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Increasing enrollment and costs in introductory geoscience classes are making the logistics of organizing on-location field trips challenging; but with modern technology, virtual field trips (VFTs) can provide a proxy. Students entering college today are digital natives with short attention spans, suggesting they would find a VFT appealing and easy to navigate. While not a replacement for an actual field trip, VFTs offer interactive alternatives to traditional lectures, and several have been successful in engaging and educating students. This proposed VFT utilizes the iconic geology of Yosemite National Park to teach the effects of climate change at geologic and anthropogenic timescales. The story is told along Yosemite's four roads and is designed for use as a roadside geology accompaniment in the park, or as a standalone interactive tool in the classroom. VFT stops narrate the geologic history of the area and use photos with illustrated overlays to further describe concepts.

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As momentum builds around the fourth industrial revolution, it is imperative that schools equip the youth of today to succeed in the workforce of tomorrow. The use of smart learning environments (SLE) is an optimal way to prepare students for the future because the use of innovative technologies and elements allow for greater flexibility, effectiveness and adaption, engagement, motivation, and feedback for the learner. It is envisioned that the “smart” learners of the future will operate in SLE that are contextual,

personalized, and seamless. The learning process in the SLE will facilitate their problem solving and promote their intellectual growth as lifelong learners. This study, then, demonstrates how educational robotics can be used by educators to equip students in the UAE for futures in STEM fields of study and work. It is claimed that students who build robots build futures for themselves and their communities: a worthy goal for Emirati students in 2018, The Year of Zayed.

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The introduction of mobile devices has brought about dramatic transitions not only in how ordinary individuals communicate with one another, but also in how media students learn to tell highly compelling digital stories. In higher education, mobile devices are increasingly proving to be quite powerful tools aiding media students in learning storytelling techniques across media platforms. This chapter draws on a pilot project involving a survey of mass communication students at the American University of Sharjah, United Arab Emirates, in which iPads and smart phones were used to generate video stories as course assignments. A survey of students involved in the project reveals they were highly passionate about doing their video storytelling assignment on iPads and smart phones as compared with traditional audio-visual capturing tools. The authors see a huge potential for mobile devices as credible media gathering tools in the emerging real-world journalistic practices.

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Saudi Arabia, with its deeply conservative yet rapidly changing society, has adopted an ambitious blueprint for the future in Vision 2030. One of its goals is to increase women's participation in the workforce from 22% to 30%. This case study focused on Saudi female undergraduates undertaking an introductory statistics course. With an emphasis on disruption and smart learning, the author created interventions and tracked changes in attitudes and perceptions of students towards statistics from the beginning to the end of the course. Reusable online resources in the form of a series of content and problem-solving videos were introduced as the semester progressed. At the same time, an appreciative inquiry approach was used to foster a positive change environment. An online forum was created to encourage student discussion and feedback throughout the semester, and anonymous course evaluations were conducted at the end of course. Qualitative and quantitative results are presented here.

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With advances in information and communication technology, students can be educated from anywhere at any time at their own pace. Students of the 21st century have different learning expectations. These expectations require the design of smart learning environments to ensure more effective and adaptive learning. This chapter essays an introduction to a new educational tool developed on the Moodle platform by The University of the South Pacific to bridge gaps in mathematics knowledge and skills as students' transit from secondary to tertiary education. The tool, known as the Online Mathematics Diagnostic Tool (OMDT), is an intelligent system which provides online tests and automates personalized remediation. This chapter will include the reasons why this diagnostic tool has been developed for the Pacific region students aspiring for tertiary education. It will also discuss why the tool is considered as a smart learning environment (SLE) and how it ensures effective learning of mathematics.

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Smart Interactive Game-Based System for Preschools in Tanzania 81

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Academia across the globe is increasingly integrating smart education into learning that describes digitized interactive technologies with elements of motivation, engagement, and feedback. This chapter presents an intelligent and interactive system using alphabetical sounds using game mechanics for preschoolers in Tanzania. Generally, it has been reported that preschoolers often experience trouble in articulating alphabetical sounds. At present, the mode of teaching alphabetical sounds differs in every preschool, resulting in a lack of standardization. This makes adaptation to a new preschool system problematic, especially in situations where a preschooler is transferred from one kindergarten to another. A smart research framework on the interactive game-based system and attributes of active learning were taken into account to uphold intelligent ways to enable language competency for preschoolers in Tanzania. A study was conducted in Tanganyika preschool in Arusha, Tanzania, which presented initial results of preschoolers' perception of the intelligent interactive game-based system.

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The main objective of this chapter is to demonstrate how an instructional model, 2T2C, was used to infuse 21st century skills in the teaching of secondary school mathematics using a smart learning environment (SLE). It was imperative that cooperative and collaborating learning methodologies were included in the teaching model to ensure peer/teacher interaction to enhance student communication, the infusion of high-order thinking skills to guarantee that students can solve real-world problems and think at higher cognitive levels, the introduction of self-efficacy sessions to ensure that all students have the confidence and self-esteem to believe and have the self-assurance to solve mathematical real-world problems and take responsibility for their own learning, and the infusion of technology as a resource in the teaching and learning process: hence, 2T2C (thinking, technology, communication, and confidence). The scenarios presented highlighted the need for communication, high-level cognitive objectives, multiple evaluation practices, and thinking as key to the learning process.

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The design of learning environments has greatly influenced learning approaches and strategies, and has traditionally been considered to exist within the physical walls of a learning institution. In recent years, learning environments have evolved alongside advances in the internet, technology, and mobile devices and have given rise to smart learning environments to better accommodate a new generation of learners and learning behaviors. This chapter presents an exploration of the possibilities of smart learning environments in distinct and diverse environments, across varying learner locations, profiles, and demographics. The authors explore and analyze technology and pedagogy elements that make up an effective smart learning environment, through different cases and viewpoints of the contributing authors of this book. Based on the findings, they propose a framework for the design and implementation of smart learning environments that will effectively create engaging, personalized, and effective learning moments for individual learners.

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This chapter is related to pre-service teachers preparing to teach in Kuwait public schools. Pre-service teachers were enrolled in an instructional technology course related to how to integrate emerging technologies, especially Web 2.0 tools, in their teaching. This course emphasized the connection between theory and practice reinforcing the process of how pre-service teachers smartly think about using web tools as means to enable them to experience deeper thinking when creating their lesson plans. This deeper thinking process will prepare them to transfer their gained experience into their actual teaching field. A conceptual model combining 7P-ILD with ASSURE model aided the design of the smart lesson planning environment. This design enables pre-service teachers to create innovative lesson ideas in the cloud environment. The lesson ideas and tools that were used to engage deeper learning enabled pre-service teachers to share their ideas with a wider audience and at the same time allowed the wider audience to assimilate these ideas into their own lesson structures.

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The chapter deals with the model of the trajectory of training teachers and a new approach to constructing a smart learning environment. The authors present a scheme of the smart trajectory, which outlines new approaches towards teaching students. The role of using interactive activity-based smart components is shown. The chapter depicts the results of the approbation of the model. The approbation revealed that the use of the smart trajectory allows to develop analytical competences, the skills of problem solving, creativity, the capacity to communicate with teams, groups, and individuals. The result of building up the smart trajectory consists in the creation of multi-format and personified educational space in an interactive environment enabling a person to study at any time and anywhere getting free access to content around the world.

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Moodle is an open source learning management system that helps universities host the courses online through standalone or a in a private cloud environment that helps the educational institutions grow exponentially with all the facilities Moodle can offer. This chapter identifies the feasibility of a university to host their courses in Moodle which runs under a private cloud environment. This chapter explains various difficulties incurred by the public cloud and other standalone servers. This chapter also analyzes various metrics towards smarter learning methodologies and observes that the learning curve of the users is considerably increasing, and hence, such models are suitable for universities with several thousands of users. This chapter proposes a method to deploy Moodle for a smarter learning environment in universities of huge strength.

Chapter 12

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Teachers' professional development programs need to be reconsidered to meet their expectations in the new digital era. Thus, there is need to consider the importance of offering mobile, informal, and social learning in the workplace through smart utilization of the emerging mobile technologies. This chapter introduces the features of an innovative mobile and social learning platform, which aims at improving teachers' performance in the UAE and the Arab world by promoting knowledge and skill through better integration of ICT in the teaching and learning process and better adoption of learner-centric learning. A smart mobile learning platform called "Wamda" is providing micro-courses that are relevant to the curriculum, experiential, and immersive. It is designed to utilize the power of mobile learning technologies, artificial intelligence techniques, and social networking approach. Through this chapter, the critical pedagogical and technical aspects of creating a smart mobile learning environment were elaborated and checked against a list of attributes of smart systems.

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This chapter explores the FATIH project and examines and analyzes the views of school administrators on the contribution. Literature review and qualitative method are conducted so as to accomplish these goals. The project has a very high potential to contribute to the smart learning environment of Turkey. However, in practice, it needs to be implemented fully.

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Science, technology, engineering, and mathematics (STEM) are the key courses for the students in the 21st century. There are several teaching approaches to improve the average scores in STEM education. Involvement of robots in the teaching-learning process plays an important role to transform and enhance the learning process. The technological advancement helps the students to translate the typical mathematics and science concept into real-world applications. In this chapter, some concepts of STEM have been implemented with the help of Bioloid educational robots. The educational robotics enhance the academic achievement of the students. The programming of the BioLoid robots is carried out using RoboPlus software, and the outcomes of the concrete mathematics concepts are shown physically.

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Smart learning environments for the Emirati learners are defined as a combination of blended learning and experiential learning approaches to create joyful educational environments. The current case study is an investigation into what generation Y of Emirati learners in one of the largest tertiary educational institutions in the United Arab Emirates consider joyful learning. The case study was based on mixed method surveys of educators and students. The case study investigation resulted in four important recommendations for creating smart learning environments where context and situated learning are essential considerations for mindful teaching and learning.

Section 3

Smart Learning Environments for Transformational Learning Spaces

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Cabot Science Library has transformed from a traditional collections-based science library into an innovative hub for collaborative learning support. This chapter examines how a well-designed space and technology promotes effective learning and documents how Cabot functions as a smart learning environment. The interplay between a physical and digital environment at Cabot Science Library emphasizes learner mobility and engagement, collaboration, and discovery, enabling knowledge creation and sharing.

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Nationally, schools are unable to cope with the increasing demands imposed upon the teachers and students as the learning systems have not changed. On the other hand, there is an increasing need for librarians to assist curriculum needs in schools and the national education agenda of UAE, of having human talents who are knowledge creators, have sufficient 21st century skills, lifelong learning habits, positive beliefs and behaviors, and knowledge and skills related to STREAM as well as a holistic personality. The role of public libraries could be extended further to work closely with schools in a systemic way that enables both entities to reach another milestone. Schools can establish another supportive educational after-school system to empower teachers and students. A more extensive and rigorous as well as controlled system that all stakeholders, teachers, and parents could share to provide the opportunity for students to be effective knowledge-contributors is planned and shared in this chapter.

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This chapter examines virtual laboratories and describes a design architecture of an intelligent lab companion (ILC) agent for intelligent virtual laboratories (IVL). A virtual laboratory is a stimulating aspect in spreading practical education based on online web experimentation in distance and blended education. It can facilitate and improve the practical and investigation learning of students.

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Smart learning environments (SLEs), like all adaptive learning systems, are built around the learner model and use it to support a variety of interventions such as mastery learning, scaffolding, adaptive sequencing, and adaptive navigation support. Open learner models (OLMs) “expose” the learner data to users through easily perceivable visual representations aiming to improve student self-reflection and self-regulated learning and also increase user motivation and even foster collaboration. This chapter presents the evolution and current state of OLMs, summarizes related research in the field emphasizing on OLM types, locus of control between the system and the user and visualizations categorized on the basis of quantized/continuous and structured/unstructured representations. OLM cases implementing typical SLEs features are described, along with representative real-life scenarios of incorporating OLMs in SLEs. Moreover, the chapter provides guidelines for designing effective OLMs and discusses current research trends in this active scientific field.

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