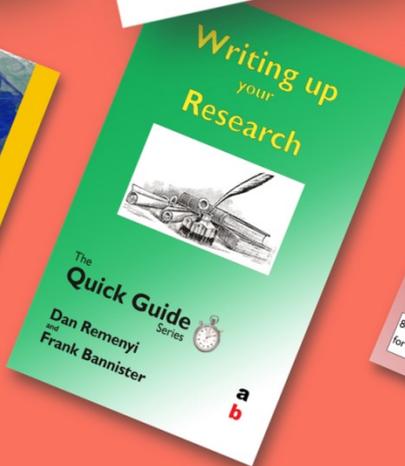
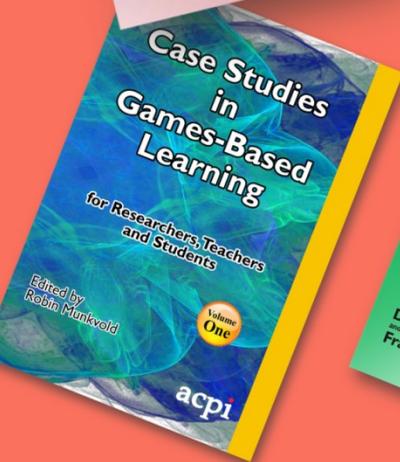
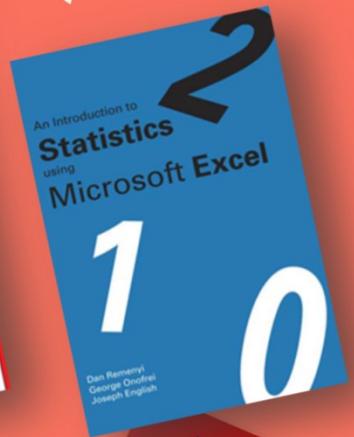
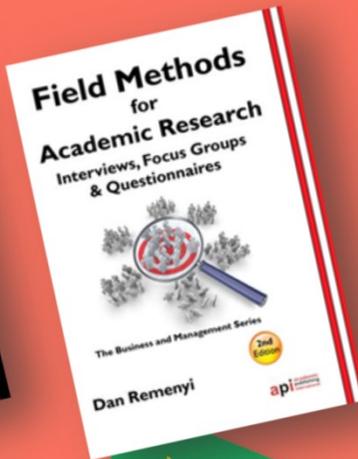
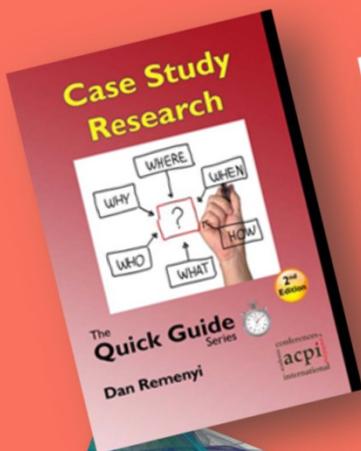
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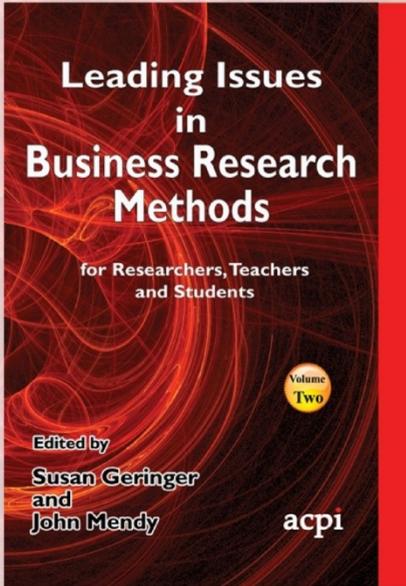
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