# Chapter 11
# To What Extent Can Multidisciplinary Artificial Intelligence Applications Enhance Higher Education?
## Open and Distance E-Learning in South Africa

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## ABSTRACT

*In order to provide readers with an overview of, and summarize, the content of this chapter, the purpose is stated as answering the primary research question: To what extent can multidisciplinary artificial intelligence in education (AIED) applications enhance higher education teaching and learning at an open and distance e-learning (ODeL) institution in South Africa? It is important to note that this is done against the background of multidisciplinary applications of deep learning-based artificial emotional intelligence.*

Anyone, who had "been frustrated asking questions of Siri or Alexa", and then were annoyed at the tone-deaf responses from the digital assistant, "knows how dumb these supposedly intelligent assistants are, at least when it comes to emotional intelligence" (Krakovsky, 2018, p. 18).

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## INTRODUCTION

Emotions and intelligence are co-related phenomena; therefore, emotions must be taken into consideration when designing towards true intelligence. Emotional intelligence has emerged as an important area of research in Artificial Intelligence (AI), while in a comprehensive *review* on the performance assessment of supervised classifiers for designing intrusion detection systems, Panigrahi et al. (2021, p. 1) indicated that supervised learning and pattern recognition was another "crucial area of research in" image processing, information retrieval, intrusion detection systems, knowledge engineering and medical imaging. Numerous algorithms had been designed to cover a wide range of such complex real-life application domains. Emotion recognition and mining tasks are often limited by the availability of manually annotated data. Several information and communication technologies (ICTs) are being used towards attaining emotional intelligence acceleration and augmentation. Like this book, the chapter will present emerging trends related to research in this field, about emerging trends with regard to technologies and tools used to simplify and streamline the formation of deep learning for system architects and designers. As part of this book, the chapter is designed to serve as a preferred reference for research and development. Machines may never need all the emotional skills that people have. There is, however, evidence that machines require at least some of these skills to appear intelligent when interacting with people.

Zawacki-Richter et al. (2019, p. 3) stated that although the field of artificial intelligence originated "from computer science and engineering," it was "strongly influenced by other disciplines such as" cognitive science, economics, neuroscience and philosophy. Therefore, AI is an interdisciplinary and Industry 5.0 a multidisciplinary research area respectively.

Higher education institutions are moving along towards the digital revolution, where artificial intelligence in education had been transformed by being influenced by not only what is taught, but also how it is taught (Roll & Wylie, 2016). The University of South Africa (UNISA) is a leading Open and Distance e-Learning (OeDL) institution in Africa, with student enrollment of over 400 000 students. UNISA is situated in Pretoria, the capital city of South Africa. South Africa is a developing country with its challenges. Teaching and learning is one of the core areas of business for the university. As a distance education provider, it is important that the university improve its offerings to students that are geographically separated.

Innovative educational technologies had revolutionized and played an active role in teaching and learning methods (Fahimirad & Kotamjani, 2018), as the presence of technological tools or applications can improve the former, providing vast opportunities to the education world. The new wave of technologies, including "developments in the 'smart classroom' as a new frontier" in the age of the smart university, as examined in the article by Kwet & Prinsloo (2020, p. 510), had evolved into using applications in teaching and learning in higher education. The evolution in terms of shifting priorities in education not only changed the way in which things are done, but also the use of these technologies to make the work environment a better place (Roll & Wylie, 2016). With digitized learning content, the distance in terms of geography, space, and time are mitigated, providing students with the freedom to choose suitable learning path and training goals. Students can actively access study materials, as well as interact with their lecturers, at any time, using computers or smartphones. The development of online learning systems helps students save time, effort and costs.

Artificial intelligence is one of the leading applications of Information Systems (IS). It offers modern knowledge in terms of understanding the nature of human intelligence and how it stimulates smart