

Chapter 2

Readiness for the Fourth Industrial Revolution: Experiences of Students in Practical Courses During the COVID–19 Pandemic at a University in South Africa

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ABSTRACT

This chapter explored the readiness of a South African university to take part in the fourth industrial revolution by exploring the experiences of students in science and technology on the impact of COVID-19 in the learning of their practical modules. Guided by two research questions, namely how the COVID-19 has impacted students' engagement with their practical modules and students' readiness to learn remotely and carry out the practical aspects of their modules, the chapter employ a qualitative case study approach to explore the views of students that offer courses that involve practical. Seven fourth-year students were purposively selected as study sample. Data were generated online using Google forms and were analysed thematically. The chapter was framed using the technology acceptance model. Findings revealed the following: ease and clarity of concept, lack of interaction with others, lack of motivation, lack of access to ICT facilities, lack of relevant materials to execute practical tasks, and lack of conducive learning environment.

INTRODUCTION

With the outbreak of the Coronavirus otherwise referred to as COVID-19 pandemic globally, many organisations and institutions around the world are at a crossroad on how to manage various activities within the confines of their traditional programmes (Burgess & Sievertsen, 2020). This is because the outbreak of the pandemic has forced serious changes on how people live, work, do their businesses and

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Readiness for the Fourth Industrial Revolution

even school. Therefore, this has led to the closure of schools, colleges and universities in Africa and other parts of the world (Burgess & Sievertsen, 2020; Mohamedbhai, 2020).

Consequently, the major challenge brought about by the outbreak of the pandemic is the introduction of social distancing and lockdown, which is intended to discourage the gathering of people, flatten the infection curve and reduce the spread of the virus (Ferrel & Ryan, 2020). This has, therefore, halted the entire economic and social activities around the globe, thereby causing more harm than good, particularly for educational institutions that operate the normal on-campus traditional approach to teaching and learning.

Hence, in a bid to keep the academic year afloat, higher educational institutions in Africa and other parts of the world resorted to online remote teaching through the use of information and communication technologies (ICTs). This is to ensure the delivery of programmes at a distance to their enrolled students (Mohamedbhai, 2020; The introduction of these innovative approaches by educational institutions is not just to ensure the continuity of academic programmes, but to also circumvent the disruptions and other issues emanating from the outbreak of the pandemic.

However, the introduction of remote learning using ICTs in education during the COVID-19 outbreak has revealed the digital divide and inequalities that exist between countries in the African continent (Mohamedbhai, 2020). These disparities exist between countries with better infrastructure than others, between institutions in the same country with some far equipped than others; between students within same institution; the rich who live in urban areas and the poor in the rural settings, who can barely afford to access internet, when and if it is available (Mohamedbhai, 2020). In South Africa, the case is not different, as access to ICT infrastructure specifically in education is impeded due to digital divide and inequality which is associated to poverty (Chinembiri, 2017; Gillwald, 2017; Choung & Manamela, 2018; Letseka, Letseka & Pitsoe, 2018). ICTs are the core platforms for which the fourth industrial revolution operates (Hariharasudan & Kot, 2018).

The fourth industrial revolution is the transformation of work from manually dominated approach to the use of technologies such as internet of things (IoTs) and robotics among others (Wichmann, Eisenbart & Gericke, 2019). The use of ICT-supported teaching and learning processes are the core concepts of the fourth industrial revolution in education (Hariharasudan & Kot, 2018). Obviously, the pandemic created avenues for higher education institutions to maximise the use of ICTs in teaching and learning. However, when compared with open universities such as University of South Africa that delivers its programmes online, some of these institutions do not have the capacity because their programmes had already been designed to follow a traditional face-to-face approach (Letseka, Letseka, & Pitsoe, 2018; Mohamedbhai, 2020). Corroborating this, is the study of Kayembe and Nel (2019) that found that ICT infrastructure among others may constitute part of the major challenges of higher education in South Africa in their adoption of the fourth industrial revolution.

It is on this premise that this chapter explored the experiences of science and technology students in practical courses at a South African University on their readiness for the fourth industrial revolution. The chapter explored two objectives namely, how remote teaching, resulting from COVID-19 pandemic, has impacted students' engagement with practical modules; and their readiness to learn remotely as well as carry out the practical aspects of their modules. To address these objectives, a qualitative case study approach was employed. Since the focus of the study hinges on the use of ICTs in teaching and learning, the Technology Acceptance Model (TAM) was adopted to frame the study. The findings of the chapter is significant to stakeholders within and outside higher education as it contributes to the body of knowledge in the following areas namely: firstly, it revealed the impact of remote teaching resulting

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