

FOREWORD

inScience Press is delighted to publish this book entitled *Education Applications & Developments X* as part of the Advances in Education and Educational Trends books series. These series comprise the work of authors and editors to address global research in the Education area.

In this tenth volume, a dedicated group of authors delves into the field of Education, contributing to the advancement of knowledge and innovation. True progress in this area relies on the active participation of individuals committed to finding creative solutions and believing in their potential to effect meaningful change. Our goal is to inspire greater public engagement and foster collaboration within and across communities. As part of our ongoing mission to serve society, we emphasize the importance of strengthening research efforts, promoting education and science, and encouraging interdisciplinary cooperation. We believe that connecting diverse perspectives and areas of expertise is essential to driving forward impactful and inclusive educational practices.

This 10th edition addresses some of the most significant and current issues in contemporary educational research. This book explores four major areas within the broad spectrum of Education, corresponding to four sections: “*Teachers and Students*”, “*Projects and Trends*”, “*Teachers and Learning*”, and “*Organizational Issues*”. Each section comprises chapters that have emerged from extended and peer reviewed selected papers, originally published last year in the proceedings of the International Conference on Education and New Developments (END 2024) conference series (<http://end-educationconference.org/>). This meeting occurs annually with consistently successful outcomes. Selected original papers were expanded by their authors and underwent a renewed evaluation process. Following this, authors of the accepted chapters were invited to revise and improve their work based on the reviewers’ feedback. This rigorous process culminated in the publication of 42 high-quality chapters, structured across four major areas. The following sections and chapters’ abstracts provide further insights into the content of this volume.

Section 1, entitled “Teachers and Students”, provides studies within educational programs and pedagogy for both teachers and students.

Chapter 1: *On scoring competence*; by Magne V. Aarset & Stig Ytterstad. The overall objective of any learning process is (at least) threefold; to increase a learner's competence, confidence, and learning ability. The totality of the learning process should improve the learner's social ability to learn from the whole process on how to be able to have stylistic flexibility and, by that, use her learning preferences to handle

a test optimally, so her learning preferences make the best fit to the test. Here, we are focusing on introducing scoring techniques to assess a learner's competence concerning a specific subject from responses to different kinds of multiple-choice tests, thereby being able to provide autonomous adapted feedback within the constraints of increasing learner awareness of own learning style and strengthen confidence and learning ability. How a learner decides to act is essential for acquiring and maintaining satisfactory situational and learning style awareness. Therefore, information of the test and evaluation design should be provided to the learner during the learning process.

Chapter 2: Initial teacher education: Teaching observation oral feedback practices in the United Arab Emirates; by Sarah Hyde. School-based practice is widely recognised as a cornerstone of effective initial teacher education programmes, with mentor feedback playing a crucial role in student-teacher development. This action research study focuses on post-teaching observation feedback (PTOF), the discussions between mentors and mentees following observed teaching sessions. Conducted at an initial teacher education institution for Emirati women in the United Arab Emirates, the study examines and enhances PTOF practices from the perspectives of Emirati and expatriate college mentors, as well as Emirati student-teachers. Cycle 1 gathered insights through qualitative questionnaires and focus group interviews, informing a series of professional development sessions that produced new practice guidelines. Cycle 2 assessed the impact of these interventions, with data collected through interviews and focus groups. Thematic analysis was used to evaluate data from both cycles. Findings from Cycle 1 revealed significant inconsistencies in PTOF practices, while Cycle 2 indicated improved structure and consistency. To further enhance PTOF, the study recommends allocating more time and providing contextual developmental support.

Chapter 3: Developing pre-service teachers' praxis through a culturally and linguistically immersive teaching experience; by Wendy Ruchti & Cory A. Bennett. Being an effective educator within culturally and linguistically diverse schools requires a rich understanding of how to support students from various cultural and linguistic backgrounds. Historically, teacher education programs have not fully addressed strategies to leverage students' cultural identities and linguistic strengths. Pre-service teachers, particularly those from rural and homogeneous communities, often have limited exposure to diverse populations. However, classrooms today are increasingly global, with students speaking multiple languages and families embodying different cultural norms. To bridge this gap, learning about the intersection of school, community, and families from diverse perspectives is critical. This mixed methods study aimed to provide pre-service teachers with unique and practical experiences to prepare them for teaching students from culturally and linguistically rich backgrounds. Data were collected through daily reflections with open-ended questions and Likert-scale questionnaires. Qualitative data were analyzed using thematic analysis to identify recurring patterns, while quantitative

data were examined through descriptive statistical methods. Findings suggest that immersive experiences broadened pre-service teachers' understanding of diversity and equipped them with strategies to create inclusive learning environments. These results highlight the importance of experiential learning in preparing future educators for success in increasingly diverse classrooms.

Chapter 4: *The electronic gradebook alternative: The custom-made course administration spreadsheet*; by Brian G. Rubrecht. Instructors at all educational levels are responsible for a variety of course-centric administrative duties, which typically include taking attendance, planning lessons, marking and recording homework and other assignments, and calculating students' grades at the end of a semester. While many instructors are drawn to the numerous commercial and open-source electronic gradebooks available to aid with the implementation of such duties, they may only later realize their drawbacks, which can include their being time-consuming to learn, inflexible, inoperable after operating system upgrades, or insufficient in terms of certain desired features. There is no one-size-fits-all electronic gradebook solution, but the often-overlooked gradebook alternative that counters many of these drawbacks is the custom-made course administration spreadsheet. The present chapter seeks to illustrate through explanation and example the reasons and methods by which such spreadsheets can offer instructors effective and adaptable tools for handling their course-related administrative requirements.

Chapter 5: *Enhanced conceptualization of learning algebra through scientific-oriented teaching*; by Natalia Karlsson & Wiggo Kilborn. The purpose of this project is to analyze how the scientific concept of inverse operations can be used as a "bottom-up" approach for teaching mathematical operations with whole and rational numbers. The primary aim of the study is to provide support for teachers in the teaching of scientific mathematical concepts to students of algebra. The theoretical approaches applied in this project are the theories of mathematical structures, especially the theory of inverse semigroups (Abelian groups), and relational thinking, in a comparison with instrumental thinking. The methodological approach uses Vygotsky's doctrine of scientific concepts. The presentation of the analytical findings expands on previous research on additive and multiplicative inverses in teaching and conceptual learning of algebra. The findings illustrate how connections to mathematical structures and scientific concepts, such as the concept of inverse, lead to an understanding of algebraic operation rules for whole and rational numbers.

Chapter 6: *Teachers' views on infusing indigenous knowledge into chemistry teaching at the junior secondary of Omusati region*; by Tomas Asino, Kgomotsego Samuel, & Washington Dudu. This study focused on the views of Natural Sciences teachers in infusing indigenous knowledge (IK) in teaching of Chemistry concepts at the junior secondary school. IK remains an afterthought in many Omusati region classrooms especially at grades 8 and 9 level. This is despite

the National Curriculum for Basic Education promoting the inclusion of indigenous knowledge into teaching to empower learners to actively participate in making Namibia a knowledgeable-based society. Five grades 8 and 9 Physical Sciences teachers were purposefully selected from one circuit in the Directorate of Education, Arts and Culture of Omusati region, Namibia. Researchers employed an interpretivist qualitative research approach. This qualitative study used CHAT to understand the teachers' views and classroom practices through integrating IK in teaching of Chemistry. Saldana (2013) was used to guide thematic analysis of data. The findings indicated a slight change of views by the Physical Science teachers. Some remained attached to certain practices where they held strong beliefs. The infusion of certain Chemistry concepts depended on the school support. The study recommended that teaching and learning policies be clear on the 'how' of infusing IK into the classroom, and adequate support through ongoing developmental workshops be provided to the Science teachers.

Chapter 7: *Comparison of visual and phonological skills in dyslexia subtypes: Clinical and educational impacts*; by Giseli Donadon Germano & Simone Aparecida Capellini. The objectives of this study were to characterize and compare the visual, phonological and mixed subtypes of schoolchildren with an interdisciplinary diagnosis of developmental dyslexia. A total of 122 schoolchildren, aged between 8 years and 11 years and 11 months, from the 3rd to 5th year of Elementary School I in the public network, divided into groups, being GI (61 schoolchildren with an interdisciplinary diagnosis of dyslexia); and GII (61 schoolchildren with good academic performance), paired with GI in relation to the school year. All were submitted to Phonological Skills and Visual Perception Assessments. Factors were created for profile classification for GI, with dyslexics separated into phonological, visual and mixed profiles. The results indicated that there was significance for all comparisons between GI and GII. There was a significant difference between the GV and GPH groups; GPH and GM groups and Between GV and GM. The findings of this study allow us to conclude that schoolchildren with dyslexia can present visual defects regardless of the phonological one. These findings have clinical and educational implications.

Chapter 8: *Adapting to crisis: A case study in emergency online faculty development*; by Ashley Salter & Shelly Wyatt. The University of Central Florida (UCF) shifted to remote online instruction during the Spring of 2020 due to the COVID-19 pandemic, revealing gaps in faculty development for online teaching. This case study examines how UCF utilized its online pedagogy expertise and resources to create an emergency faculty development program. Through semi-structured interviews and document analysis, five key themes emerged: leadership challenges, reliance on existing resources, implementation barriers, foundational LMS tutorials, and strategies for diverse faculty needs. Findings showed that instructional designers adapted resources rapidly, defined training objectives, and supported faculty engagement despite challenges like departmental resistance. The study compared

UCF's approach to those of other institutions, highlighting common issues such as tight timelines, diverse faculty needs, and effective practices like peer mentoring and data-driven design. The study concludes with recommendations for improving emergency faculty development programs, focusing on modular training, leadership support, peer collaboration, and accessibility. It offers valuable insights for institutions seeking to build resilient and inclusive faculty development frameworks for future emergencies.

Chapter 9: *Understanding of pre-service teachers' mathematical knowledge and perceptions of teaching*; by Natalia Karlsson & Wiggo Kilborn. The objective of the present study is to analyze pre-service teachers' mathematics knowledge base as a relationship between their substantive subject mathematics knowledge and syntactic subject mathematics knowledge. The theoretical approach refers to Shulman's pedagogical content knowledge and Ball, Thames and Phelps' subject matter knowledge for the teaching concept. The participating pre-service teachers (PSTs) were divided into two groups: 20 from a program course for K–3 teachers and 25 from a program course for grade 4–6 teachers. The crucial mathematical content for the study was algebraic patterns, rational numbers (fractions), proportionality and elements of combinatorics. The findings show the importance of gaining a better insight into and understanding of student teachers' learning process and challenges related to the mathematics knowledge base (e.g., its substantive and syntactic components). The benefits of the empirical findings are that they led to new knowledge and a deeper understanding of PSTs' learning of mathematical concepts through two learning processes (SUB and SYN), as well as the relationship and shift between these processes.

Chapter 10: *Assessment of numerical cognition in Brazilian preschoolers - Elaboration and study pilot*; by Silvia Cristina de Freitas Feldberg, Rita dos Santos de Carvalho Picinini, & Simone Aparecida Capellini. During the preschool years, the main difficulty that can predict the risk of mathematical difficulties is the delay in the ability to learn quantities associated with number words and Arabic numerals. Objective: to assess numerical cognition for Brazilian preschoolers aged 2 years to 5 years and 11 months old. Methods: Based on a literature review, mathematical skills were selected to evaluate numerical cognition. A pilot study was conducted to verify the applicability of the developed instrument in 74 Brazilian preschoolers (44 boys) from public municipal early childhood education in the city of São Paulo, Brazil, distributed in the following age groups: Group I: 15 preschoolers, aged 2 years to 2 years and 11 months old; Group II: 18 preschoolers, aged between 3 years and 3 years and 11 months old; Group III: 19 preschoolers, aged between 4 years and 4 years to 11 months old; and Group IV: 22 preschoolers, aged between 5 years and 5 years to 11 months old. Developing an instrument to assess numerical cognition in preschoolers can contribute to developing logical-mathematical reasoning in these children, helping teachers develop activities and games that teach basic numerical, contributing to future gains in mathematics learning.

Chapter 11: *Absence-presence in the production of 'green' schoolscales*; by Tanaya Vyas & Girish Dalvi. Schoolscales are increasingly involved in the production of 'green' artefacts, installations, and activities. However, schoolscale discourse rarely features design processes and negotiations related to school 'greening'. What does it mean for schools to become 'green'? This chapter offers a critical examination of school 'greening' beyond its pedagogical purpose, particularly through tracing logics underlying production and consumption of tree-based installations in government primary schools of suburban Mumbai. Participant observation, and go-along conversations with school members reveals an image of a 'green' school, as an intense version of reality. The schools bear 'presence' of trees in absence of actual trees in or around their campus, through crafting site-specific displays. The discussion articulates how 'green' schoolscale is projected as a prospective remedy for many issues. The desirability of the hyperverdant projections seems to rest on the seemingly liberating, yet normative discourse of 'mending'. Analysis of schoolscale production concludes that, despite their apparently subversive character within educational conventions, the 'green' imaginings inadvertently reinforce the very norms they seek to challenge. This could result in school members negotiating paradoxical expectations. Implications are discussed with regard to new ways of thinking about schoolscale design research in the context of Environment Education.

Chapter 12: *A transformative instruction model and task-oriented learning*; by Natalia Karlsson & Constanta Olteanu. This study is analytical research that examines a theoretical approach to transformative pedagogy (TP) and transformative learning (TL) in order to conduct a logical deductive construction of the transformative instruction model (TI model). The study aims to enhance the understanding and effectiveness of the interplay between teaching content and learning in the form of requires for the high-quality teaching of students in the cognitive development of mathematics. It also analyzes the conditions for transformative teaching and learning in a task-oriented context. The crucial psychological outcomes focus on the domains of TP and their interpretation within the context of Mezirow's TL theory, emphasizing an instrumental, dialogic and self-reflective learning discourse, as well as meaning schemes in learning. The methodological approach is based on a systematic deductive analysis. The analytical results as a conceptualization and an analytical construction of a TI model related to transformative teaching and learning algebraic concepts. The TI model is the result of extending theoretical approaches to TP and TL, as well as logical connections to research about the formation of algebraic concepts. Benefits of the TI model is a new knowledge about an effective teaching of algebra, where students' algebra learning, and knowledge development is crucial.

Chapter 13: *Psychosocial skills, emotional understanding and resilience related to attachment in young people*; by Eva Vancu. Adolescence is a stage of development of psycho-social skills through training and education. The goal of our research is on

the bases of scientific theory and empirical research assemble psychoeducational methodology for development of emotional regulation and resilience of students and adolescents. The sample consisted of 367 adolescents. The respondents completed questionnaires The Child and Youth Resilience Measure, modified version of Situational Test of Emotional Understanding and a questionnaire of trait emotional intelligence. To obtain the results, we used a battery of questionnaires, which consisted also of IPPA-R questionnaire designed to measure the quality of the attachment to the mother, father and peers. The results have shown that adolescents in middle adolescence have lower rates of emotional regulation and resilience. We found out that the quality of the attachment influences the effectiveness of emotional regulation of adolescents. Our results also show that adolescents usually form a secure attachment in their relationships. We also found out that they form the least quality with their fathers and the most quality relationship with their peers.

Chapter 14: *Teachers' challenges navigating the provision of support to learners with special needs: Mainstream rural school perspective*; by Omphile Tshepo Cooperate Madiba & Appolonia Masunungure. Implementing support to learners with special needs in South African schools has largely been presented with challenges which increasingly make it difficult for teachers to navigate their provision of support. Thus, the pragmatic realities show that there is a need to identify and combat such challenges. This study investigated challenges experienced by teachers in their attempt to support learners with special needs. The study is underpinned by the social constructivism paradigm. The study used the transformative learning theory. The phenomenological qualitative research approach was employed to explore teachers' challenges in providing support to learners with special needs in mainstream rural schools. Data were collected using focus group interviews, with 36 purposively selected teachers in 6 schools. The collected data was thematically analysed and interpreted using Braun & Clarke methods. The study discovered the following as challenges hindering the provision of support to learners with special needs: lack of competency in managing the diverse learning needs of learners; limited resources; as well as a lack of training in attending to learners' learning needs. The study recommended resource allocation, teacher professional development training, and initiation of collaborative networks, to be in place for the alleviation of the support challenges experienced by teachers.

Chapter 15: *Teachers' attitudes in multicultural schools in Athens - A pilot study*; by Kendra Macris & Despina Paizi. Greece stands as the 'gateway to Europe', embracing waves of refugees and immigrants from diverse corners of the globe over the past three decades. Consequently, the educational landscape is undergoing a profound transformation, as students representing a kaleidoscope of backgrounds attend school in Greece. However, teachers are often left grappling with the challenge of adapting to this vibrant mosaic of diversity without support. This pilot study aimed to investigate the attitudes of twenty four teachers that attempt to navigate this multicultural milieu in three elementary schools in a highly

concentrated multicultural area of downtown Athens. A survey was employed to assess how teachers' awareness of the challenges that multicultural and multilingual students face influence their ability to use adept teaching strategies. The results indicate that the more teachers are aware of these challenges, the more teaching strategies they employ. The findings also show that they feel unsupported in their efforts to bridge the cultural chasms between themselves and their students of varied backgrounds. Based on these findings this pilot study explores how teachers could be effectively supported by means of teacher training seminars targeting key areas of multicultural education.

Chapter 16: *Reflections in acceleration: How GenAI technologies impact educational practice*; by Stine Bylin Bundgaard, Susanne Dau, Camilla Gylvendahl Jensen, & Camilla Finsterbach Kaub. In an accelerating world where generative artificial intelligence (GenAI) significantly influences the daily operations of education, it is pertinent to discuss how this format can be integrated to balance and support students in working reflectively with the complex array of available knowledge and its interconnections. This chapter will explore the future of education through the lens of reflective practice learning, proposing how higher education can be reimaged to embrace GenAI as an opportunity to develop reflective competence. The discussion is grounded in Hartmut Rosa's (2021) mapping of the accelerating society, Donald Schön's work on reflection and learning (1991; 1990), and Hannah Arendt's elaboration on professional judgment. The chapter argues that future education must increasingly support the development of students' ability to learn how to learn and their capacity to critically reflect in their qualification of actions.

Chapter 17: *Strategies for developing mathematics and science resilience in pre-service teachers to address maths and science anxiety in South African schools*; by Sakyiwaa Boateng. This chapter explores strategies to foster resilience among pre-service mathematics and science teachers education to reduce maths and science anxiety within South African schools. Pre-service teachers often face high levels of maths-science-related anxiety, which can impact their effectiveness and confidence in teaching these subjects. Developing resilience is crucial to helping them cope with the challenges of teaching. This project examines various resilience-building strategies and practical teaching experiences and the integration of anxiety-reducing techniques within teacher training curricula for mathematics and sciences. The Self-Determination Theory underpins this study. The study employs a participatory action research approach, collecting qualitative insights from focus group interviews and reflective journals. This study employed action research to design cycles of whole class (n=29) intervention based on three tools designed by Johnson-Wilder and the mathematical resilience network team, and the emotional grid to support pre-service teachers in building resilience in math/science as they prepare for fieldwork. Data was analysed through thematic content analysis. The findings revealed that maths/science anxiety may be successfully reduced through

the effective use of emotional tools. These findings suggest a new method of utilising the affective domain in teachers' training in South Africa for educational transformation.

Chapter 18: *Leveraging ICT tools for teaching and learning in physical sciences*; by Sam Ramaila. This chapter examines the effective use of Information and Communication Technology (ICT) tools to enhance teaching and learning in physical sciences. By incorporating various ICT resources—such as simulations, virtual labs, and interactive multimedia—the chapter evaluates their impact on student engagement, comprehension, and academic achievement. Through a mixed methods approach, the study identifies optimal strategies for integrating ICT into pedagogical practices, particularly for deepening students' understanding of abstract scientific concepts. The study's findings reveal that ICT tools, such as simulations and interactive demonstrations, significantly improve students' grasp of complex concepts by providing visualizations and hands-on experiences. Participants reported increased engagement and comprehension, with ICT-enabled personalized learning allowing students to progress at their own pace and access supplementary materials. Despite these benefits, challenges persist, including limited access to technology, insufficient technical support, and concerns over digital equity. The chapter concludes by offering actionable insights for educators and policymakers seeking to enhance physical sciences education through ICT integration while addressing the systemic barriers that hinder equitable implementation in diverse educational contexts.

Section 2, entitled “Projects and Trends”, presents chapters concerning, as the title indicates, education viewed as the center for innovation, technology and projects, concerning new learning and teaching models.

Chapter 19: *Barriers to flipped classrooms in South African universities: Context and content challenges*; by Thuthukani Dlamini. A significant shift in pedagogical methods is the adoption of the Flipped classroom approach. This method challenges direct instruction as the most efficient use of class time. Instead, it encourages students to engage with new material before coming to class, reserving class time for activities that foster higher-order thinking and activity. While this strategy addresses limited classroom time, it often overlooks the complexity and cognitive demand of module content, as well as the socio-cultural contexts within South Africa's diverse higher education landscape. This qualitative research investigates the challenges associated with implementing the Flipped classroom model within South African Higher Education. Using a case study approach, data was collected through questionnaires with South African University students to assess the influence of their community backgrounds. Additionally, semi-structured interviews with a lecturer were conducted to evaluate cognitive demands and support needed for this instructional approach. The findings reveal that the community contexts, combined with the cognitive challenges posed by module content, significantly impede the

successful implementation of the Flipped classroom model. The study recommends that South African universities prioritize community engagement initiatives that foster supportive learning environments and invest in university residences equipped with the necessary infrastructure and academic support.

Chapter 20: *What chatbot should support novice instructors in assisting students in PBL practice*; by Akiko Kai, Yuriko Ishida, & Ryuichi Matsuba. "Reflection-Bot" is a chatbot originally designed for daily journaling in self-directed language learning, with features that promote goal setting and reflection through personalized notifications. In the present paper, we explore the potential of utilizing this chatbot for students' weekly learning supports in a PBL course through an analysis of interview data from several new instructors. The results highlight various issues with the PBL course as currently practiced, such as inadequate instructional time for students, lack of intervention training for instructors, and underestimation of the importance of intervention. We show that if we add to the existing chatbot the ability to intervene for students' learning on behalf of instructors or to show instructors how to do that could potentially solve some of the issues.

Chapter 21: *Strengthening the university-company partnership - A collaborative design project*; by Xiaozhu Lin & Matteo Oreste Ingaramo. On a global scale, universities today are increasingly expected to enrich their curriculum with real-world learning experiences to increase student engagement and cultivate students' critical social competencies. The topic of collaboration between universities and companies has been extensively debated, and there is a widespread acceptance of the notion that companies can genuinely contribute to teaching content by sharing cutting-edge knowledge, expertise, and resources. In this chapter, the authors examine the discrepancy between universities and companies in the design field to identify viable strategies to enhance collaboration between these sectors. The authors provide a design project conducted in partnership with a prominent global company as a case study to illustrate the effectiveness of such initiatives in closing the gap between universities and companies. The authors aspire to furnish fellow researchers in cognate fields with a valuable reference point, informed by the experiences gained from this project, to explore further and enhance design practice, achieving more substantial and consequential outcomes.

Chapter 22: *Digital and analogue gaming in the daily lives of people with intellectual disability - A case study in the Portuguese context*; by Carla Sousa & José Carlos Neves. The role of games in promoting cognitive and social development for People with Intellectual Disability (PwID) is increasingly recognised, yet the specific impacts of digital versus analogue games remain underexplored. This study explores the cognitive, social, and emotional influence of digital and analogue games on PwID in Portuguese institutions. Using a participatory design approach, four games – two digital and two analogue – were developed collaboratively between academia and self-advocacy institutions. Semi-structured

interviews were conducted with support workers from two institutions in the North of Portugal, who provided feedback based on their experiences of using these games with PwID. Thematic analysis of these interviews identified key themes such as cognitive skills development, social interaction, accessibility challenges, and game design preferences. Results indicate that both digital and analogue games can promote cognitive stimulation and social engagement, though analogue games tend to foster richer peer interaction, while digital games are associated with maturity and autonomy by the participants. The study highlights the importance of customisation and accessibility in game design and suggests future research should focus on longer-term effects.

Chapter 23: *Ecodesign as an innovative approach to teaching in secondary schools*; by Tetjana Tomášková, Daniel Duda, Jan Krotký, & Jarmila Honzíkova. The main objective of this chapter is to provide a new tool for teaching technical subjects in secondary schools. Specifically, it is ecodesign as a systematic process of designing and developing a product, which, in addition to features such as functionality, safety, technical feasibility, etc., places great emphasis on achieving a minimal negative impact of the product on the environment, mainly from the point of view of the life cycle. The introduction to the chapter describes the product manufacturing process as a system that is managed with respect to the environment. The next part of the chapter summarises the theory on the integration of environmental aspects into the product design process using the ecodesign methodology. In conclusion, the chapter compares metal and plastic 3D printed products and considers the usual requirements for product properties such as functionality, quality, safety, price and appearance. The connection of ecodesign and environmental management systems is an effective implementation of a preventive approach to the identification of risks of products, activities and services and the subsequent setting of preventive measures, which will clearly show the students the importance of Ecodesign as a tool.

Chapter 24: *Online education in Latin American higher education: A systematic review*; by Salvador Antelmo Casanova Valencia, Arcadio González-Samaniego, Bertha Molina Quintana, & Rigoberto López Escalera. COVID-19 forced higher education institutions to implement virtual education activities without being prepared for it, representing a challenge for the traditional model. This has been exacerbated in Latin American institutions, as they do not have adequate resources and infrastructure. The objective of the study was to identify trends in online education research in Latin America because of the health emergency. To achieve the objective, a systematic literature review was carried out. Documents published in Scopus between 2008-2023 were analyzed using the Biblioshiny and VOSviewer software. 47 documents were found, of which 40 were published in the period 2019-2023. Keywords were analyzed according to their co-occurrence. 376 documents were found and 47 with a minimum of two co-occurrences were selected. The documents have been associated in four clusters. The results show the impact on university education during and after the pandemic in Latin America. Online

education has continued after the pandemic, exploring new forms of learning. It has enabled access to higher education for sectors of the population that traditionally could not join it, due to issues such as geography and economics. Challenges are noted in creating infrastructures and processes that allow promoting this type of teaching.

Chapter 25: *The importance of the role of professional socialization for educators as they encounter innovation in curricular and artificial intelligence technology*; by Ekaterina Kozina, Marie Hyland, & Catherine Comiskey. Teachers throughout their professional lives and their career experiences have long been the focus of educational research. Educators at all levels, including primary, secondary schooling, and tertiary education, are faced with increasingly complex demands placed on them by society, expanding role of education, curriculum reforms, the increasing use of Artificial intelligence technology in the classrooms, and diverse environments in which teachers work. It is recognized that teachers' professional experiences encountered during their early years of professional practice and their first teaching year, also known as an induction year, has far reaching implications for teachers professional learning, development as well as their subsequent teaching career. Consequently, teacher professional socialization and retention in the profession to a large degree depend on professional experiences encountered in their working environments during early teaching years.

Chapter 26: *Views of learners on transforming schools into more inclusive spaces*; by Thabo Makhalemele, Rachel Rirhandzu Mayimele, & Pateka Pamella Jama. Inclusive education has gained prominence as an essential educational approach throughout the world. In the South African context, inclusive policies recommend the active participation of learners in the education process to develop and extend their potential as equal members of society. This study explores the perceptions of learners regarding inclusive education and its potential to improve teaching practices. This participatory research study, using transformative learning theory as a lens will employ photovoice and narratives. The participants were 25 full-service school learners in Gauteng and North-West Provinces of South Africa. Thematic data analysis was used to analyse the data. The study findings revealed that learners do not have a voice in the implementation of inclusive policies; only teachers are privileged to influence inclusive teaching, while learners are only expected to be recipients, and that learners are treated as empty vessels. Although the study has found that learners are disadvantaged in contributing to inclusive practices, it recommends an integrated approach among teachers, learners, and education policy developers to ensure that learners' voices are heard in schools to improve inclusive teaching practices.

Chapter 27: *Personalizing learning through collaborative networks of knowledge*; by Ralucca Gera, Mark Reith, D'Marie Bartolf, Simona Tick, Paolo Singh, Sean Mochocki, & Akarti Saxena. Over the past two decades, numerous learning systems have emerged promising novel approaches to improve education and

training. However, most rely on exposure to information and practice, which does not guarantee the internalization of the concepts and changes in behavior required to engage the learner appropriately in education and training. This paper presents a new learning process that addresses these limitations by modeling, motivating, guiding, assessing, and attesting the learner. We present each of these steps and discuss how leveraging innovative knowledge structures using network science, emerging technologies, and AI, can support the proposed learning system that engages learners in their learning journey. The system's effectiveness is illustrated through two pilot studies on two different learning systems, a process that integrates: (i) a theoretical framework developed based on data on student learning and (ii) on student and faculty experience undergoing years of testing and refinement based on faculty expertise and learners' experiences, shaping the systems' designs and outcomes.

Chapter 28: *Fostering scientific thinking in primary students through investigative environment*; by Valentina Bologna & Caterina Bembich. The Agenda 2030 objectives highlight the need to engage students in STEM (Science, Technology, Engineering, and Mathematics) to support ecological and cultural transitions. Understanding students' scientific thinking involves examining their social, cultural, and environmental contexts. Inquiry-based learning is an effective teaching strategy that promotes exploration and develops scientific reasoning. This work presents preliminary findings from a case study testing innovative teaching methods to inspire primary school students in STEM. In the first phase, a class of final-year primary students participated in a hands-on physics activity using an inquiry-based approach. Observations indicated that the activity improved reasoning flexibility, encouraged collaborative learning, and increased motivation and engagement.

Chapter 29: *Towards a framework to support novice teachers in rural areas: Implications for blended professional development initiatives*; by Nomfundo K Radebe & Emmanuel Mushayikwa. Research indicates that teacher professional development significantly influences teaching practice. The widespread adoption of online and blended modes of professional development that occurred in response to the COVID-19 pandemic was expected to enhance access to professional development for teachers in remote and rural areas of South Africa. However, research on the use of blended professional development in these settings remains limited. This study addresses this gap by employing a qualitative approach to examine the key components of a blended teacher professional development intervention in a rural area. Data was collected using classroom observations, interviews, and field notes and was analysed thematically. The study identified several components that contributed to the effectiveness of the intervention: sustainability, content focus, coherent, access to digital tools, active engagement, longer duration, individual support, and collaboration. The study also underscored the importance of facilitators of blended professional development possessing Technological Pedagogical Content Knowledge (TPCK) competency.

Chapter 30: *Students' use of learning videos*; by Bjarte Pollen, Joar Sande, Lars Kyte, Per Eilif Thorvaldsen, Sven-Olai Høyland, Erlend Raa Vågset, & Marcin Fojcik. As digital learning grows, understanding student engagement with educational videos is essential, yet few quantitative studies exist within Norwegian educational research. This study addresses that gap by surveying over 1,400 Western Norway University of Applied Sciences (HVL) students with 252 responses to explore their video preferences, viewing habits, and perceived benefits. Results show that, while students rate external videos from elite institutions higher in technical quality, they still prefer videos made by their lecturers over hybrid teaching videos. Academic relevance stood out as the most important factor, with content quality prioritized well above other considerations like pedagogical approach, video length, and technical features. Students use videos as a general learning aid throughout the semester, not just for exam preparation, and prefer videos to be available before class, supporting flipped classroom methods. These findings suggest that educators focus on creating accessible, content-centered videos aligned with course needs to enhance student engagement and learning outcomes.

Chapter 31: *Innovative education and life cycle assessment of 3D printed products*; by Tetjana Tomášková, Daniel Duda, Jan Krotký, & Jarmila Honzíková. The chapter is devoted to life cycle assessment, specifically determining the carbon footprint of a product produced with the help of a 3D printer. At the beginning of the chapter, mind maps are described that relate to a specific product printed on a 3D printer, which has clearly defined goals: to describe the individual phases of the product's life cycle; orientate yourself in concepts related to product quality; define product life cycle costs; assess the impact of various factors on product quality; to evaluate the impact of production using a 3D printer on the environment. There are various calculators for calculating emissions, which, after filling in, will evaluate the result. However, it is often impossible to look at how the process was calculated to know how a particular value arrived at. Calculations were calculated in Microsoft Excel, where clear methods of calculation were presented to the students. At the end of the chapter, there are recommendations for applying the sustainable development of active learning methods to teaching.

Chapter 32: *An Afrocentric approach to analysing literary text through African values in English first additional language*; by Thuthukani Dlamini & Eugene Marais. Literature and culture have an interlinked relationship, and prescribed literature texts have a fundamental role in ensuring that these coexist harmoniously. Centralising African Values in prescribed literature should be prioritised in South African classrooms, to achieve the nationally aspired decolonised approach to education. This paper explores the teaching of these African Values in prescribed literature, particularly short stories. This qualitative study uses textual analysis to generate data with the Afrocentric paradigm as the conceptual underpinning for the study. Reviere's (2001) Afrocentric canons show how African values can be taught. The paper presents the context, methodology and doctrinal underpinning of Afrocentrism before using Afrocentrism as a tool to analyse a text.

We also look at the functions of texts for young adults to distinguish ideological purpose and as a vehicle for transmitting cultural values. The paper recommends that teachers and learners be conscious of these Afrocentric values and their impact on literary analysis in South African classrooms.

Section 3, entitled “Teaching and Learning”, offers research about foundations in the education process itself, in various contexts, both for tutors and students.

Chapter 33: *Developing emotional literacy, support of emotion regulation and psychological resilience in the context of learning programs*; by Eva Vancu. The chapter presents the main findings of a research project aimed at methodology for developing and strengthening resilience and emotional literacy for teachers. The aim of this thesis is to find out what are the needs of today's teachers in the area of emotional literacy and the appropriateness of applying the proposed training programme. In the theoretical section, the concepts of emotion, emotion regulation, social skills and communication, resilience and their relevance to the profession of teachers are explained. The training programme is developed for continuous training of teachers in the form of presentations. The outputs of the project include an empirically validated, theory-based methodology manual for teachers to strengthen their psychological resilience. Teachers' practice and experience indicate a strong need for further training in the area of emotions and emotion management. After completing the training programme, the teachers' expectations were met and they expressed their satisfaction with the implementation of the emotional skills training and the promotion of their self-development. The programme was designed to stimulate teachers' interest in further exploring ways of learning. In the future the preparation of webinars for the acquisition of the methodology in the form of a short-term training programme for teachers using e-learning.

Chapter 34: *How do students manage challenging study tasks? A thematic analysis of higher education students' (non-)strategic study-related behaviors*; by Diane Marcia Manuhuwa, Simone Hanegraaff, Johanna Schönrock-Adema, Sjoerd J. de Vries, Jan Willem de Graaf, & Joke Fleer. Higher education presents students with numerous challenges, requiring effective use of executive functions (EFs) to navigate academic demands. EFs are higher-order cognitive processes that regulate thinking, behavior, and emotions for goal-directed and adaptive actions. While strategic behaviors can optimize EFs, students also adopt routines or habits (non-strategic behaviors) to manage study tasks. This study explores students' (non-)strategic behaviors and which EF they predominantly support. Twenty-three students (aged 17-26) were interviewed at a Dutch University of Applied Sciences. Subsequently, we identified 27 themes and 89 types of (non-)strategic behaviors linked to nine EFs through inductive and deductive thematic analyses. The findings provide insights into which specific (non-)strategic behaviors support EFs. This helps students and educators identify behaviors that can strengthen particular EFs, especially those that may be underdeveloped and offers input for guidance for more targeted educational interventions to improve learning and studying.

Chapter 35: *The challenges of learning tasks from the perspective of children from marginalised Roma communities*; by Mária Hušlová Orságová, Katarína Vančíková, & Marián Trnka. Slovakia is a country of permanent or temporary residence for many nations and ethnic groups, which oftentimes do not have the possibility to receive education in their own language. One of the most controversial linguistic minorities on this front are children from the Roma community, which are commonly marginalised due to different living conditions as well as socio-economic standards. Both these factors highly contribute to segregation of Roma children from the Slovak majority and negatively affect their cultural experience. When entering the formal education system, Roma children do not possess the same linguistic competence of Slovak language as pupils from the major population. In this paper, the authors analysed the textbooks in Slovak: commonly used in the first two grades of elementary schools and attempted to identify the most frequent words, phrases and sentences that children from the Roma community usually encounter in written form, while being educated. By doing so, the authors would like to increase their potential comprehensibility for pupils from marginalised Roma communities. The findings of this research provide a basis for the development of an effective language programme for the second language acquisition of Slovak and urges the Slovak school system to develop a comprehensive national strategy, which would provide adequate language support for children from linguistic minorities.

Chapter 36: *Understanding the learning space: A bibliometric analysis on blended learning in higher education*; by Thoko Poppy Mahlangu. Learning in higher education was predominantly the traditional face-to-face type of learning. Blended learning has been adopted as the relevant approach to teaching and learning, based on the lesson learned during the COVID-19 period. The concept “learning space” refers to a full range of spaces in which learning occurs, from real to virtual learning, and from the classroom to chat rooms. Blended learning necessitates an understanding of the learning space and design, pedagogy and curriculum, and their relation to the learning space. The learning space is critical for the realisation of learning outcomes. Online learning cannot replicate everything of value in the face-to-face experience of learning. The reflection on the blended learning approach is guided by the conceptualisation of learning as acquisition, learning as participation, and learning as knowledge creation. This study reflects on trends in blended learning (between 2013 and 2024), as aided by an extensive literature review. A qualitative methodology was employed, and data was analysed using the bibliometric analysis. This chapter discusses the effects of blended learning on students. This study is significant as it helps improve lecturers’ implementation of blended learning, which would translate into developing essential online and face-to-face learning pedagogy, as institutions of higher learning globally have adopted blended learning.

Chapter 37: *Project-based teaching - Insights from development in teaching in construction management*; by John Lindgren & Anna Isaksson. Future engineers must be fluent in different technologies, methods, and methodologies requiring a

high dynamic capability, in opposite to many students' behavior. Project Based Learning, student-centred with a dynamic approach to teaching where students study real-world problems and challenges, aims to increase dynamic capability. This research reports transforming a course in construction management into a project-based approach to stimulate students' intrinsic motivation, i.e. interest in what is learned and the pleasure it brings. Course material has been developed in four rounds, ranging from 2022-2024. Course documentation regarding the execution of the course as well as documented student feedback was thematically reviewed and analyzed relation to the aim of this chapter. The development shows interesting challenges in teaching regarding the balance between showing results from the actual project vs. stimulation of creativity among students. Age and work experience positively affect how the students execute the projects. It also shows the significance of the course framing and variation of project set-ups. Our findings also show values in PBL for students' ability to handle changes in a world with many insecure influences and it is indicated that PBL requires a learning process over time both for students and teachers.

Chapter 38: *Exploring the support needs of teachers in full-service schools to promote inclusion*; by Matabe Rosa Modiba & Appolonia Masunungure. Supporting teachers in full-service schools (FSSs) is important in the South African education system as it enhances education for sustainable development. Although teachers have undergone pre-service and in-service training as part of support in inclusive education, it is apparent that they do not receive adequate support to teach in inclusive classrooms. Entrenched within the qualitative approach and the interpretivism paradigm, the study allowed teachers to construct reality in terms of their support needs. 12 participants from two full-service schools in the North-West Province were purposively sampled. Data were generated through semi-structured interviews and were thematically analysed. The findings indicate that continuous practical training is their key need for support. Availability of the teaching and learning resources, participation in Professional Learning Communities (PLCs), and intentional support by the support structures were highlighted as other support needs of teachers in full-service schools. In addition, adequate collaboration with the key learning support stakeholders was highlighted as a support need in inclusive education settings. It is recommended that the School Management Teams (SMTs), School-Based Support Teams (SBSTs), and District-Based Support Teams (DBSTs) should ensure that teachers are trained theoretically and practically on a continuous basis to maintain inclusive pedagogies.

Chapter 39: *Screening for mathematical difficulties: Elaboration and pilot study*; by Rita Picinini, Simone Aparecida Capellini, & Giseli Donadon Germano. In Brazil, there are few studies about identification and early intervention of difficulties in mathematics. Objectives: To develop a screening tool to identify students at risk for mathematical difficulties in the initial literacy series and to verify the applicability of the screening elaborated. Methods: From a bibliographic survey, 8 mathematical skills were selected based on the Triple Code Model to elaborate a screening program

composed of number sense, number line, place value, addition, subtraction, multiplication, division and problem-solving skills. The screening was applied in four 45-minute sessions, twice a week, during class time. A total of 201 students from the 1st and 2nd grades of elementary school were evaluated. Of these, 44 students were identified as at risk and referred to the remediation program. The study showed the need to reduce the number of skills to 5: number sense, number line, place value, addition and subtraction. This reduction occurred due to the observation that knowledge related to addition and subtraction should be developed first. Conclusion: The adjustments made based on the results of the pilot study will favor the application of the screening to better identify students with difficulties in mathematical skills.

Chapter 40: *Active learning methods in anatomy teaching for operating room nursing*; by Lars Kyte, Grethe M. Dāvøy, Geir Egil Eide, & Alisa Rysaeva. Several studies have shown the benefit of drawing when learning anatomy. Virtual Reality (VR) also appears to be useful when learning about anatomical structures. This study aimed to describe how students in a master study programme in operating room (OR) nursing perceived the combination of drawing and the use of VR in the learning of anatomy. Constructivism and a sociocultural view of learning constitute a foundation for applying these active learning methods. The two methods were combined in a class of 29 students. The students were provided half-finished drawings of anatomical structures that they were to complete with guidance from the teacher. They also were to find various anatomical structures by using VR technology. A paper questionnaire was applied to evaluate the teaching programme. Data were analysed statistically (check-off questions) and descriptively (open-ended questions and comments field). Twenty-eight students (96.6%) completed the questionnaire. The students highly appreciated both learning methods. They reported that drawing made them work more actively during lectures and increased learning outcomes. They also perceived that the use of VR technology increased their understanding of the location of anatomical structures. The combination of drawing and VR technology appears to offer significant benefits to OR nursing students when learning anatomy, by both increasing student engagement and enhancing their understanding of anatomical structures.

Section 4, entitled “Organizational Issues”, gives a glance on tools for implementing organizational learning and change in the education context.

Chapter 41: *Facilis Descensus Averno - Or effects of interactions between own PhD research project and other projects initiated within university*; by Cezar Scarlat. This chapter is focused on PhD research projects in a large university, aiming to analyse the effects of their interactions with other organizational projects of the university. Assuming that objectives of doctoral research projects are aligned to the strategic objectives of the university, there were a few research questions, specific to this explorative study: How could the effects of interactions be measured? Are the effects of interactions always positive? If the effects of interactions are negative, then

which might be the reasons behind them? Ultimately, are there any solutions to avoid or mitigate the negatives? The study includes both secondary research (literature survey) and primary research: directly observed and personally experienced doctoral projects in a Romanian university environment under scrutiny, completed with semi-structured interviews with doctoral students. This piece of work reveals novel types of inter-project conflicts within higher education institutions, and findings allow the formulation of several recommendations, which are critically important to doctoral schools and PhD supervisors as well as to major stakeholders: higher education leaders and strategists, policy and decision makers, administrators and research managers. Alignment of objectives is essential.

Chapter 42: *Incrementa Atque Decrementa...Managing the university research centres along their lifecycle: Three cases and a common administrative issue*; by Cezar Scarlat. This chapter raises a specific question: Is there any common reason behind cases of failure encountered in higher education research centres or laboratories? The purpose is to launch a discussion about reasons behind unexpected failures of some university research units, with the objective of identifying possible administrative and management causes, possibly a common reason (either internal or external). As methodology, the study is qualitative, using both secondary (literature review) and primary research (empirical investigations). The method (observation) used three case studies (i.e. university research centres that failed). They were directly observed and/or personally experienced instances in the Romanian university environment – over a relatively long period of time (1980s–2000s). The empirical data were analysed through the lens of the organizational lifecycle. Regardless of their diverse age and size, mission and profile, and phase of growth in their lifecycle, administrative decisions were found as common type of cause of ending the activity in each case explored. The concluding remarks are focused on a set of recommendations centred on the main findings – to be recommended to the stakeholders: higher education policy makers, administrators and research managers.

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