THE RESPONSIVENESS OF INSTRUCTIONAL DESIGN IN OPEN DISTANCE AND E-LEARNING TO THE 4TH INDUSTRIAL REVOLUTION

by

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DECLARATION

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I declare that the above thesis is my own original work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

I further declare that I submitted the thesis to originality-checking software and that it falls within the accepted requirements for originality.

I further declare that I have not previously submitted this work, or part of it, for examination at Unisa for another qualification or at any other higher education institution.

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ABSTRACT

The rapid advancement of technology has necessitated a review of the approaches to teaching and learning in both face-to-face and distance education settings. These changes, premised within the era of the Fourth Industrial Revolution(4IR), include the use of technology for instructional design, teaching, student support and assessment. Open distance education institutions, by their very nature, should be pioneers in the use of technology for education. This study set out to investigate the responsiveness of instructional design in an open distance learning (ODL) institution to the 4IR environment. University of South Africa (Unisa), being an Open Distance and E-learning (ODeL) institution, was selected as the site of the study. Chaos theory was chosen to frame the researcher's thinking about the impact of a small change in a system on the broader environment. The system, in this case, is the instructional design system. Chaos theory was used together with constructivism because of its (constructivism) emphasis on social interaction in teaching and learning and its positioning in a technologically charged environment. The study targeted instructional designers, electronic originators, academic staff and students. Therefore, individual interviews were conducted with seven instructional designers, five electronic originators, ten academic staff, and four students who were selected to participate in the study. Atlas.ti was used as the selected Computer Assisted Qualitative Data Analysis System (CAQDAS) to analyse the data which yielded four broad themes, namely: Unisa's instructional design processes, response of Unisa through migration to fully online delivery, the FTA and responsiveness to the 4IR. The data revealed that the process of migrating to online delivery was necessary but quick and unorganised. It resulted in increased workloads for staff, particularly the academics. Students did not receive adequate technical support to tide them over the transition to online delivery. Recommendations were made for the review of the Framework for a Team Approach (FTA) by the Directorate for Curriculum Development and Transformation (DCDT). In addition, it was recommended for the institution to address workload issues and to implement a change management process that recognises the impact of change on both staff and students. The study

was successful in achieving its intended goal of determining the responsiveness of instructional design in ODeL to the 4IR demands.

KEY TERMS

Instructional design; Fourth Industrial Revolution; online teaching and learning; Open distance and e-learning; instructional design models; framework for a team approach; ADDIE (Analyse, Design, Develop, Implement, Evaluate); instructional designer; electronic originator; Unisa; Learning Management System; Chaos theory; Open Distance Education; Open Distance Learning.

TSHOBOKANYO

Tswelelopele e e akofileng ya thekenoloji e dirile tlhokego ya gore go sekasekwe melebo ya go ruta le go ithuta mo seemong sa namana le sa o le kwa gae. Diphetogo tseno tse di theilweng mo pakeng ya Diphetogo tsa Bone tsa Thekenoloji (4IR), di akaretsa tiriso ya thekenoloji go thadisa dithuto, go ruta, go tshegetsa baithuti le go ba tlhatlhoba. Ditheo tsa thuto ya go ithuta o le kwa gae ka tlholego e tshwanetse go nna baeteledipele mo tirisong ya thekenoloji mo thutong. Thutopatlisiso eno e ne e tlhotlhomisa go tsibogela seemo sa 4IR ga thadiso ya dithuto mo setheong se go ithutiwang o le kwa gae (ODL). Yunibesithi ya Aforikaborwa (Unisa), jaaka setheo sa Thuto e go Ithutiwang o le kwa Gae le ka E (ODeL), e tlhophilwe go nna lefelo la thutopatlisiso. Go tlhophilwe tiori e e lebeletseng dintlha tse di sa bonelweng pele tse di bakang ditiragalo go rulaganya dikakanyo tsa mmatlisisi malebana le kami ya diphetogo tse dinnye mo tsamaisong mo tikologong ka bophara. Tsamaiso mo mabakeng ano ke tsamaiso ya thadiso ya thuto. Go dirisitswe tiori e e lebeletseng dintlha tse di sa bonelweng pele tse di bakang tiragalo gammogo le tiori ya kago ka ntlha ya fa e (tiori ya kago) gatelela dikamano tsa loago mo go ruteng le go ithuta le maemo a yona mo seemong se se dirisang thekenoloji. Thutopatlisiso e ne e totile bathadisi ba dithuto, baitshimololedi ba eleketoroniki, batlhatlheledi le baithuti. Ka jalo, go dirilwe dikopanotherisano tsa bongwe ka bongwe le bathadisi ba dithuto ba le supa, baitshimololedi ba eleketoroniki ba le batlhano, batlhatlheledi ba le lesome le baithuti ba le bane ba ba tlhophilweng go nna le seabe mo thutopatlisisong. Go dirisitswe Atlas.ti jaaka Tsamaiso ya Tokololo ya Data ya Khwalitatifi ka Thuso ya Khomphiutha (CAQDAS) go lokolola data e e tlhagisitseng merero e le mene ka bophara, e leng: Ditirego tsa thadiso ya dithuto tsa Unisa, tsibogo ya Unisa ka go fudugela mo tlamelong ya dithuto ka botlalo mo maranyaneng, FTA le go tsibogela 4IR. Data e senotse gore tirego ya go fudugela mo tlamelong ya mo maranyaneng e ne e tlhokega fela e nnile bonako e bile e sa rulagana. E ne ya okeletsa badiri mokgweleo wa tiro, bogolo segolo batlhatlheledi. Baithuti ga ba a bona tshegetso e e lekaneng ya setegeniki go ba tataisa mo go kgabaganyetseng kwa tlamelong ya mo maranyaneng. Go ne ga dirwa dikatlenegiso tsa tshekatsheko ya Letlhomeso la Molebo wa Setlhopha (FTA) ke Lefapha la Tlhabololo ya Kharikhulamo le Diphetogo

(DCDT). Go tlaleletsa foo, go ne ga atlenegisiwa gore setheo se samagane le merero ya mokgweleo wa tiro le go tsenya tirisong tirego ya tsamaiso ya diphetogo e e lemogang kami ya diphetogo mo badiring le mo baithuting. Thutopatlisiso e atlegile go fitlhelela maikemisetso a yona a go swetsa ka go tsibogela ditopo tsa 4IR ga thadiso ya dithuto mo ODeL.

MAREO A BOTLHOKWA

Thadiso ya dithuto; Diphetogo tsa Bone tsa Thekenoloji; go ruta le go ithuta mo maranyaneng; Go ithuta ka E o le kwa gae; dikao tsa thadiso ya thuto; letlhomeso la molebo wa setlhopha; ADDIE (Lokolola, Thadisa, Tlhama, Tsenya tirisong, Sekaseka); mothadisi wa dithuto; moitshimololedi wa eleketoroniki; Unisa, Thulaganyo ya Tsamaiso ya Go ithuta; tiori e e lebelelang dintlha tse di sa bonelweng pele; Thuto ya go Ithuta o le kwa Gae; Go ithuta o le kwa Gae.

MANWELEDZO

U ṱavhanya u khwinisa thekhinoḽodzhi zwo kombetshedza u sedzwa hafhu ha maitele a u funza na u guda kha u funza ho livhanywa zwifhaṱuwo na kha vhupo ha u funza u kule. Tshanduko hedzi, dzo ḓisendeka nga kha tshifhinga tsha Mumono wa Vhuṋa wa Nḓowetshumo ya zwa makwevho (4IR), hu tshi katelwa u shumiswa ha thekhinoḽodzhi kha u bveledza na u ṋetshedza pfunzo na matheriaḽa a vhugudisi, u funza, thikhedzo ya mutshudeni na u linga. Zwiimiswa zwa nnyi na nnyi zwa u funza u kule, nga mvumbo yazwo, zwi ḓovha mazhakanḓila kha u shumisa thekhinoḽodzhi ya pfunzo. Ngudo yo bvisela khagala u ṱoḓisisa kufhindulele kwa vhugudisi kha tshiimiswa tsha u guda u kule tsha nnyi na nnyi (ODL) kha vhupo ha 4IR. Yunivesithi ya Afrika Tshipembe (Unisa), u vha tshiimiswa tsha Nnyi na nnyi tsha u Guda u kule na U Guda nga kha Lubuvhisia (ODeL), tsho nangwa sa fhethu ha ngudo. Thiori ine vhudziki ha shandukela kha u sa vha na vhudziki yo nangwa u fhaṱa kuhumbulele kwa muṱoḓisisi nga ha masiandaitwa a tshanduko ṱhukhu kha sisiṱeme ya vhupo vhuhulwane. Sisiṱeme, kha nyimele heyi, ndi sisiṱeme ya vhugudisi. Thiori ine vhudziki ha shandukela kha u sa vha na vhudziki yo shumiswa yo ṱanganelana na u fhaṱa nḓivho ngauri u ombedzela u (fhaṱa nḓivho hayo) kha u ṱanganelana ha matshilisano kha u funza na u guda na vhuimo hayo kha vhupo vhune ha shumisa thekhinoḽodzhi. Ngudo yo vha yo sedza kha vhabveledzi na vhaṋetshedzi vha pfunzo na matheriaḽa a vhugudisi, vhabveledzi vha eḽekiṱhironiki, vhashumi vha akademi na matshudeni. Nga zwenezwo, ho farwa inthaviwu dza muthu nga muthu na kha vhabveledzi na vhaṋetshedzi vha pfunzo na matheriaḽa a vhugudisi vha sumbe, vhabveledzi vha eḽekiṱhironikisi vhaṱanu, vha vhashumi vha akademi vha fumi na matshudeni maṋa vhe vha nangwa u dzhenela ngudo. Ho shumiswa Atlas.ti sa Sisiṱeme ya u Saukanya Data ya Khwaḽithethivi ya u Thusedza kha Khomphyutha (CAQDAS) yo nangwaho u saukanya data ye ya bveledza thero nṋa dzo ṱanḓavhuwaho, dzine dza vha: maitele a Unisa a mubveledzi na muṋetshedzi wa pfunzo na matheriaḽa a vhugudisi, u fhindula ha Unisa nga kha u sudzulutshela kha nḓisedzo yo fhelelaho ya kha lubuvhisia, FTA na u fhindula kha 4IR. Data yo dzumbulula uri kuitele kwa u sudzulutshela nḓisedzo ya kha lubuvhisia yo vha yo tea fhedzi yo ṱavhanya na u sa dzudzana. Yo bveledza u engedzea ha

mushumo kha vhashumi, nga maanḓa vha akademi. Matshudeni a vho ngo wana thikhedzo ya thekhiniki yo teaho u vha thusa kha tshanduko u ya kha nḓisedzo ya kha lubuvhisia. Themendelo dzo itwa u sedza hafhu Furemiweke ya Kuitele kwa Thimu (FTA) nga Khethekanyo ya Mveledziso na Tshandukiso ya Kharikhuḽamu (DCDT). U ḓadzisa kha zwenezwo, ho themendelwa kha tshiimiswa u amba nga ha mafhungo a u ḓalesa ha mushumo na u shumisa kuitele kwa u langula tshanduko kune kwa dzhiela nṱha masiandaitwa a tshanduko kha vhuvhili havho vhashumi na matshudeni. Ngudo yo bvelela kha u swikelela tshipikwa tshayo tsho lavhelelwaho u ta kufhindulele kwa mubveledzi na muṋetshedzi wa pfunzo na matheriaḽa a vhugudisi, kha ODeL kha ṱhoḓea dza 4IR.

MAIPFI A NDEME

Mubveledzi na muṋetshedzi wa pfunzo na matheriaḽa a vhugudisi; Mumono wa Vhuṋa wa Nḓowetshumo ya zwa makwevho; u guda na u funza nga kha lubuvhisia; U guda u kule ha nnyi na nnyi nga kha lubuvhisia; zwiedziswa zwa mubveledzi na muṋetshedzi wa pfunzo na matheriaḽa; furemiweke ya kuitele kwa thimu; ADDIE (Saukanya, Ola, Mveledziso, Shumisa, Linga); mubveledzi na muṋetshedzi wa pfunzo na matheriaḽa a vhugudisi; vhabveledzi vha eḽekiṱhironikisi; Unisa; Sisiṱeme ya u Langula u Guda; Thiori ine vhudziki ha shandukela kha u sa vha na vhudziki, Pfunzo ya Nnyi na nnyi ya u Guda u kule; U Guda u Kule ha Nnyi na nnyi.

LIST OF ACRONYMS AND ABBREVIATIONS

4CID	Four-component Instructional Design
4IR	Fourth Industrial Revolution
ADDIE	Analyse, Design, Develop, Implement, Evaluate
AI	Artificial intelligence
AID	Automated Instructional Design
AIMS	Academic Information Management System
ASSURE	Analysis of learners; Statement of objectives; Selection of instructional methods, media, and materials; Utilization of media and materials; learner participation; Evaluation and revision
BYOD	Bring your own device
CAQDAS	Computer Assisted Qualitative Database Software
CDD	Certificate of Due Diligence
CEDU	College of Education
CEMS	College of Economic and Management Sciences
CESM	Classification of Educational Subject Matter
CoD	Chair of Department
COVID-19	Corona Virus Disease of 2019
D&C	Dick and Carey Model
DCDT	Directorate for Curriculum Development and Transformation
DISS	Directorate for Instructional Support and Services
DO-ID	Decision Oriented Instructional Design
DPAR	Directorate for Programme Accreditation and Registration
DSAA	Directorate for Student Assessment Administration
DSAR	Directorate for Student Admissions and Registrations
EC	Education Consultant
EO	Electronic Originator
FTA	Framework for a Team Approach
GAIDA	Guided Approach to Instructional Design Advising
HE	Higher Education

HEDA	Higher Education Data Analyser
ICT	Information and Communication Technology
ID	Instructional design
IoT	Internet of Things
LMS	Learning Management System
MIDE	Multimedia Instructional Design Editor
MOOC	Massive Open online Courses
Ms Teams	Microsoft Teams
ODE	Open and Distance Education
ODeL	Open Distance and electronic Learning
ODL	Open Distance Learning
POPIA	Protection of Personal Information Act
SA	South Africa
SMPD	Study Material Production and Delivery
STEM	Science, Technology, Engineering and Mathematics
TSA	Technikon South Africa
UMUC	University of Maryland University College
Unisa	University of South Africa
WWII	Second World War
XAIDA	Experimental Advanced Instructional Design Advisor
ZPD	Zone of Proximal Development

CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

1. ORIENTATION TO THE STUDY

1.1 Introduction

This study explored the response of University of South Africa's (Unisa's) instructional design model to the fourth industrial revolution (4IR). The motivation for this study arose from the strategic decision taken by Unisa to migrate from print and blended mode to electronic delivery of teaching and learning (Unisa 2016). This decision impacted the various sections of the university community in different ways. Academic staff members had to adapt to a different approach to teaching and interacting with the students. The students also had to learn in a new way while professional and support staff had to provide their services in a changed context, therefore, requiring them to find new approaches to their roles. The changing context also had an impact on the role of instructional designers at the institution requiring an adjustment to the practised approach to learning design and development. Through this study, the researcher set out to explore the responsiveness of Unisa's instructional design model to the 4IR.

While extensive research exists (Merril 1971; Gagne & Briggs 1974; Dick & Carey 1978; Molenda 1997; Branch 2009; Rothwell & Kazanas 2011) on the instructional design for face-to-face teaching, distance education and computer-assisted teaching, this has been premised within the first, second and third industrial revolutions. The emergence of the 4IR has created a gap in the design of appropriate instruction within this context (Bates 1997; Aslan & Reigeluth 2013; Gleason 2018; Penprase 2018; Ren 2019; Jung 2019). To that effect, this study pursues the foregoing aim.

From a process perspective, this study is premised on the chaos theory. This theory is used to describe the role of instructional designers in a changing environment and

in response to the 4IR. The relevance of the chaos theory to the research problem and context is emphasised by Williams (1997:13), who contends that "change and time are the two fundamental subjects that together make up the foundation of chaos". The first element of time is the change in the delivery mode of teaching and learning at Unisa. The second element is the context of the 4IR which prevails during this current timeframe. This study is focused on change in one part of a particular system and its effect on other parts of the same system. According to Mason (2008:36), "chaos theory suggests that even a slight degree of uncertainty in the initial conditions can grow inexorably and cause substantial fluctuations in the behaviour of a particular phenomenon". Therefore, the study explored the responsiveness of Unisa's instructional design approach to the changing context of the 4IR.

1.2 Background to the study

1.2.1 The Open Distance and e-Learning nature of Unisa and the Framework for a Team Approach (FTA)

Unisa adopted an Open Distance and e-Learning (ODeL) business model which flowed from the objectives of the Strategic Plan 2030. As a result, various policies have been developed and adopted by the institution to facilitate ease of functioning of different role-players. The three main policies which are applied in guiding the instructional design process at Unisa are: Curriculum Policy, Tuition Policy and Open Distance Learning (ODL) Policy. Sections of the Curriculum Policy which are of relevance here are "responsiveness to Unisa's context" and "curriculum processes". The Tuition Policy (Unisa 2003) also has a sub-section titled "the open and distance learning (ODL) design and development process" which provides specific details applicable to the instructional design processes applied. The ODL model as espoused by the ODL Policy has instructional design as one of its basic elements, hence making the whole policy relevant to this study.

To implement the aforementioned policies, the Framework for a Team Approach (FTA) (Unisa 2004) to Curriculum and Learning Development was adopted in 2009. This framework recognises that the process of curriculum and learning development involves several different role-players each of which contributes in a unique manner towards the process and final product. These role-players include academics, librarians, graphic designers, language editors, information technologists, critical readers, and instructional designers. This claim is supported by Peters' (2007) notion that instructional design is an industrial activity which consists of various contributors. Peters (2007) draws parallels between an industry and instructional design where in the former, various workers contribute in different forms to the final product. The same principle applies to the latter where various participants contribute towards the design and development of learning materials. Quite clearly, the role played by each of these listed players is important. To this end, the FTA was developed to provide these guidelines for the role of each of the listed participants in the curriculum and learning development process. This role allocation falls in line with Peters' (2007) characteristic of division of labour as described earlier.

The development of Unisa as an institution in response to the various stages of industrialisation and changes in the mode of delivery of teaching and learning have necessitated a commensurate change in the nature of support services provided towards the academic project. These support services include student administration, student support, the library, instructional design, materials design and development, student assessment and student counselling services. As it can be noticed, the instructional design function is part of the professional support services available at Unisa. This service is fulfilled by the Directorate for Curriculum Development and Transformation (DCDT). This directorate is staffed by deputy directors, education consultants, curriculum and learning specialists, all led by the director. The instructional designers at Unisa are named education consultants and curriculum and learning development specialists. For purposes of this study, the name, instructional designer is adopted as it is the preferred nomenclature in literature.

Instructional design processes require continuous adjustment to suit the context. This is supported by Sharif and Cho (2015:73) thus, "the constantly shifting landscape of educational demands design that can grow and change with its context". As stated earlier, this study aimed to explore the response of Unisa's instructional design model to the 4IR. Furthermore, the study was conducted during the pandemic of the Corona Virus Disease of 2019 (COVID-19) which had affected the whole world and caused governments to implement lockdowns and curfews, limiting movement of people in general. South Africa, being the immediate context of the study, was not spared the impact of COVID-19. Hence, the pandemic forced a change in the way various activities were conducted including research, therefore, forcing people and institutions to operate online from their homes or spaces where they could adhere to social distance regulations. In the light of this study, the pandemic heightened the impact of 4IR, and this had huge implications on the operations of Unisa.

1.2.2 A brief historical view of Unisa

To expand on the contextual picture within which this study is premised, it is necessary to provide an outline of Unisa as an institution of higher learning in South Africa. Unisa is an open distance education institution situated in the capital city of South Africa, Pretoria. It has campuses and regional offices in various towns and cities throughout the country and beyond. According to Manson (2018), Unisa was founded in 1873 and it went by the name the University of the Cape of Good Hope (UCGH). It served as the examining university for the South African College in Cape Town, Victoria College in Stellenbosch, Huguenot College in Wellington and later Rhodes University College in Grahamstown, and others. In 1946 it became one of the "world's pioneers of distance education" and by 1970 Unisa "was sending out over three million parcels during a six-month period" (Diehl 2011:113). This demonstrates the massiveness that the institution had grown into, long before the turn of the century.

When the democratic government took over in 1994, South Africa had a total of 36 universities and 23 technikons (South Africa 2003: 3-4). Unisa was the only university offering distance education while Technikon South Africa (TSA) offered technical courses through the distance mode as well. In 2003, the South African government implemented the restructuring of higher education which included the merging of some institutions. The mergers gave rise to "a new type of institution" referred to as a comprehensive university (Karodia, Shaikh & Soni 2015:330). These consisted of mergers between traditional academic universities and technikons. Unisa became a comprehensive university resulting from the merging of Unisa, TSA and the distance education campus of Vista University. This merger gave birth to a massive institution with an explosive number of students.

As the institution developed over the 147 years of its existence, it also passed through various stages in terms of the mode of delivery of courses to students. To keep abreast with technological advances, Unisa has been on a trajectory of development towards full openness and online teaching and learning for two reasons as outlined by Lee (2019:27) as follows:

> *Open education, open courses and open resources have gained popularity in the public domain. Since the status of open universities has shifted from being an outlier HE institution towards being normal, they no longer have to struggle to justify their existence.*

Unisa has as a result grown into a fully-fledged comprehensive university serving a total of more than 350 000 students in the 2020 academic year (Unisa website). The number of years of Unisa's existence coupled with this exponential increase in student numbers has led to the broad diversity in the current cohort of students. A profile of the students is provided next sub-section.

Different contexts experience the technological advancements in different ways. This differentiation is dictated by the development stage which the specific country

is at. Furthermore, there is differentiation within the countries themselves, particularly the developing countries. For this reason, it is rational to avoid treating students as a homogeneous group even within the same institution. To this effect, it is necessary to provide a brief discussion of the profile of the student body at Unisa as it is also an issue in the mix of Unisa's response to the 4IR.

1.2.3 The student profile of Unisa

Unisa students are geographically located across various parts of South Africa, in many countries on the African continent and throughout the rest of the world. The 2020 student enrolment at Unisa stood at 397 801. This number consists of students across the nine provinces of South Africa, accounting for 98% of this total and the remaining 2% based in the rest of the world (Higher Education Data Analyzer Portal 2020).

A further look at the statistics shows that the Gauteng Province has the highest number of students. Figure 1.1 provides a breakdown of student numbers per province.
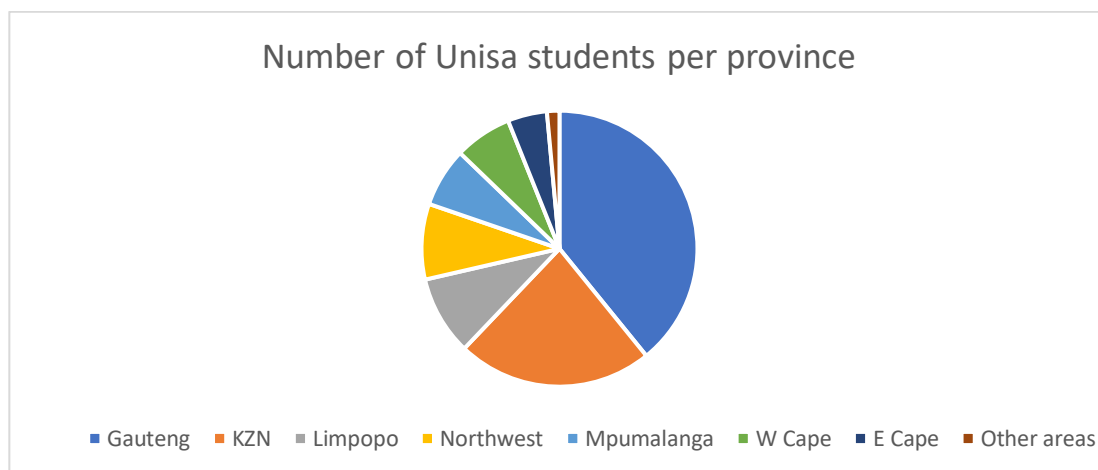
Figure 1.1: The number of registered Unisa students per province in 2020 (HEDA website 2020)

Figure 1.1 illustrates that there was a considerable number of students based in the less urbanised areas of the country, such as Mpumalanga, Kwazulu-Natal and Eastern Cape. This arouses interest in how Unisa responds to the 4IR while ensuring an uncompromised service to the students in these contexts. This observation brings into sharp focus the diversity among students in terms of their technological advancement and access. The differentiation gives credence to Prensky's (2001) description of digital natives versus digital immigrants. He argues that the 21st century students are predisposed to technology from a very early age therefore, making them inhabitants of the digital world and era.

On the contrary, there are still many adults who are not *au fait* with the various technological applications. They are referred to as digital immigrants (Prensky 2001). The complexity arises where the education context requires digital immigrants to teach digital natives and where some students are digital natives and others are still digital immigrants. The result of this situation is lack of congruence between the different groupings. Nevertheless, Prensky's (2001) description does not recognise that not all students across the world fit the description of digital natives. Kennedy, Judd, Churchward and Krause (2008) warn against the generalisation that students entering universities in this era are digital natives. They advise that there is a need for "an evidence-based understanding of students' technological experiences" to inform educational policy and practice. More than a decade later, the lack of congruence among students is highlighted by Beaunoyer, Dupéré and Guitton (2020:1) who name it as 'digital inequality'. They describe this phenomenon as arising from "the differences in actual access to technology…as well as the capacity, knowledge, motivation and competence to use digital technologies". Ndibalema (2022:596) further asserts that digital inequality is mostly prevalent in African countries, thus:

> *African countries have inefficient ICT-related infrastructure, trained personnel in technology, ineffective ICT policies in education, limited accessibility of*

digital resources, limited financial capacity to afford the internet and technophobia.

South Africa, as part of the Southern Africa Customs Union (SACU), is no exception to this assertion. The SACU consists of five countries, viz., Botswana, Lesotho, Eswatini, Namibia and South Arica. According to Ndzinisa and Dlamini (2022) digital inequality is endemic in the SACU. They contend that "within the SACU region, it is flawed to portray students as having 'grown up digital' given that social inequality continues to influence the pattern of access to these technologies" (Ndzinisa and Dlamini 2022:2263).

The current profile of Unisa students is highly diverse in terms of age, occupations, type (full-time/part-time), location, language, and most importantly, technological advancement. Therefore, it is critical to find an approach to teaching and learning that will adequately address the diversity that exists among the students as part of the effort to conform to the demands of the 4IR. This study recognises this diversity as an important element that instructional design practices should consider.

1.2.4 The 4IR and its demands

According to Penprase (2018:215), the 4IR is often described as "the result of an integration and compounding effects of multiple 'exponential technologies,' such as artificial intelligence (AI), biotechnologies and nanomaterials". In simple terms, this term refers to the integrated and advanced use of various types and modes of technology to facilitate many activities that were previously conducted manually or through human interaction. In the academic context, this term refers to the application and integration of various types and modes of technology to facilitate the teaching and learning processes. An elaborate definition and explanation of the term will be provided under the definition of terms section.

The 4IR has necessitated that Unisa responds to the advancements of technology in teaching and learning by revamping its course offerings and mode of delivery from

print to electronic format. To explain this further, an historical background of the Unisa is provided within the contextual framework of industrialisation as supported by Peters (2010:11) thus, "it is important to distinguish historical periods of industrialization as each of them influenced and even marked distance education in specific ways". Peters (2007) describes teaching and learning at a distance as an industrial activity. In his words, cited by Bernath and Vidal (2007:434), he explains his view thus, "after studying the teaching and learning at correspondence schools, correspondence colleges, at Unisa, at European and U.S. universities, and at universities of the former Soviet Union, I found that all of them had something in common: their teaching and learning are highly 'industrialized'".

Peters (2007) uses four main characteristics of the industrialised system to compare the two activities, i.e. industrialisation and distance education. The first characteristic that he identifies is the concept of division of labour as applicable to both contexts. In industry, the production line consists of various role-players who each contribute towards the final product. The concept is also applicable to distance education where various activities are undertaken towards the implementation of effective teaching and learning. These activities would be undertaken by the various role-players such as academic staff members, instructional designers, technology specialists, graphic artists, language editors, librarians, and many others. This characteristic is applicable to Unisa where various role-players participate in the enterprise of distance education in general and instructional design in particular.

Christoff Ehmann reflected on the characteristics of distance education as identified by Peters and concluded that the concept of division of labour is the most important element of distance education development and asserts that no distance education institution can "do without the co-operation of all those involved" (Ehmann 1981:233). However, to delineate the concept of division of labour further, Moore and Kearsley (2012) use the systems approach. They present distance education as a system consisting of various components that make up sub-systems. These components are learning, teaching, communication, design, and management

(Moore & Kearsley 2012:9). Each of these components consists of its own parts which together combine into a sub-system. Of particular relevance to this study is the instructional design sub-system with its components and processes. The sub-system enlists the participation of various role-players such as the academic staff, instructional designers, librarians, language editors, administrators, graphic designers, electronic originators, critical readers, students, and many others.

The second characteristic used to compare the two is regularisation. This stems from the consecutive arrangement that the activities must follow. In industry, some activities along the production line can only happen after others have been concluded. This, in Peters' (2007) view, is also applicable to education where the various activities from curriculum and learning development through evaluation of learning are also sequenced. Regularisation also plays out in the instructional design process at Unisa. The institution applies the FTA which details the process flow for instructional design that reflects Peters' characteristic of regularisation.

The third characteristic is the rationalisation of activities in both industry and distance education. The careful analysis of each activity, including the amount of time and resources to be spent on each activity, applies in both contexts. This is also included in the FTA that is applied at Unisa. The framework provides guidelines in respect of the activities involved in the design process. The instructional designer, as the project manager, allocates time and resources to each activity as part of rationalisation of activities.

The final characteristic is the application of technology to make the process efficient and effective. In industry, this is of utmost importance to find the most profitable way to produce goods and services. This characteristic would also be applicable to distance education to utilise technology to increase the possible success of the education project. It does apply at Unisa where some of the activities are conducted digitally; for instance, the transmission of the learning material among the various

role-players is done via email. The effective use of technology in the instructional design process forms the basis of this study.

It is of interest to note that Peters (2010) further delineates the various stages of industrialisation and how each of these periods impacted on the development of distance education. The first period saw the development of the industrial society resulting from the introduction of machines and other sources of energy, therefore, leading to the rise of commercialism. This was owing to the introduction of rail and road traffic as well as postal services.

The second period was characterised by further technological developments such as automation of machines and the introduction of robots. A significant development in this era was the further development of the printing press and the elevation of professional work above manual labour. The third period of industrialisation was characterised by the advancement of technology through the introduction of networked computers and mobile phones. This period saw the development of the information society as knowledge became a currency.

It is important to note that distance education was, according to Peters (2010), present in different formats throughout these three stages of industrialisation. The 4IR is no exception. To support this notion, Gleason (2018:3) asserts that higher education is the key player in every revolution.

The common thread running through these periods of distance education as outlined by Peters is the need for communication between the teacher and the student. Various technologies have been employed to facilitate this communication. However, Børje Holmberg in Bernath and Vidal (2007) introduces the theory of empathy in distance education conversations. Through this theory, Holmberg advocates that teachers should demonstrate an empathetic approach to distance education through friendly conversation with students. For the empathetic approach to function, it should be incorporated in the design of the learning materials and

transported by the most appropriate communication technology vehicle. The role of instructional design becomes relevant in this regard.

Anderson (2003) takes the thread of communication further by discussing the concept of interaction in distance education. He lists six dimensions of interaction, namely, student-teacher; student-student; student-content; teacher-content; teacher-teacher and content-content. He contends that "each of the six modes of interaction needs systematic and rigorous theoretical and empirical research" (Anderson 2003:141) for effective implementation in distance education.

Unisa as a distance education institution, exhibits the characteristics that align it with Peters' (2007) description as outlined earlier. It, therefore, fits the description of an industrial institution as described by Peters. Furthermore, the other theories on distance education such as Holmberg's empathetic approach and Moore's transactional distance (Bernath & Vidal 2007:436) also apply to Unisa as an ODL institution.

While Unisa was progressing at a relatively slow pace along the ODL continuum, the crisis of the COVID-19 pandemic led to the acceleration of this pace. The lockdown imposed on almost all areas of economic activity on 26 March 2020 in South Africa had far-reaching implications for the institution.

All staff members were required to continue to fulfil their roles remotely. This meant that the institution had to urgently provide the tools of trade for all staff members. The number of available laptops was by no means adequate for all staff members who needed to use computers to continue functioning efficiently. As a result, the institution was under pressure to provide the laptops although suppliers were also affected by the lockdown. The institution was therefore exposed in as far as its online operations were lagging behind; hence its response to the 4IR was brought to light at the same time.

Students who still relied on postal and courier services to submit their work were also affected by the lockdown. They had to adapt very quickly to the electronic mode of communication with the academic staff. This required such students to find computers and to develop the relevant technological skills to access various support mechanisms made available by the institution.

The initial lockdown period covered the time allocated for first semester formative and summative assessments. Traditionally, summative assessments at Unisa consisted of venue-based examinations. The institution had many venues in the regions and towns of South Africa and abroad used for examination purposes. The lockdown rendered this well-structured system useless necessitating a rapid move to the use of technology for summative assessment.

Existing Unisa systems were inadequate for the number of staff and students who required to log in at the same time. As a result, the Information and Communication Technology (ICT) system crashed continuously leading to frustrations for staff and students. The 4IR arrived without prior announcement and the institution had to exercise agility to adapt as quickly as possible. Though Unisa recovered quickly from this problem, the question remained as to the efficiency of its online modes of delivery in view of the situation of the pandemic and the 4IR ultimately.

1.3 Rationale

The role of higher education in the preparation of the workforce and the society at large for the future cannot be over-emphasised. The world is changing at a very fast pace. Students are also transforming to keep up with these changes. Whether all students transform at the same pace is a critical question for higher education institutions to address. Part of this response derives from the provision of a commensurate response through regular updates to the curricula among other activities. To this end, Gleason (2018:4) believes that "the skills needed to take advantage of the automation economy are different from those that have been emphasized in HE institutions in the past".

Higher education curricula require regular updating to keep abreast with environmental, contextual and technological developments to remain relevant to their contexts. This is the function of an instructional designer as espoused by Branch and Stefaniak (2019:85). Therefore, "instructional design (ID) is an integral component in the field of educational technology, which has also been applied in the field of open and distance education (ODE)".

Bates (2019) holds that the updating of curricula is the responsibility of the academic staff. Bates (2019:38) argues that:

> *If universities are to change to meet changing external pressures, this change must come from within the organization, and in particular, from the professors and instructors themselves. It is the faculty that must see the need for change and be willing to make those changes themselves.*

Unisa recognises these views in line with Peters' assertion of division of labour discussed earlier. This is reflected in the composition of the teams intimated by the FTA.

The role and function of the DCDT at Unisa is to provide instructional design support to the academic staff. The process is guided by the implementation of the FTA. The researcher's experience as one of the instructional designers at Unisa is that the FTA may not be appropriate to the changing technological context driven by the 4IR. The FTA's emphasis on division of labour may be one of the elements of the instructional design process which makes it inappropriate to the 4IR environment.

Another point of concern for the researcher is the contextual consideration of the instructional design process at Unisa where students are not necessarily based in the same contexts. This is illustrated in Figure 1.1 which shows that Unisa students are distributed across all South African provinces and beyond the country's borders

as well. Starkey (2012:14) supports this assertion that pedagogical decisions will be informed by knowledge of the context in which the student is situated and where the teaching occurs. However, in the digital age, the context may be broader than the local physical environment; it could include a virtual or global environment. Students may not be situated in the same physical location as the teacher in which case the context for the teaching and learning may be an online environment and each context calls for a different approach to teaching and learning.

1.4 Problem statement

Transformation has been sweeping through the higher education sector in South Africa since the introduction of democracy in 1994. The rate at which this has unfolded has not always been acceptable to all role-players in the sector. Marwala and Marwala (2018:178) opine that transformation "is not easily achievable since everyone is a victim of a subtle force: lag. In 4IR, lag can be perceived as obsolesces, because most people who fall behind may feel that they will not be able to catch up". The rate at which technological advancements within the 4IR context occur requires consistent efforts to avoid 'falling behind' as 'catching up' may never be achieved. The responsiveness of an institution to the 4IR is one of the indicators of its progress with transformation. A complicating factor for transformation is the diversity that exists within higher education. Transformation does not play itself out on a level playing field and this makes it challenging to implement. This seems to be the case with Unisa.

Gleason (2018:5) holds that "academic development units, commonly holding a title such as the Centre for Teaching and Learning, are responsible for preparing faculty for evidence-based practice in improving learning skills". Unisa seems to be lagging behind in this regard owing to the continued application of the FTA to curriculum and learning development. The FTA was developed during a phase in the history of Unisa when teaching and learning was primarily delivered in print format, with the inclusion of some electronic material to a very limited extent. Technological developments seem to have overtaken the FTA so that its appropriateness and

relevance have become questionable. To this extent, it would appear that the instructional design process has not responded adequately to the advancement in technology and the resultant shift in the mode of delivery of teaching and learning at Unisa. The arrival of the COVID-19 pandemic in South Africa in early 2020 also added to the urgent need to review practices and operations within the institution in line with the set preventative protocols. This implies that processes which largely depended on physical interaction among role-players had to be reviewed urgently to allow for remote electronic interaction. This placed a burden on the institution to provide the required resources and the skills to operate in this new environment.

In the light of the foregoing explicated problem, fundamental research questions need to be asked and pursued. Research questions are a refinement of the research topic. They are a necessary component of the research project intended to frame the direction that the project will take. At a broader level, Solis (2007:193) asked, "As much as technology continues to change, what are those key areas of our field (instructional design) that require further investigation?" At a narrower, more specific level, Branch and Stephaniak (2019:91) phrase the question as follows: "With the continuing technological advances in the field of instruction, a debate among researchers is whether or not we need additional instructional theories and models to support the new learning environments and technological platforms". The aforementioned two questions are of paramount importance to Unisa as an institution of higher learning within the changing technological landscape. Therefore, based on the background and the problem statement, the research sought to answer the broad question:

How responsive is Unisa's instructional design model to the 4IR?

To provide a sharper focus of this research question, the following sub-questions were pursued:

- What is the nature of Unisa's instructional design model?

- How does Unisa's instructional design model support the prevailing learning contexts of students in the era of the 4IR?
- What is the relevance of the FTA to the instructional design model in the era of the 4IR?
- How could Unisa's instructional design model satisfy the demands of the 4IR?

The following aim and objectives were stated in line with the foregoing research questions:

Aim: To explore the responsiveness of Unisa's instructional design model to the 4IR.

Objectives:
- To describe the nature of Unisa's instructional design model.
- To explain the support of Unisa's instructional design model to the prevailing learning contexts of students in the era of the 4IR.
- To determine the relevance of the FTA to the instructional design model in the era of 4IR.
- To develop a model of instructional design at Unisa that can satisfy the demands of the 4IR.

1.5 Significance of the study

According to Lee (2019:29), the academic pioneers in technological innovation have strong beliefs, that (a) using new technologies will improve the quality of learners' experiences, (b) as a distance education institution, it is part of the university's mission to lead technological innovations in education and thus (c) technological innovation is not a choice but a mandate. This contention by Lee (2019) is applicable to Unisa as an ODeL institution. The researcher explored the responsiveness of Unisa's instructional design model in the era of 4IR. This led to the identification of shortcomings of the FTA to address the demands of the 4IR instructional design.

Another development of relevance at Unisa is the conversion of the delivery mode from print to online. While this process unfolded at a gradual pace over the years, COVID19 pandemic accelerated the pace of online teaching and learning at Unisa because some activities could no longer be conducted in the same manner. One example is the summative assessment that had to be conducted online to avoid the spread of the pandemic from students congregating in examination venues. This new development brought with it a new set of demands for all involved; for example, academic staff had to contend with online marking tools. They also had to plan for the online delivery of teaching and learning for the second semester of 2020. This planning showed the existence of a gap in the instructional design processes at Unisa as these are still applicable to printed and blended materials in the main.

This study, therefore, contributes a model of instructional design which is informed by the current contextual technological advances in response to the demands of the 4IR while considering Unisa as the learning context. The study will benefit Unisa and its stakeholders as it will inspire reflections on the current instructional design model with the possible review of the same. While the findings of the study may not be generalisable, they may bear relevance to other institutions of similar nature as Unisa. Therefore, the study stands to benefit ODeL institutions that might be grappling with the same issues as Unisa as far as instructional design processes are concerned.

1.6 Overview of research methodology

The nature of the inquiry in this study, as guided by the research problem and the research questions, suggests that it adopts a qualitative approach. Qualitative research provides an opportunity to gather in-depth data from the participants. Baxter, Hughes and Tight (2010:65) concur that, "it tends to focus on exploring, in as much detail as possible, smaller numbers of instances or examples which are seen as being interesting or illuminating and aims to achieve 'depth' rather than 'breadth'". The researcher's interest in this study is to obtain an in-depth understanding of the institution's response to the demands of the 4IR about

instructional design model. It is in this light that the focus of this study makes the qualitative approach most appropriate.

Within the qualitative research approach exists a few possible designs that researchers can apply. Baxter *et al* (2010:64) and Padgett (2017:31) identify some primary designs to qualitative research, namely ethnography, grounded theory, case study, narrative study, phenomenology, community-engaged research and action research. A case study design is adopted owing to the study's focus on the instructional design function within the specific context of Unisa in response to a broader context of the 4IR. A case study, in the words of Baxter and Jack (2008:544), is "an approach to research that facilitates exploration within its context using a variety of data sources". To this end, the researcher proposes four sources of data as a measure of triangulation. This approach is supported by Baxter and Jack (2008:556) thus, "triangulation of data sources, data types or researchers is a primary strategy that can be used and would support the principle in case study research that the phenomena be viewed and explored from multiple perspectives".

The participants of the study consist of staff members who are involved in the design and development of learning materials at Unisa. These are six instructional designers, six electronic originators and ten academic staff members from the College of Education as one of the colleges which has started with the process of designing modules for blended and fully online delivery. Additionally, students are included in the study as consumers and users of the learning materials developed through the FTA.

Baxter and Jack (2008:554) advise that in case studies, data from multiple sources are "converged in the analysis process rather than handled individually". This design is supported by Eisenhardt (1989:534) as follows, "case studies typically combine data collection methods such as archives, interviews, questionnaires, and observations". In line with these assertions, data collection was conducted through interviews. Individual semi-structured interviews were conducted with the identified

instructional designers, academics staff and electronic originators to allow them to provide as much information as possible.

The students included in the study are from the College of Education (CEDU) and College of Economic and Management Sciences (CEMS). Purposive sampling was applied to identify students who completed modules that were recently designed and developed following the FTA. Focus group interviews were used to collect data from the students. Owing to the prevailing conditions necessitated by the outbreak of COVID-19, the focus group interviews were conducted remotely using the Microsoft Teams online meeting application.

The required permissions and ethical clearance certificates were acquired before conducting the data collection. The collected data were recorded for accuracy and safe-keeping. These are attached as Appendices J and K.

There is no standard format for analysing a case's data. Eisenhardt (1989) explains that case analysis usually involves detailed write-ups for each case which are often pure descriptions central to generating insight. Therefore, data were organised in a meaningful manner to allow the researcher to make sense of them. The researcher used the Computer Assisted Qualitative Database Software (CAQDAS) to analyse the data. According to Wickham and Woods (2005:688), CAQDAS was initially developed to enhance the accessibility of qualitative data by overcoming the physical limitations of paper data records. The researcher selected this approach to reduce reliance on manually stored data and for data security.

1.7 Definition of key concepts

The main concepts applicable to this study are defined below. These are instructional design, open distance and e-learning, and fourth industrial revolution.

1.7.1 Instructional design (ID)

ID is a concept used to refer to a range of activities aimed at producing a product intended to result in learning by the user (Fyle, Moseley & Hayes 2012:55). In the case of higher education, this refers to all the activities aimed at preparing teaching and learning materials for students. Furthermore, Branch and Stefaniak (2019:86) define instructional design as "a systematic process which is employed to develop education and training programs in a consistent and reliable fashion", even though they contend that there is no widely accepted definition of instructional design. The process of instructional design at Unisa is a combined effort by various participants. It is managed on a single project approach by instructional designers who are otherwise referred to as education consultants. Instructional design follows the guidelines of the FTA. In the context of this study, ID is used to refer to the process of design and development of learning materials including the supporting media and technologies.

1.7.2 Open Distance electronic Learning (ODeL)

To understand the concept of Open Distance and electronic learning (ODeL), it is necessary to define its building blocks individually first. According to Holmberg (2005:9), "distance education is characterised by teaching and learning being brought about by media: in principle students and their teachers do not meet face to face". He further indicates that the term developed "in the 1970s and was officially adopted in 1982 when the International Council for Correspondence Education changed its name to the International Council for Distance Education" (Holmberg, 2005:10).

Open learning, on the contrary, "implies evading avoidable restrictions, for instance, entry without prescribed entrance requirements" (Homberg, 2005:10). The concept of openness can be traced back to 1836 when, according to Holmberg (2005:14), the University of London began to function as an examining institute for students who were not necessarily registered as their students. Deimann (2019:41), in contrast, traces the origin of openness back to the 1950s and 1960s. The definition

of openness has evolved over the years to include other aspects such as learner-centredness, use of a variety of teaching and learning strategies and the removal of barriers to learning (Lewis 1986:5). In the early 21st century, openness has developed further to include the use of open educational resources.

About e-learning, Holmberg (2005:10) holds that the term was brought about by the developments in technologies for communication and presentation of subject matter. The concept of ODeL in its current form is relatively new in higher education particularly the addition of the 'e' for 'electronic', which represents a different mode of delivery. According to Jung (2019:1), ODE "has evolved through several historical stages from correspondence education to the use of print, radio and TV, to the use of teleconferencing, computers and multimedia, and so on up until online learning including Massive Open Online Courses (MOOCs)".

To sum up, reference is made to the definition applied at Unisa which states that open distance learning is:

> a multi-dimensional concept aimed at bridging the time, geographical, economic, social, educational and communication distance between student and institution, student and academics, student and courseware and student and peers. Open distance e-learning focuses on removing barriers to access learning, flexibility of learning provision, student-centredness, supporting students and constructing learning programmes with the expectation that students can succeed (Unisa, 2008).

Open distance learning in the context of this study is used to refer to all activities of educational nature conducted at Unisa where there is a geographical separation between the institution and the students. It also includes the diverse profile of the students and the different contexts from which they study. Furthermore, ODL speaks to the types of support available for students towards success in their studies and the widening of access. These activities are all conducted within the broader

transformation agenda on which the institution has embarked. This also forms part of the basis for this study.

1.7.3 The Fourth Industrial Revolution (4IR)

The world is undergoing vast technological advances making increased connectivity possible. Higher education is not excluded from this revolution. This current technological development is referred to as the 4IR. In Xing *et al's* (2018:178) words, "the 4IR is gradually introducing a shift in the way in which production in the economy is conducted". To understand this impact of 4IR, we need to define the concept first. A revolution is defined as "a complete change in ways of thinking and acting" (Longman Dictionary of Contemporary English (1978). According to Gleason (2018:2), the first industrial revolution emerged in the 1780s with steam power, followed by the development of mass production and electrical energy in the 1870s. "The third industrial revolution emerged with the development of IT and electronics" and concludes that "we are now in a new phase where the fusion of several technologies is not only automating production, but also knowledge" (Gleason 2018:2). Schwab (2016:1) concurs that the 4IR is "characterised by a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres". For purposes of this study, the concept of 4IR is used to refer to the digital revolution that is currently sweeping through the whole world. According to Markowitz (2019:5), the list of 4IR technologies is by no means complete and final. It is, therefore, necessary to delineate the focus of this study within the 4IR on one specific component being the automation of knowledge work.

This component is, however, closely linked to another component of 4IR, which is digitisation. It is therefore possible that the data will extend from knowledge work automation to cover digitisation as well.

1.7.4 Responsiveness

The concept responsiveness is mostly premised within four main disciplinary fields, i.e. political science, evaluation, business management and education (Bheda

2013:9). Various definitions for this concept are provided within each of these disciplinary contexts. An early attempt at a definition of responsiveness in political science was made by Pennock (1952:790) as the response of a government to the will or demands of the people. More than five decades later, Hobolt and Klemmensen (2008:309) define responsiveness within political science by linking it with the aspect of representation thus: "elected representatives are expected to act responsively to the needs of their constituents" in order to demonstrate responsiveness.

In his definition of responsiveness in evaluation, Stake (1973:116) emphasises the usefulness to those who should benefit from the course or programme being evaluated. In a much later publication, Stake (2014:445) puts even more emphasis on getting acquainted with the evaluand, the history and the general context of the evaluation to deepen its responsiveness.

Homburg, Grozdanovic and Klarmann (2007:19) define responsiveness as it relates to business and marketing as "the extent to which a firm responds to market changes, and it results from a firm's proactive interaction with its external environment". They allude to the role of speed as a determinant of responsiveness. Therefore, how fast an organisation responds to the demands of the environment is critical to the description of its responsiveness. Wei and Wang (2011) summarise organisational responsiveness as "a firm-level strategic action" which is necessitated by "increasing competition and constantly evolving customer needs". Responsiveness, therefore, requires an intimate and in-depth understanding of the environment. It also requires a high level of agility to keep up with fast changing trends within that environment.

In the educational context, Bheda (2013:11) notes that responsiveness refers to the "the way in which teaching takes into account the diverse identities of students within the teaching process". While this study is placed within the educational context of Unisa, this definition by Bheda (2013) will be extended in meaning beyond the

confines of the student profile and concomitant teaching process. The focus on the study being the instructional design process dictates that the concept of responsiveness be seen within the broader framework of the relevance of the whole educational project to the changing technological environment, i.e. the 4IR.

1.8 Chapter outline

The study consists of seven chapters. These are outlined hereunder.

Chapter 1: Background and orientation

This chapter provides a comprehensive orientation and background to the study with inclusion of an historical account of the development of Unisa as the context of the study. It also delineates the specific area within which the study is premised within the university structure. The chapter also outlines the problem statement, the research question as well as the research aims.

Chapter 2: Theoretical and conceptual framework

This chapter focuses on the theoretical framework which shapes the researcher's perspectives and approaches to the study. Various theories on learning and instruction which are considered relevant, are discussed in this chapter. The chaos theory is discussed as part of the framework for this study. In the course of the study, various concepts are applied. It is, therefore, necessary to include definition of these concepts in this chapter.

Chapter 3: Literature review

In this chapter a broad review of relevant literature is provided, premised on the view that research is placed within an existing body of knowledge. This literature review provides guidance to the researcher in terms of the direction that the study takes. The review focuses on the main construct of the study, namely, instructional design and its role within the changing context of higher education.

Chapter 4: Research methodology

In this chapter the research methodology selected for this study is described. This includes the description of the population, the sample as well as the instrument that is used to collect data.

Chapter 5: Data analysis and interpretation

This chapter provides an analysis of the data collected from the sample of the population combined with the discussion of the findings. It is also used to provide an interpretation of the data to respond to the research question.

Chapter 6: Interpretation of analysed data

The interpretation of data is completed by a discussion of the findings which are provided in this chapter. These findings are in line with the set aims and objectives of the study. The study is intended to provide guidelines for the development of an appropriate framework for instructional design within the context of the 4IR. This contribution is outlined in this chapter.

Chapter 7: Summary, Limitations, contribution and recommendations

This concluding chapter is used to summarise the study, draw conclusions from the data, acknowledge limitations of the study, as well as provide recommendations towards the resolution of the research problem. Suggestions for future research are outlined in this chapter.

1.9 Conclusion

The researcher used this chapter to provide a contextual and historical background to the study with the sole intention to demonstrate its importance towards Unisa's various efforts of responding to the 4IR. The chapter sharpened the focus of the study on instructional design within the given context. A brief reference was made to the theoretical framework on which the study is based as well as an overview of the research methodology. The chapter closes with the definitions of the key concepts which are used in the study as well as an outline of the various chapters of the study.

CHAPTER 2

2. THEORETICAL FRAMEWORK

2.1 Introduction

A research study must be contextualised within and directed by a theoretical framework. According to Rule and John (2015:2), "theories help to interpret and explain phenomena" and they are "thinking tools". Therefore, the theoretical framework for a study can consist of several relevant and applicable theories that provide the epistemological and ontological view of the researcher. This chapter presents the theoretical framework within which the study is premised.

Learning theories and instructional theories are important and relevant to this study because they continue to provide a framework which outlines the requirements to construct learning and instructional design approaches (Branch & Stefaniak 2019:88). To this end, the theoretical framework for this study consists of the existing learning theories as well as instructional design models that have been used to develop the FTA. "It is important to be able to distinguish between learning theories and instructional theories" (Branch & Stefaniak 2019:88). They continue to provide a framework which outlines the requirements to construct learning and instructional theories.

There is, however, a view which suggests that "the existing theoretical paradigm has a limited capability to explain and understand the diverse phenomena encountered in instructional systems design and development" (You 1993:17). This view has led to the application of an alternative theoretical paradigm in the form of chaos theory. In supporting the use of chaos theory in educational settings, You (1993:18) posits that it "opens the door for a new analogy; alternative framework and/or metaphor to probe the phenomena that cannot be described, explained or predicted by current paradigms".

The application of the chaos theory to this study is, therefore, premised on this notion as outlined by Trygestad (1997:3) that chaos theory provides an explanatory power to understand the behaviour of diverse systems. And what could be more diverse than educational systems? Cartwright (1991:53) underscores the importance of applying the chaos theory as follows: "chaos may make the world easier to understand, not more difficult" because it carries a "more optimistic message" (Cartwright 1991:45).

Further to the chaos theory, this chapter also examines the learning theories of constructivism and connectivism. The relevance of constructivism to this study stems from the proposition of this theory that learning is the construction of meaning through the interaction of existing knowledge, new knowledge and the context where learning takes place. Some models of instructional design are aligned with this theory. In contrast, connectivism becomes relevant to this study owing to its focus on the role of technology in the learning process as influenced by the decreased longevity of knowledge and its subsequent impact on the student. Technology, in this instance, is premised within the 4IR which forms the contextual basis for the study. A discussion of the three theories and their relevance to this study follows.

2.2 Chaos theory

2.2.1 Description and elements of Chaos theory

Chaos theory developed from the mathematical field of study. However, over the years its application has been extended to other disciplines such as the social sciences where it is considered useful to the explanation of phenomena that characterise modern societies such as diversity and sudden, unpredictable changes (Lancu & Lanteigne 2022:133). This view is succinctly supported by Oestreicher (2007:286) that, "chaos theory finds resonance in present social and philosophical preoccupations".

There are many definitions of chaos theory with a common thread of elements running across most of them. According to Biswas, Hasan, and Bala (2018:123),

chaos theory is in brief the study of complex, non-linear, dynamic systems. From this definition, a few elements stand out. Firstly, chaos is complex. This arises from its relation to the complexity theory. What makes it complex is its lack of predictability. The world today is very complex in different ways. This complexity is multiplied where it applies to multifaceted social phenomena like education (Hooley 2013:208). The second element of chaos is its non-linearity, which suggests that chaos does not follow a specific order. According to Lartey (2020:45), non-linearity refers to lack of direct and proportional relationship between variables in a system. Lartey (ibid) further contends that chaos is orderly but a representation of a lack of predictability in an evolutionary system of order. The element of evolution in this statement is crucial because it points to the ever-changing nature of the system which could be context or the environment. This leads to the third element of chaos which is dynamism. The dynamic nature of a chaotic system arises from its sensitivity to initial conditions. Biwas *et al* (2018:124) hold that sensitive dependence on initial conditions is the key component of a chaotic system. This means that a small shift in the initial conditions in a system can lead to massive effects at a different time and space.

The overall element emerging from this definition is that chaos is "disorderly-looking". The description of chaos as being disorderly stems from Popper (1991) in You (2008:18), who uses concepts such as "disorder, complexity, instability, diversity, disequilibrium, and non-linearity" as presentative of chaos. All these descriptive words point to a state of messiness and disorder as intimated by Popper's definition. The foregoing definition may suggest that chaos theory is not adequately organised to be applied within scientific and educational contexts in general and research in particular. However, Cartwright (1991:44) refutes this by stating that chaos theory is "the most important scientific idea" of the 20th century. Having progressed to the 21st century, the 4IR environment has cemented the importance of the chaos theory owing to its dynamic nature and the temporariness of the solutions offered by technology. Chaos implies a kind of inherent uncertainty principle – not just in how we perceive the world but in how the world actually works

(Cartwright 1991:45). It is also considered as a simplified theoretical construct which can be "an event, behavior, or process which is variable, non-linear, and unpredictable" (Trygestad 1997:3).

Another common definition of the chaos theory derived from Cvetek (2008:250) is that chaos "describes the behavior of certain non-linear dynamical systems that under specific conditions exhibit dynamics that are sensitive to initial conditions". This is commonly referred to as the "butterfly effect". The term developed from an analogy by Lorenz (1972) that a butterfly flattering its wings in Tokyo, Japan can cause a tornado in New York. The essence of this metaphor is that a "small cause which eludes us, determines a considerable effect that we cannot fail to see" (Oestreicher 2007:282). While this metaphor is commonly applied to the definition of chaos theory, Cartwright (1991: 45) warns that chaos should not be interpreted as anarchy or randomness but rather as order that is invisible. To support this, You (1993:18) holds that chaos plays an important part in the "evolution and maturing of organisms". This is supported by Aricioglu and Berk (2022:22), who assert that "chaos is not disorder. It represents the unpredictability of an evolutionary system".

You (1993) identifies three key conceptual elements of the chaos theory, namely sensitive dependence on initial conditions, fractals and strange attractors. Trygestad (1997:5) adds bifurcations as an element of chaos theory. For purposes of this study, focus is on three of the elements, namely sensitive dependence on initial conditions, fractals and bifurcations.

Sensitive dependence on initial conditions refers to the effect that a slight change in one part of a chaotic system can deliver on other parts significantly. This can be compared to the systems theory which is defined by the same principle. In brief, the systems theory suggests that a system consists of a combination of parts and cannot function if one part is missing. This element of the chaos theory, on the other hand, focuses on the initial conditions and how a slight change in those conditions can affect the rest of the system. Trygestad (1997:5) puts it succinctly as follows: "with

change in the initial condition, change in the entire system may occur". The educational system generally depends on initial conditions being set and the end conditions being predicted. In this context, chaos is, therefore, likely to arise when these conditions change; for instance, the success of the curriculum depends on the contributions of various stakeholders. If one of the stakeholders changes in a certain manner, the expected outcome is likely to be affected.

The second conceptual element of the chaos theory is fractals. Fractals can be defined by means of two characteristics: "that they are irregular throughout and that they have the same degree of irregularity on all scales" (You 1993:19). Therefore, size is not a factor in chaos, as described by Trygestad (1997:4) that "what appears as a particular pattern exists despite the scale; that is whether the scale is large or small, the pattern continues". This element suggests that chaos can occur at all levels and spheres of life. In educational settings, it can occur at macro and micro level. What is important to note is that the existence of chaos at one level does not automatically mean that the next level is also chaotic. To illustrate this using the educational system, the existence of chaos in the classroom does not mean that there is chaos in the whole department of education at national level. In Trygestad's (1997:4) words, "microscopic examination might identify random patterns whereas the macroscopic view might see unity and cohesion, or the reverse may be true".

The distinguishing characteristic of bifurcations refers to the fluctuations in open linear systems. In simpler terms, a bifurcation can be described as failure occurring in the structural stability of a system. According to Trygestad (1997:5), 'bifurcations may occur when the fluctuation threatens the structure of the system at a far from equilibrium point". This means that where there is no stability in the system, bifurcation is likely to arise and cause chaos in the system. Bifurcations cannot be prevented because they are unpredictable. The prevailing context of the COVID-19 pandemic is an example of how bifurcations can cause chaos. Firstly, the emergence of the pandemic was not predictable; secondly, it affected the existing conditions of many systems, therefore bringing about a state of chaos.

In summary the elements of the chaos theory can be depicted in Figure 2.1 as follows:

Sensitive dependence on initial conditions
Non-linearity
Unpredictability
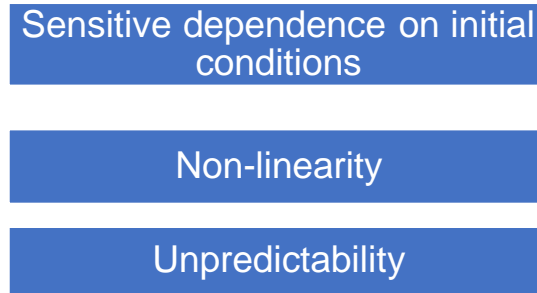
Figure 2.1: Elements of the chaos theory

There are several developments in this current environment that increase the rate of uncertainty, unpredictability, disorder, change and chaos. Table 2.1 provides a summary of these factors with a brief explanation of how each factor influences chaos.

Table 2.1: Factors that influence chaos (adapted from Aricioglu & Berk 2022:22-23)

Factor	Explanation
Globalization	Increased mobility and interaction led to a change in the world order and the creation of a chaotic environment, e.g., the war in Ukraine is affecting economies in the rest of the world.
Technological developments and the information revolution	The emergence of a single platform that connects individuals, objects and organisations has led to changes in how things are done, e.g., education is no longer conducted strictly face-to-face.

Factor	Explanation
Extreme competition	Changing consumer preferences and attractive substitute goods have led to fierce competition for markets.
Changing balances in the world	The changing role of different countries in the global markets has led to changes in the power relations among countries, e.g., the rise of the wealthy Middle East countries and the development of the BRICS countries.

2.2.2 Limitations of chaos theory

The chaos theory, like any other point of view, has more than one perspective and interpretation to it. While it received acclaim as an alternative theory for explaining complex and unpredictable systems, it is not without criticism. According to Trygestad (1997:7), "critics of chaos theory are challenging researchers to investigate applications more deeply and broadly because particular aspects of chaos may not be applicable to some contexts or may require redefinition". Whether education is one such context is still debatable, however, Benson and Hunter (1993:93) strongly doubt that. They argue that "chaos theory cannot be applied to human systems of learning where individual choices and decisions are part of complex thinking that crosses boundaries". Of notable importance is the fact that Benson and Hunter (1993:93) presented their arguments in the 1990s and the educational context has not remained unchanged over the past decade. This researcher believes, therefore, that the chaos theory has gained stronger relevance to education as technological developments have advanced in the early 21st century. The COVID-19 pandemic has also added to the applicability of this theory to education through the impact it has on various elements of the education system. These two specific developments have had a chaotic impact on human existence in general and education, in particular.

Chaos theory is also criticised for its application to learning. In this regard, Trygestad (1997:7) holds that the applications of this theory have not yet been fully explored even though its value in education has been widely identified. This researcher's view is aligned with that of Salomon, Perkins and Globerson (1991) who suggest that the application of chaos theory to education enhances learning. Of particular relevance to this study is their view that "chaos confirms learning processes as fluid, dynamic and nonlinear" and further that they need "change, conflict and diversity" (Salomon *et al.* 1991:8).

2.2.3 Relevance of chaos theory to the study

Change is a constant element of any context and education is no exception. The need for change in education derives from many realities such as the kinds of students, the socio-economic environment, the technological advancements, the kinds of teachers, the political environments, to name a few. More than a decade ago, Cvetek (2008:248) already noted that traditional models of teaching were being replaced by models that emphasised the involvement of students. However, Mason (2008:44) argues that change in education should not be limited to one factor regardless of its importance and influence. Instead, it should be more "a case of generating momentum in new direction by attention to as many factors as possible".

This notion by Mason (2008) is accepted as it acknowledges the need to address various elements of the educational sector for success in general. However, for purposes of this study, focus is on change that can be prompted in instructional design in keeping abreast with other contextual changes and how chaos theory directs this change. This need is premised on the observation by Beal (2003:3045) that "existing models of instructional design (ID) have implied that it is a linear process going from analysis to evaluation". The contextual changes relevant to this study are brought about by the 4IR, which is characterised by advances in technology. The study sought to demonstrate through application of the chaos theory, how these technological advances impact on instructional design.

The chaos theory provides a lens through which learning can be viewed and for purposes of this study, it is intended to give direction to a changed approach to instructional design processes. In Cartwright's (1991:53) words, "the beauty of chaos lies in its disturbing integration of order and disorder, certainty, and uncertainty, calm and turbulence. This integration has profound implications for planning", in this instance, instructional planning or design.

While theory provides a general statement guiding the interpretation of the phenomena, Damschroder (2020:1) extends this role to the building of scientific knowledge through "testable propositions that are explicit". She further classifies theories into three different types according to their function, namely process theories, determinant theories, and evaluation theories. Following the description of chaos theory by Cziko (1989:19) as "one in which strict deterministic causality holds at each individual step in an unfolding process", it can then be concluded that chaos theory belongs to the class of process theories. This conclusion strengthens the relevance of the chaos theory to this study on instructional design owing to the latter being a process-based activity.

The focus of this study on instructional designers, electronic originators, academics, and students validates the use of chaos theory because these role-players are all human beings and Cartwright (1991:44) holds that chaos theory implies that human behaviour may be a good deal more complex than we thought so much so that a complete understanding of some things we plan may be beyond possibility. This view can be applied to the instructional design process which is carried out by humans to develop teaching and learning materials which are consumed by humans, which often becomes messy and complicated despite prior planning. This ostensibly arises from the assumption by existing learning theories and instructional design models that humans and learning environments are fixed, stable and homogeneous. The chaos theory provides a perspective that guides this study towards a rethinking of learning theories, instructional design models and instructional approaches. In the words of Lancu and Lanteigne (2022:134), a

paradigm shift is needed in the theoretical approach and the epistemological perspectives of instructional designers and educators of this era. To this effect, the theories of constructivism and connectivism are discussed in the following sections as the premise of the current instructional design model which is applied at Unisa.

2.3 Connectivism

The spread of technological applications to the educational context has challenged the relevance of the existing learning theories, giving rise to a view that the theories of behaviourism, cognitivism and constructivism do not adequately explain the role of machines in the learning process. This view, attributed to Siemens (2004), implied the need for a fresher, more relevant theory of learning. This sub-section focuses on connectivism as the relevant theory applicable to learning in the digital age.

2.3.1 Description and elements of connectivism

Connectivism has been presented as an appropriate theory or guiding principle for teaching and learning in the current technological environment characterised by constant change and advancement. There are many researchers who support this notion. Among them is Darrow (2009) who postulates that the history of e-learning points to the "need to develop a new learning theory that would encompass the type of learning that takes place online". Similarly, Bell (2011:100) concurs that the current learning theories "do not provide an adequate framework for us to think and act in the digitally saturated and connected world in which we live".

Another factor that agitated for a new learning theory is from Bessenyei's (2007:11) view, that "the learning is a continuous, lifelong system of network activities, embedded into other activities" and Gonzalez's (2004) idea as quoted by Darrow (2009) that in the digital age the longevity of knowledge is greatly compromised. This has led to the coining of the concept of the "half-life of knowledge"; meaning that knowledge changes and expires rapidly in the digital age. There is a very limited

time between the introduction of knowledge and its obsolescence (Foroughi (2015:13).

To this effect, Siemens (2004) proposed the theory of connectivism which is intended to close this gap. The theory of connectivism is premised on the idea that learning no longer happens solely within the human mind. Siemens (2004:6) holds that learning is no longer "an internal individualistic activity". He maintains that humans' approach to learning is greatly influenced by technology. Whereas technology in learning is not a new phenomenon, the theory of connectivism is an attempt to acknowledge the role of digital technology in learning. Strong and Hutchins (2009:57) sum up their support for this theory thus:

> Connectivism may be a more useful lens through which to view the types of learning associated with a rapidly changing information core, diverse knowledge sources and complex information environment.

Learning, in the connectivist paradigm, happens when knowledge is distributed through the digital networks to and from the learner and within the learning community. The learning community is referred to as a node within the broader network of learning. According to Kop and Hill (2008:2), two important activities occur in a connectivist learning environment, i.e., "the ability to seek out current information and the ability to filter secondary and extraneous information". Furthermore, how the student applies the newly acquired information is an important element of the learning process.

According to the connectivist paradigm, learning and knowledge are not located in one set place but are distributed along a variety of networks connected by a series of nodes (Goldie 2016:1065). These nodes may differ in size and strength owing to the amount of information and the number of users at a given time.

To make a clearer argument for the validity of connectivism, Siemens provides a set of principles that guide this theory. Verhagen (2006:1) further groups the eight principles into four broad categories. Table 2.2 depicts the principles as well as the categories.

Table 2.2: Principles of connectivism

Category (Verhagen 2006:1)	Principle (Siemens 2004:5)
Educational aims for the curriculum	Capacity to know more is more critical than what is currently known.
	Ability to see connections between fields, ideas and concepts is a core skill.
Premises for the curriculum	Learning and knowledge rest in diversity of opinions
	Nurturing and maintaining connections is needed to facilitate continual learning.
	Currency is the intent of all connectivist activities.
Learning processes that are to be facilitated when putting a curriculum in practice	Learning is a process of connecting specialised nodes of information sources.
	Decision-making is a learning process.
Learning may reside in non-human appliances	Learning may reside in non-human appliances.

A common thread running through the various attempts at defining connectivism as a learning theory is the application of machines for learning. This happens in many different forms depending on the context and the intended outcome of the learning process. Kropf (2013) identifies the various contexts where learning takes place in modern times. He refers to these contexts as reservoirs of information which are grouped into three broad categories as presented in Table 2.3.

Table 2.3: Information reservoirs (Kropf 2013:15)

Category	Examples
Virtual reality learning platforms	Second life, video games, web conferences
Social networks	Twitter, Facebook, Pinterest, blogs, *Instagram*
Online classrooms	MOOCs, online libraries, learning management systems

In a connectivist environment, learning happens through these different information reservoirs in the 21st century. It is important to note that there have been many additions to these reservoirs since 2013 (when Kropf's article was published) to date. These additions have been made possible by technological advancements that continue to occur. An example is mobile technology which has had a huge impact on learning. Duke, Harper and Johnston (2013:6) support this notion thus: "connectivism is characterized as a reflection of our society that is changing rapidly, becoming more complex, socially connected, global and mediated by increasing advancements in technology".

The most important element within the connectivist learning environment is the individual. Learning begins with the individual who connects with others through the network of the learning environment. The individual learns from interaction with others from the connections and this process takes a cyclic form of knowledge development. Bell (2011:4) notes in this regard that connectivism "characterizes knowledge as a flow through a network of humans and non-humans", while Kop and Hill (2008:2) explain that the starting point in the connectivist learning environment occurs when knowledge is actuated by the learner; connecting to and feeding information into a learning community.

Duke *et al* (2013) posit three reasons for the adoption of connectivism as a learning theory. The first reason is that since connectivism is characterised as the enhancement of learning through networks, it is only through these networks that

the student can acquire a diversity of opinions and the ability to make critical decisions. Secondly, the ability to access databases in search of knowledge empowers the learning process. Lastly, the current learning theories do not adequately explain learning within the rapidly changing technological environment.

2.3.2 Limitations of connectivism

Whereas George Siemens and Stephen Downes individually put across arguments for the adoption of connectivism as a learning theory, these have been met with criticism from some authors such as Verhagen (2006), Kop and Hill (2008) and Bell (2011). These authors generally hold the view that connectivism is not a fully-fledged learning theory. In defence, Downes (2022:63) contents that connectivism is a "non-representational theory", meaning that in connectivism there is "no real concept of transferring knowledge, making knowledge or building knowledge. Rather learning and knowing are descriptions of physical processes that happen in our brains". To support this view, Strong and Hutchins (2009:56) define a learning theory as "an explanation of what happens when learning transpires". Therefore, connectivism qualifies as one because it provides a description of how learning happens within the context of the digital age.

To further cement the view opposing connectivism as a learning theory, Clara and Barberàt (2014) provide three issues with connectivism from a psychological and epistemological perspective. The first argument is that connectivism fails to address the learning paradox meaning that learners, according to the connectivist approach, do not know what they do not know. They do not intentionally set out to look for information and knowledge. It happens through networking. Secondly, connectivism seems to place interaction strictly as a connection to a human node, whereas in constructivism the role of the social network is emphasised. Clara and Barberàt (2014) note that there is no adequate place for the nature of interaction in connectivism.

The other criticism of connectivism is that it falls short in explaining the development of concepts. In the view, it is important to explain the relationship between learning and the development of concepts to qualify as a learning theory (Clara & Barberàt 2014:203). The jury is still out on whether connectivism is a learning theory. In the words of Strong and Hutchins (2009:55) "Whether connectivism is a new learning theory, a simple extension of existing theories or simply a basis for or lens through which to rethink and reframe pedagogy and curriculum for a changing educational landscape has yet to be decided".

In an attempt to address this conundrum, Kop and Hill (2008:3) propose the naming developmental theory instead, as it is still under construction towards becoming a learning theory. They hold that a developmental theory provides a fertile ground for ideas which may be further researched and validated as fully-fledged theories. Connectivism, in their view, still has to undergo this process towards becoming a learning theory.

Another strong opponent to the admission of connectivism as a learning theory is Verhagen (2006) whose view is that connectivism should rather be viewed as a pedagogical approach because it deals with how learning takes place at the instructional level. Duke *et al* (2013) support this notion that connectivism is a pedagogical view and not a learning theory. Further substantiation is made by Goldie (2016:1067) who argues that there is no connection between "connectivism's underlying principles and the arguments and theories on which it is based". Goldie (2016) further asserts that the principle of connectivism that learning can reside in non-human appliances is not adequately explained.

Successful learning through the connectivist approach is in the view of Foroughi (2015) doubtful; firstly, because teachers may not be ready to transfer instructional control to technology and to students; secondly, because "not all learners have enough background in a knowledge domain to be able to pursue a connectivist approach to learning in it" (Foroughi 2015:19). These concerns may be addressed

by Goldie's suggestion that connectivism may not be applicable to all subjects and areas of learning but could be limited to selected areas of knowledge (Goldie 2016:1068). Perhaps the safest approach is to follow Kropf (2013:21) who takes the middle road by suggesting that connectivism has a dual role, serving as a learning theory and an instructional theory.

2.3.3 Relevance of connectivism to the study

Technology plays a very important part in the 21st century education arena. Institutions offering contact classes have in recent times gradually added some elements of e-learning to augment these classes. Distance education has always relied on the use of some technology or another for the delivery of learning materials to the students. More than a decade ago, Bell (2009:1) already observed that internet devices were becoming part of the teaching and learning activities, giving students and teachers access to global resources and online tools and services. In recent times, the COVID-19 pandemic has forced all educational institutions to resort to the use of technology to teach and to communicate with the students.

This study is premised within the context of the 4IR. It is undertaken during the time of the COVID-19 pandemic when various regulations are in place to limit the transmission of the virus through physical contact and interaction. This situation may have been predicted by Kop and Hill (2008:5) when they stated that the advent of new considerations in instructional design and implementation would instigate universities to take the tasks of adapting their instructional approaches more seriously.

The need to continue with the academic project under the prevailing circumstances has necessitated the utilisation and optimisation of technology and all indications are that will become a permanent feature of life in the 21st century. In this regard, Bell (2009:3) notes that this ubiquity of the internet will have implications for students and staff, challenging them to work and learn effectively in the changing environment.

As teachers and students continue to experiment with various technologies, connectivism becomes an attractive and accessible theory to explain and guide the structuring innovation that occurs in this space (Bell 2009:5). Its applicability is, however, not limited to education settings only because it has implications in all aspects of life (Siemens 2004:6). The latter outlines the various aspects of life which are affected by the notion of connectivism, two of which are of particular interest to his researcher, i.e., design of the learning environments and the improved speed of implementation in the systems view of learning (Siemens 2004:6). According to the connectivist view, the process of learning is not solely under the control of the individual owing to persistent changes in the learning context. As Siemens (2004:5) puts it, "Learning is a process that occurs within nebulous environments of shifting core elements". However, the application of advancing technologies is increasingly enabling students to connect to one another and to knowledge networks of their own making (Kop & Hill 2008:10).

The relevance of connectivism to this study emanates, therefore, from its contextualisation in the ever-changing and ever-increasing information that is being acquired in modern day living in general and in educational settings in particular. To support this notion, Kop and Hill (2008:11) observe that this theory is not limited to the online environment. However, the online environment is one application that has been important for the development of connectivism, even though the theory applies to a larger learning environment and helps to inform how we understand our relatedness to the world and consequently, how we learn and understand from it. Duke *et al* (2013: 8) assert that "connectivism is a school of thought directly applicable to the use of technology in the classroom today. There is no doubt that online learning is a direct technological response to different learning cultures, methods and aspirations".

2.4 Constructivism

Constructivism is one of the traditional learning theories developed over the years in an attempt to describe the learning process. This sub-section provides a description of this theory, its elements, its shortcomings and closes off with a discussion of its relevance and applicability to this study.

2.4.1 Description and elements of constructivism

The process of learning as a human activity has been under scrutiny for many years by various researchers with contributions from Pavlov (1928), Skinner (1967), Piaget (1977), Vygotsky (1978), Gardner (1983) and many others. This has given rise to equally as many theories about it as posited by Ertmer and Newby (2013:43) that, learning is a complicated activity which has generated many interpretations and theories of how it is achieved. These various theories all shed light on how humans acquire knowledge with the intended outcome of guiding approaches to instruction. Ertmer and Newby (2013:43) further provide two reasons for this interest in learning and research by stating that first, learning theories are a source of verified instructional strategies, tactics and techniques and second, learning theories provide the foundation for intelligent and reasoned strategy selection. This second point is important because it supports the inclusion of learning theories in this study. This study is focused on instructional design which is, in essence a set of actions derived from a selected reasoned strategy for teaching and learning.

The earliest traceable interest in learning was developed by theorists such as Skinner and Pavlov who described learning in the manner that gave rise to the theory that became known as behaviourism. This was followed by another learning theory known as cognitivism, which also attempted to describe the learning process. Owing to the shortcomings of these theories, researchers developed another theory to define and explain the learning process known as constructivism.

According to Hanley (1994:1), constructivism is deeply rooted in philosophy with applications in sociology and anthropology, extending to cognitive psychology and

education. This view is supported by Olusegun (2015:67), who also posits that constructivism "has its roots in philosophy, psychology, sociology and education". On the other hand, Fosnot and Perry (2005:1) state that constructivism was "initially based on the work of Jean Piaget and Lev Vygotsky and then supported and extended by contemporary biologists and cognitive scientists". However, Yoders (2014:13) attributes the foundation of constructivism to the work of Lev Vygotsky. From all these points of view, it is clear that constructivism has its origin based in the broad area of social studies.

The simplest definition of constructivism is that it is a theory which holds that learning is constructed through interaction with others. This implies that interaction with others is necessary for learning to take place.

Various researchers share a common view regarding the definition of constructivism. For instance, Almala (2006:34) defines constructivism as a "philosophy based on the principle that knowledge is created from experience," while Murphy (1997:3) avers that "in the constructivist perspective, knowledge is constructed by the individual through his interactions with the environment". Furthermore, Schcolnik, Kol and Abarbanel (2006:12) hold that "constructivism is a theory of learning which posits that students learn by actively constructing their own knowledge". The element of interaction and the use of experience form a common thread across all definitions of the theory of constructivism.

Other authors further emphasise the nature of constructivism as a social process. One such author is Tam (2000: 51), who asserts that "Central to the tenet of constructivism is that learning is an active process. Information may be imposed but understanding cannot, it must come from within". This is supported by Yoders (2014:12) thus: "the central premise of constructivism is that learners create (or construct) new understanding by actively building upon prior knowledge and experiences". This element of constructivism emphasises that the student does not bring a blank mind to the learning context but already possesses knowledge and

experiences which should be used to form the basis for the new incoming knowledge. In Oliver's (2000:5) words, the constructivist learning context requires the students to "bring forth their own relevant mental models and attempt to integrate external information with these personal frameworks".

The social nature of the constructivist learning theory suggests therefore, that while knowledge maybe common, there are different forms of its interpretation arising from the students' existing frames of reference. This means that in the constructivist paradigm, the success of learning is primarily determined by the "context in which an idea is taught as well as by the student's beliefs and attitudes" (Olusegun 2015:66).

There are two main approaches to the theory of constructivism. The first one is cognitive constructivism which is based on the work of Jean Piaget. It focuses mainly on the importance of the mind to learning. According to Amineh and Asl (2015:10), Piaget's work consists of the 'ages and stages' component as well as the theory of development. This approach to constructivism uses accommodation and assimilation to describe the interaction between the student's mind and the learning context during the learning process. New knowledge is assimilated into the existing cognitive structures. These structures then accommodate the new knowledge by allowing it to modify the existing knowledge accordingly. These processes constitute learning according to the constructivist perspective.

The second approach is social constructivism which places emphasis on the importance of social interaction and the environment to the success of the learning process. This approach is based on the work of Lev Vygotsky who posited "theories about language, thought and their mediation by society" (Amineh & Asl 2015:10). The basic tenet of this approach is the interaction among students during the process of learning. As Ralenala (2003:69) puts it, the belief that learning is an active process in which students construct new ideas and knowledge based on their experiences lies at the core of constructivism.

Vygotsky further holds that "good instruction could be provided by determining where each child is in his or her development and building on that child's experiences" (Tam 2000:52). This is based on what he terms the Zone of Proximal Development (ZPD) which is indicated by the mental age of their ability to solve problems at a certain level. Yoders (2014:13) refers to this as the difference between what the student can do with assistance and without assistance. Fosnot and Perry (2005:17) hold that the ZPD "varies from child to child and reflects the ability of the learner to understand the logic of the scientific concept".

It can be concluded that cognitive constructivism focuses on the intrapersonal nature of learning while social constructivism focuses on the interpersonal. In Murphy's (1997:8) words, "in constructivism paradigm, learning emphasises the process and not the product". The role of social interaction in the learning process makes it a very complex process because for one, individuals vary in their thoughts and thinking. Secondly, individuals have different experiences that will impact their learning processes differently. Learning, in the constructivist paradigm is therefore, not a linear process. It cannot be predetermined from one point to another. For purposes of this study, social constructivism is preferred as the most applicable theory of learning.

What emerges from the literature about constructivism is that it is a theory of learning not for teaching. Schcolnik *et al* (2006:13) posit that we cannot understand how individuals think without an understanding of the cultural environment in which their thoughts were shaped. This makes the context critical to the success of learning process. It is, therefore, incumbent upon the teacher to have a good conception and comprehension of the learning context. This will allow the teacher to create relevant opportunities for the student to succeed. For this reason, it is important to understand the 4IR as the prevailing learning context of this era and the role of social interaction in learning within this context.

2.4.2 Limitations of constructivism

The theory of constructivism may have provided guidance concerning the process of learning to a certain extent. However, it has not been a panacea for all problems and challenges encountered during learning. Scientific developments in the learning environment have rendered the theory of constructivism inadequate in describing human behaviour during the learning process. This is primarily owing to the different backgrounds that the students come from and the variety of experiences that they bring to the learning context. It would be challenging for a teacher to accommodate these varieties in their preparation. The ever-evolving technological environment exacerbates this challenge for the relevance of the theory of constructivism.

Another shortcoming of constructivism arises from the varied perspectives on the subject. As Olusegun (2015:66) puts it, "Constructivism is embodied in numerous ways and these different views share important overlaps, but also contain major differences". These different views and approaches have a negative impact on the application of constructivism to the explanation of various human activities. Learning and instructional design are two examples of such activities. In the case of instructional design, Lebow (1993:4) contends that it is fundamentally incompatible to constructivism owing to differences in assumptions about the nature of knowledge and its acquisition.

Further criticism of constructivism is presented by Tam (2000:58), who identifies three main criticisms of constructivist instructional approaches from the literature. Firstly, they are too costly to develop. This criticism is based on the need to address the existing knowledge and experiences of different students within a single learning context. Secondly, they require technology to implement. This may have been a disadvantage over two decades ago. However, technological advancements have in recent years, improved the way in which lives are conducted and how learning is undertaken. As a result, this criticism may have lost its credibility. The third criticism is that constructivist instructional approaches are very difficult to evaluate. This may arise from the notion that in constructivism, "the learner's errors are seen in a

positive light and as a means of gaining insight into how they are organising their experiential world" (Murphy 1997:8). Essentially, the students are given free rein in knowledge development, acquisition and creation because constructivism does not provide a method, approach or particular pedagogy (Murphy 1997:13).

From the description of constructivism and the criticisms advanced against it, it is clear that "becoming a constructivist teacher may prove a difficult transformation" (Hanley 1994:3) since most teachers continue to be prepared for the traditional objectivist classroom.

2.4.3 Relevance of constructivism to the study

Constructivism, as a learning theory is relevant to this study, firstly owing to its focus on instructional design, which includes planning of learning for ultimate success. The prevailing environment of the 21st century, with the heightened use of technology for learning makes it more imperative to apply the constructivist approach. Even though constructivism as a learning theory developed many decades ago, it still has relevance to the current context. Research supports constructivism as a good fit for e-learning because it ensures learning among learners (Koohang, Smith, Riley & Schreurs 2009:91). This is attributed to its focus on knowledge construction based on the current and previous experiences of the student. Therefore, if the teacher or instructional designer is adequately empowered to work as a constructivist, the student will be exposed to an enriching learning environment particularly with the use of technology. In the same vein, Tam (2000:57) concur that computer-mediated communication, transforms the teaching and learning styles of both instructors and students from information dissemination to critical inquiry and from instructor-dominated to collaborative learning. Schcolnik *et al* (2006:13) presented three principles from constructivism which were intended to guide teachers during the instructional design phase. Firstly, the learning materials should allow students to inductively build their own knowledge. Secondly, they should include activities that that will encourage the students to communicate and exchange ideas. Lastly, and most importantly, they should endeavour to view the students' work from the

perspective of the learner with the understanding that their own perspective might not be similar to that of the student.

There is, furthermore, a connection between constructivism and the chaos theory, adding to its relevance to this study. According to Amineh and Asl (2015:10), "Piaget explains that when learners encounter a situation or an experience that challenges the way they think, a state of equilibrium or imbalance is created. The learner must then alter his/her thinking to restore the balance of equilibrium". The need to maintain stability and equilibrium within a system has already been mentioned as an element of the chaos theory. Schcolnik *et al* (2006:14) elaborate on this connection between the chaos theory and constructivism by advising that "if, as Piaget claims, learning results from a need to return to equilibrium after disturbance to a system, teachers need to create a learning environment that leads students to disturbance and then provide resources through which the student can resolve the disturbance and return to equilibrium". It is, therefore, imperative for the teacher within the constructivist paradigm to facilitate learning by ensuring that it maintains an equilibrium within the student's mind and thoughts. In Olusegun's (2015:69) words, the teacher should create an environment that will incite active participation by leaners and enable them to make connections between their existing knowledge, new knowledge and the process involved in learning. This is the basic tenet of social constructivism.

Learning theories have given rise to the development of various instructional design models. Of relevance to this study is the ADDIE model which derives its name from the five activities involved in instructional design, namely analyse, design, develop, implement, and evaluate. The ADDIE model is based on the principles of social constructivism, particularly the role of interaction among student for successful learning. The instructional design approach applied at Unisa; the FTA is based on the ADDIE model. It emphasises the importance of social interaction among students.

2.5 Application of the theories to this study

While the study is premised within the context of the 4IR, which is essentially a networked environment, the temptation to apply the theory of connectivism on its own should be avoided. In Bell's (2011:112) words, "connectivism alone is insufficient as a theory to inform learning and its technology-enabled support in an interconnected world". To address this concern, the study is based on an eclectic combination of elements of the aforementioned three theories.

The basis of this study on the three theories of chaos, constructivism and connectivism arises from the researcher's epistemological and ontological views about learning and instructional design. There is a common thread that binds together the three theories, making them relevant to this study. It is the element of connectedness and integration which is central to learning according to the three theories. In Siemens' (2004:5) words, "chaos as a science recognizes the connection of everything to everything". The element of connectedness in constructivism is demonstrated by the importance of social interaction. Accordingly, Fosnot and Perry (2005:27) state that "dialogue within a community engenders further thinking". The community in the education setting is the students.

In the connectivist theory, the connections are observed by Siemens (2004:5), who posits that "connectivism is the integration of principles explored by chaos, network, and complexity and self-organization theories". This view is supported by Strong and Hutchins (2009:54), who also concur that connectivism integrates principles explored by chaos, network, complexity, and self-organisation theories into a coherent learning theory for the digital age. The interconnectedness of these theories is supported by Kropf (2013:21) who holds that "connectivism can also be part behaviourist, part cognitive and part constructivist learning theory".

The prevailing technological environment requires the adoption of a combination of theories owing to its rapid advancements which cause a state of chaos particularly in learning environments. In Siemens' view, "chaos is a new reality for knowledge

workers" (2004:4). To function effectively in this environment of chaos, Strong and Hutchins (2009:59) propose that connectivism is best placed as a theory "to provide a platform for adapting teaching/training and learning to meet the needs and demands of the 21st century world of growing information complexity". Furthermore, Almala (2006:39) asserts that constructivism is a plausible theory for e-learning because it meets the demands of the principles of quality e-learning.

Instructional design within the 4IR context is the central focus of this study. The current instructional design approach applied at Unisa is based on the ADDIE model which was conceptualised by the Florida State University in 1975 for the United States of America Army. This model is based on the principles of the theory of constructivism, particularly the importance of social interaction with students during the analysis phase and among students during the implementation phase. This element of social interaction together with the need for students to collaborate as the constructivist theory proposes, also provides a direct link to the elements of connectivism mainly, network nodes, distributed knowledge and the use of technology for learning.

For purposes of this study, another direct link is made between these two theories, i.e., constructivism and connectivism in the light of the chaos theory. The three identified elements of the chaos theory, i.e., unpredictability, non-linearity and sensitivity to initial conditions are applicable to instructional design in the prevailing context of ever-advancing technology. The changing technological environment makes it challenging for instructional designers to predict the outcomes of the learning interventions. This is firstly owing to the non-linearity of the design, development and implementation phases of the process and secondly, owing to the possible shift in outcomes that may result from changes in the initial conditions of the process.

According to the chaos theory, small disruptions in the system can result in unpredictable outcomes. The 2019 outbreak of the COVID-19 that became a

pandemic in 2020 is a classic example. It started off as a result of a small event in one part of the world but had widespread implications for many aspects of life globally. The COVID-19 pandemic was not predicted – yet it disrupted the world. Unisa as an ODeL institution did not escape the impact of the pandemic. The delivery of learning materials, the assessment processes as well as general communication with students had to be adjusted to the lockdown environment that resulted from the pandemic. This adjustment rendered the instructional design processes of the university futile and irrelevant.

Instructional design may benefit from a theoretical framework which requires a rethinking of the designers' epistemological perspective, enabling them to design learning experiences which are appropriate to the current 4IR environment characterised dynamism. A chaos theoretical framework can improve the way instructional designers address issues related to sensitivity to initial conditions, predictability of outcomes and non-linearity in their modelling of instructional design processes.

The integration of the theories (chaos theory, connectivism and constructivism) described above is depicted in Figure 2.2, which serves as the theoretical framework for this study ultimately.

4IR

Networked environment

Instructional Design

Connectedness and integration

Constructivism
• Social Interaction
• Collaboration

Chaos theory
• Unpredictability
• Non-linearity
• Sensitivity to initial conditions

Connectivism
• Use of technology
• Network modes
• Distributed knowledge
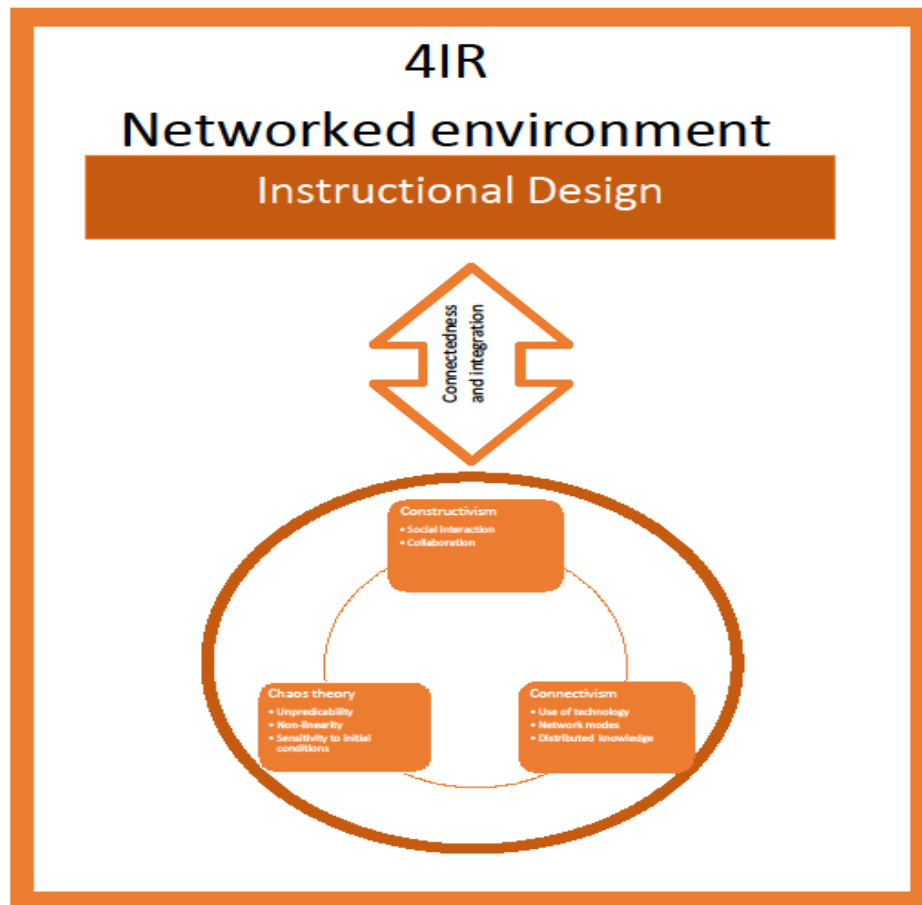
Figure 2.2: Theoretical framework for the study

2.6 Conclusion

This chapter outlined the theories that frame the researcher's thinking in the approach to this study. The discussion focused on the chaos theory, connectivism as well as constructivism as the basis for the study. The relevance of the chaos theory to this study derives from the dynamism that characterises learning environments of the 21st century. It provides a lens through which this change can

be viewed and analysed. The notion by Crandall, Crandall and Parnell (2013:51) that the behaviour of a chaotic system cannot be predicted over an extended period is central to the selection of the chaos theory for this study. To this end the researcher adopts two other theories of constructivism and connectivism to help shape the study.

The applicability of constructivism to this study is succinctly summarised by Phillips (1995:8), who postulates that "constructivism deserves praise for bringing epistemological issues to the fore in the discussion of learning and the curriculum" owing to the focus of this study on these very important areas in the form of instructional design. In the same vein, Almala (2006:39) concurs that constructivism can provide the necessary theoretical support to implement quality e-learning courses and programmes. This reference to e-learning programmes provides the link to the theory of connectivism.

The relevance of connectivism is supported by Duke *et al* (2013:9) who indicate its importance as an instructional guide or theory to develop previous learning theories for their application to a globalised and networked world, but not as a standalone theory. The chapter closed off by providing an integrated view of the application of these three theories to the current study. In the following chapter, a study of the relevant literature is provided.

CHAPTER 3

3. INSTRUCTIONAL DESIGN (ID) AND THE FOURTH INDUSTRIAL REVOLUTION (4IR)

3.1 Introduction

This chapter reviews literature relevant to the study from which the researcher provides a basis for the empirical study which follows later. Therefore, it is necessary to conduct a review that provides a background to and guides the research. Several studies on how to conduct a literature review have seen the light (Badger, Nursten, Williams & Woodward 2000; Torraco 2005; Boote & Beile 2005; Randolph 2009; Byrne, Keary & Lawton 2012; Templier & Paré 2015; Jahan, Naveed, Zeshan & Tahir 2016). From these publications, various approaches on how to conduct a literature review have been postulated, giving rise to different types and forms of the literature review.

In the light of the foregoing, Templier and Paré (2015:117) list four types of literature reviews: narrative, developmental, cumulative, and aggregative reviews. Randolph (2009:8), on the other hand, holds that literature reviews could be structured along either historical, conceptual, or methodological delineations. Some researchers such as Badger, Nursten, Williams and Woodward (2000) propose a systematic approach to literature review. An additional approach, the integrative literature review, is presented by Torraco (2005:356), who describes it as "a form of research that reviews, critiques and synthesises representative literature on a topic in an integrated way". He further purports that literature reviews address either mature or emerging topics. Where the review focuses on a mature topic, the intention is to critique the vast array of publications available on that topic. On the other hand, a review of an emerging topic may lead to an initial or preliminary conceptualisation of that topic (Torraco 2005:357).

This study adopts the integrative approach to literature review. It presents what is already known about the central elements of the topic and highlights the issues arising from such studies. To this effect, the review focuses on the literature about instructional design (ID), the 4IR and the concept of responsiveness as these are the central concepts of the study while remaining within the set theoretical framework. The integrative approach is preferred for its accommodation of both mature topics and emerging ones. ID is considered a mature topic owing to the term of its existence and the extensive research already conducted around it. The other two concepts, i.e. 4IR and responsiveness, are relatively new and therefore, considered as emerging topics. The integrative approach is, therefore, suitable for this study to allow the researcher to cover both the mature topic and the emerging ones.

3.2 Instructional design (ID)

The concept ID is introduced in Chapter One of this study. However, this concept was not discussed extensively there, hence, this section provides an in-depth discussion of ID. To fully understand the concept of ID, it is important to unscramble it by defining its two elements, which are 'instruction' and 'design''. This is followed by a brief historical background to the concept and practice of ID. The discussion also touches on related concepts such as principles of ID, the role of instructional designers and ID models. The final sub-section provides a link to the purpose of the study through a discussion of ID processes at Unisa.

3.2.1 Defining ID

The two concepts of instruction and teaching are often used interchangeably. Where a distinction is made, teaching is mostly limited to the school environment whereas instruction is applied to contexts where more practical or applied teaching and learning obtains. To this effect, Smith and Ragan (nd: 2) define instruction as "the intentional facilitation of learning toward identified learning goals". In the same vein, Seel, Lehmann, Blumschein and Podilskiy (2017:7) define instruction as the "act or

process of imparting knowledge or skills to another person". This definition narrows the difference between the two concepts of teaching and instruction.

The word "design" is used often and in many varying ways. Generally, it refers to depicting a plan for the creation of an object or a system (Brown & Green 2018:178). In the educational context, design refers to the planning for the delivery of learning. Seel *et al* (2017:7) define it as "a comprehensive process of forming, composing and modelling that presupposes multiple working steps carried out by several people".

Various authors such as Smith and Ragan (nd), Gustafson and Branch (2002), Branch (2009), Carr-Chellman (2016) have attempted to define the concept ID, yielding different definitions. However, some commonalities are evident among these different definitions. This view is supported by Crawford (2004:413) as follows, "instructional design can be defined through numerous viewpoints, yet the basic tenet of ID is the simplistic explanation revolving around the distinct systematic process through which evolves an instructional product". Remaining with the simplistic definition of the concept, according to Willis (1995:5), ID is "the process of designing instructional materials". This definition, however, lacks adequate detail. Carr-Chellman (2016:3) provides a more detailed definition by stating that ID is the process by which instruction is created for classroom use through a systematic process of setting goals, creating learning objectives, analysing student characteristics, writing tests, selecting materials, developing activities, selecting media, implementing, and revising the lessons.

Another definition is by Gustafson and Branch (2002:17), who present ID as a system of procedures for developing education and training programmes in a consistent and reliable fashion. In contrast, Smith and Ragan (nd:2) define ID as "the systematic and reflective process of translating principles of learning and instructions into plans for instructional materials, activities, information resources, and evaluation". A clearer description is given by Branch (2009:1) as follows, "instructional design centres on individual learning, has immediate and long-range

phases, is systematic, and uses a systems approach about knowledge and human learning". Reiser (2001) also delineates the field of ID by listing its elements as the "analysis of learning and performance problems, and the design, development, implementation, evaluation and management of instructional and non-instructional processes and resources intended to improve learning and performance in a variety of settings".

A few important highlights can be drawn from these definitions, and these appear to have formed the core of the field of ID. Firstly, all definitions provided allude to ID as a system. If the systems theory is applied to ID, then it would suggest that all the elements of the system should function effectively to ensure that the whole system works. Secondly, the definitions indicate that ID is a process or a set of procedures or an approach. This suggests that ID must follow certain steps or procedures for it to succeed. In this case, the determination by the chaos theory that a slight adjustment in the initial conditions affects the whole process becomes relevant. The third common theme among the definitions is the use of media for instructional purposes. Media, in this instance, are technological tools which have advanced considerably in the era of the 4IR. This theme provides a link to the theory of connectivism as discussed in Chapter 2 of this study.

Having presented these various definitions of ID, it can be concluded that ID refers to the process of developing teaching and learning materials towards the achievement of set objectives within a specified context. This definition takes into consideration that the ID context is dynamic and dependent on the broader socio-economic, political and technological environment. The focus of this study is sharpened by this realisation that ID processes must remain responsive to the environment in which they are being applied to achieve the intended outcomes.

A further processing of the definitions provided reveals that the definition of ID can revolve around numerous perspectives. Crawford (2004) lists four of these perspectives as depicted in Figure 3.1.
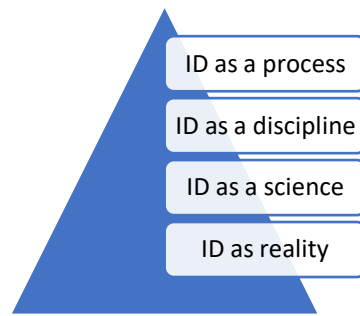
Figure 3.1: Four perspectives of the definition of ID (Adaptation from Crawford 2004:414)

ID, as a process, may be defined as the systematic development of instructional materials following certain specifications and applying learning and instructional theory. ID, as discipline, focuses on the approaches and models applied to the process. ID, as a science, derives from its creation and application of detailed specifications for the development, implementation, evaluation and maintenance of learning experiences for various contexts which could differ based on size, type of content and level of complexity. Lastly, ID, as reality, encompasses a more authentic view of the process, wherein ID can start at any point in the design process. Crawford (2004:414) summarises ID aptly by stating that its focus is the "systematic process through which evolves a superior instructional product".

3.2.2 A brief history of ID

The field of ID spans over several decades. In fact, some researchers such as Reiser (2001), Power (2009) and Carr-Chellman (2016) trace its origin back to the Second World War (WWII) when 18 million members of the military were trained to perform various tasks for the European and South-Pacific countries where they were deployed. According to Reiser (2001:58), a large number of educators and psychologists were called on to conduct research and develop training materials for the military during the WWII. After the war, they continued to work on instructional problems. This historical view is supported by Seel *et al* (2017:13) as follows, "the roots of ID can be traced back to the very beginning of 20th century when systematic

planning of instruction became a scientific topic". The concept was later adopted for use in the higher education sector.

Following the huge demand for military training in the 1940s, the concept of programmed instruction was developed by Skinner in the 1950s. The concept originated from an attempt to distinguish between the science of learning and the art of teaching. Skinner purported that instructional planning should be aligned with the theory of learning, which was behaviourism at that point in time (Seel *et al* 2017:13). The late 1960s saw the development of another concept, the design of instruction by Glaser (1966), which essentially connected the analysis of conditions of learning to the design and development of instruction. Around the same time, Gagné (1965) developed the basis for ID through the publication of the book on the Conditions of Learning.

Another contributor to the origin of ID was Patrick Suppes through research into computer-assisted instruction. This research was conducted in the late 1960s. These were followed by the development of various models of ID which earned the umbrella term – First generation models of ID. The second generation, with focus of the role of technology followed. The main ideal of this generation of ID was the automation of some of the processes using artificial intelligence (AI). This led to the development of the Automated Instructional Design (AID), which was a computer-based approach to ID. Despite the apparent strides having been made through the development of AID, the models based on the idea did not make the desired impact in the field of ID, primarily because they were based on traditional models of instruction as proposed by the theories of behaviourism and cognitivism.

It, therefore, became critical to develop more appropriate models to the prevailing context giving rise to the third generation of ID. It is important to mention that the process of ID is as dynamic as the instructional environment. Consequently, it should evolve on a continuous basis. This points directly to the purpose of this study,

which sought to address the responsiveness of the current ID model to the prevailing 4IR environment.

Figures 3.2 and 3.3 together with Table 3.1 provide a summary of the historical development of ID through the three generations.
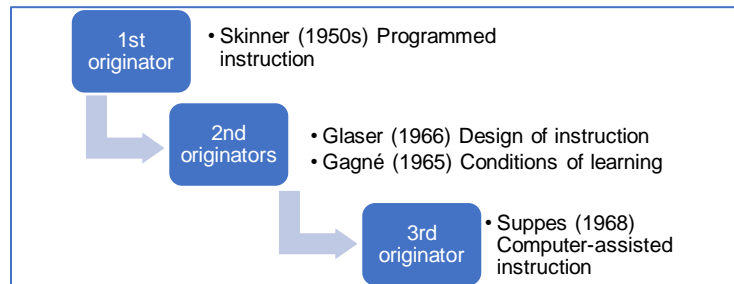
Figure 3.2 First generation of ID
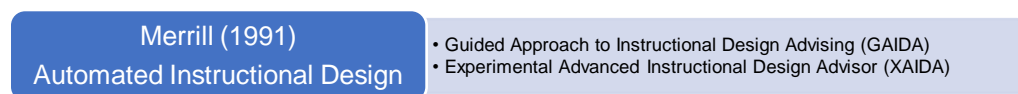
Figure 3.3 Second generation of ID

Table 3.1 Third generation of ID

Proponent/s	Year	Model
Sweller *et al*	(1998)	Cognitive Load Theory
Merriënboer	(1997)	Four-component ID (4CID)
Niegemann *et al*	(2008)	Decision Oriented ID(DO-ID)
Jonassen	(1999)	Constructivist Learning environments
Kourilsky & Wittrock	(1992)	Generative Learning and Teaching
Pellegrino	(2004)	Anchored instruction
Schanck *et al*	(1993-1994)	Goal-based scenarios
Kolodner *et al*	(2004)	Learning by design
Gibbons	(2001)	Model-centred Learning and Instruction
Desrosier	(2011)	Rapid prototyping

The preceding figures and table provide a summary view of the development of the concept of ID with examples of the models applied at each stage of the process. There has been many conceptual developments and innovations in the educational setting that have given rise to a vast array of ID theories and models. However, the summary does not cover all the existing models because these are not the focus of this study. A discussion of the relevant models follows later in this chapter.

3.2.3 Principles of ID

As alluded to in the preceding paragraphs, the practice of ID is systematic and structured according to the expected outcomes of the process. It consists of several clearly defined steps that should be followed. These steps are derived from a set of principles that form the basis for ID. In Seel *et al*'s words (2017:9), ID "contains the whole process of planning – starting from analysis of needs and objectives, along the development of instructional materials until the point of implementation and evaluation of effectiveness". This summarises the whole process of ID. Petrina (2004:90) further highlights that the ID processes are premised on responses to four questions, i.e. For whom is the programme being designed? What do you expect the learners to achieve? How is the subject or skill going to be learned? How will the extent of the success of the learning be determined? These questions essentially provide a basis for the various models of ID that exist, but primarily the ADDIE approach which is discussed in detail later.

Another set of considerations for the practice of ID is presented by Carr-Chellmann (2016:4). Firstly, the instructional designer should know where they are going with the design. This refers to the analysis phase of the process where the learning context is determined, and clear objectives are set. Secondly, the target learner is described. The instructional designer should understand who the learners and their backgrounds are, their motivation to learn and possible impediments to their learning. The next consideration is that instructional designers should be creative with the activities and media that they propose for application. When all these are in place, the designer can draft the content, then test it out on a sample population to

determine its possible success. Where there are indications of gaps, the instructional designer should revise the initial draft accordingly. Carr-Chellmann (2016) further emphasises the principle of alignment as the most important element of ID. Alignment implies that the content, activities, media, and assessment support the set learning objectives. The final important principle that instructional designers should observe is that the process of ID is continuous. It does not end at the point of implementation. The door to the design and development process should remain open owing to various dynamic elements of the design environment such as the target students, and the learning context. These principles are reflected in the various models of ID which will be discussed later. At this juncture, the discussion turns to the role of the instructional designer.

3.2.4 The role of instructional designers

It has already been established that the practice of ID is guided by the learning theory. From the learning theory, various models of ID have been developed. Success in the role of instructional designers is determined, to a large extent, by their application of these learning theories and ID models. A few views on the role of instructional designers are presented. According to Chartier (2020:117), "an ID expert has extensive disciplinary knowledge including learning theory, ID models, as well as keeping up with advances in technology". McGriff (2001:308), on the other hand, describes a skilled instructional designer as "a well-trained professional for assisting faculty members and serving faculty development programs to better utilize innovative instructional methodologies, strategies and techniques". Another description is provided by Ren (2019: 3483), who avers that "instructional designers often serve as learner analysts, instructional innovators, and leaders in educational technology to assist instructors in developing teaching materials". From these selected descriptions, a few common threads can be discerned. Firstly, instructional designers are experts, meaning that they possess extensive knowledge and experience in the field of ID. This means that ID is a highly specialised occupation that requires theoretical knowledge about learning and teaching. Therefore, it places

an obligation on the instructional designers to think thoroughly about their role and the contribution they make to each project they embark undertake.

Secondly, they apply theories, models, techniques, and strategies in their role. This suggests that they should possess a broad and deep understanding of the various learning theories, ID models and teaching strategies available. They should also be able to select appropriate ones for the particular audience and context for which the design in intended. The third and most important point in the context of this study is that instructional designers are expected to keep abreast with technological advances that influence education. To this effect, Dousay (2018:15) confirms that "designers often draw upon personal experience and the wide variety of models, strategies, and theories to customize each instance of ID".

From this discussion, it can be concluded that sound ID helps students to learn more effectively. Ren (2019:3485) concurs that, "IDs often play an important role in providing strategies for delivering information in an effective manner to enhance students' learning outcomes".

Several extensions to the primary role of the instructional designer are proposed. Bates and Poole (2003) describe another role of the instructional designer as being a project manager. This is supported by Kumar and Ritzhaupt (2017:384), who state that instructional designers manage several projects and use various approaches to keep track of their projects. Williams van Rooij (2010:852) holds that in addition to a strong ID knowledge base, instructional designers require project management skills, including the ability to lead a project team, estimate project requirements and develop processes and standards for completion of ID projects. A further supporter is McGriff (2001:311), who advocates for instructional designers to possess supplemental skills such as project management and facilitating change to complement their ID skills. Their backgrounds and experiences, more than any other professional field, qualify them to handle the dynamic nature of change in educational technology and its application to learning processes and teaching

strategies. It is clear that instructional designers are increasingly required to apply principles of project management for effective functioning and fulfilment of their role despite it being a highly specialised skill. This is critical for the instructional designers at Unisa as an ODeL institution if they are to leave up to the technological advancement that drives ID.

A further role of instructional designers is described in detail by Thiessen and Ambrock (2008:269). This new role arises from the use of technology for teaching and learning. They introduce Multimedia Instructional Design Editor (MIDE) whose functions reflect those of an instructional designer in an online teaching and learning context. The tasks outlined for MIDE are essentially to integrate multimedia instructional components into online course materials, apply ID principles and to edit the course materials (Thiessen & Ambrock, 2008:266). This additional role places emphasis on the need for instructional designers to keep abreast with the technological developments that influence teaching and learning. In the same vein, Kumar and Ritzhaupt (2017:388) concur that "knowledge of multimedia development, graphical design and programming is essential" for instructional designers.

It is important to emphasise that instructional designers do not work on projects alone. ID projects are usually completed through a combined effort between several role-players. In many instances, the instructional designer retains the role of the project manager while other participants may consist of the responsible member of faculty, the librarian, language practitioner, graphic designer, and technology expert. Ren (2019:3485) confirms that instructional designers usually work with faculty members to design and develop course materials to solve instructional problems or to meet specific learning objectives and conduct quality assessment. In the words of McGriff (2001:312),

> The instructional designer is one of the best prepared education professionals
> to provide training in the skills that are essential for teaching and learning with

technology, to provide support during the instructional development process and to offer pedagogically sound guidance for the effective integration of media and information technologies.

This explanation covers all the bases of the role of the instructional designer and Figure 3.4 captures the various roles of the instructional designer as discussed in the paragraphs above.
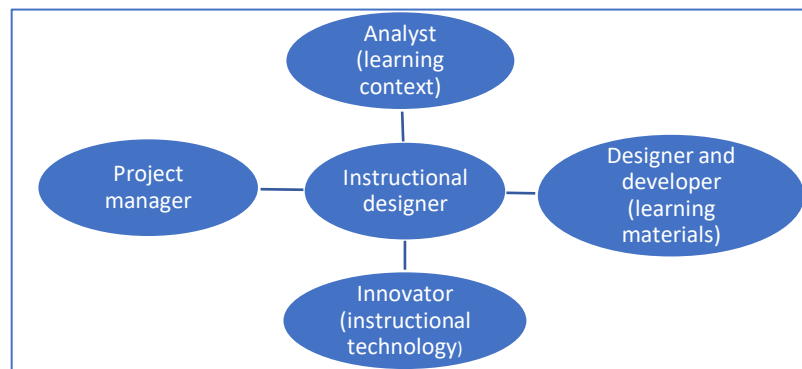
Figure 3.4: Roles of the instructional designer

These various roles require that instructional designers be competent in communication, problem-solving, instructional theory, design, decision-making and most importantly, knowledge of technology (Kumar & Ritzhaupt 2017:372).

The current emphasis on the use of technology in education, particularly in distance education, suggests that instructional designers should keep abreast with technological developments and their innovative application to education. Harrison and DeVries (2019:2) assert that it is the responsibility of the instructional designers and other influential contributors involved in the design and development of distributed learning programmes to challenge and push the boundaries of traditional practices to ensure that higher education remains relevant to the prevailing environment.

Instructional designers usually excel in their role when they adopt a specific approach to their practice. To this end, the following discussion focuses on models and approaches to ID.

3.2.5 ID models

ID is a systematic process which follows set out steps towards the achievement of the final product. Various ID theories and models have been developed over the years owing to the dynamic nature of the educational environment. Some of these ID theories and models are based on the different learning theories that have been postulated. In the words of Mukhopadhyay and Parhar (2001:544), "instructional designers draw upon and incorporate from different learning theories". This sub-section presents a selection of ID models form the extensive number that is available.

The origin of ID models can be traced back to the 1960s when various concepts used in areas such as task analysis, setting of objectives and evaluation were linked together. These compositions gave birth to instructional processes, models and approaches (Reiser 2001:61). According to Bichelmeyer (2004:4), a model is, by definition, a representation that accurately resembles an existing structure. Njenga (2005:33) defines ID models as "a set of instances employing instructional and learning theories and their relationships forming a mind map that helps us in understanding the instructional design process". A more focused definition is by Slagter van Tryon, McDonald and Hirumi (2018:125), who argue that "an instructional design model in its rudimentary form is a tool for designers to logically engage in producing solutions to instructional problems".

ID is approached differently depending on the variety of contexts and environments giving rise to what Slagter van Tryon *et al* (2018:125) refer to as a "plethora of models". They proceed to indicate that these models have led to several schemas that categorise the approaches in different ways to highlight their similarities, differences, or possible applications. According to Gustafson and Branch (1997:10),

"there are literally hundreds of instructional design models in the literature". Therefore, it is not practical to discuss all of them in the context of this study.

In this section a selection of ID models is discussed. The selected consists of the Dick and Carey, the Leshin, Pollock and Reigeluth and the ASSURE models as well as the ADDIE approach.

3.2.5.1 The Dick and Carey Model

The Dick and Carey (D&C) model is based on the behaviourist theory of stimulus and response which suggests that a stimulus should be created first for the learner to respond by learning. Therefore, the design process starts with a needs analysis which in turn informs the identification of goals. These goals are used to develop intended outcomes and are considered as the stimulus for the learner.

The activities and content are also developed as part of the response to the stated stimulus. What distinguishes the D&C model from others is the iterative nature of the process between its four phases of analysis, design, development, and evaluation. Figure 3.5 provides a depiction of the D&C model.
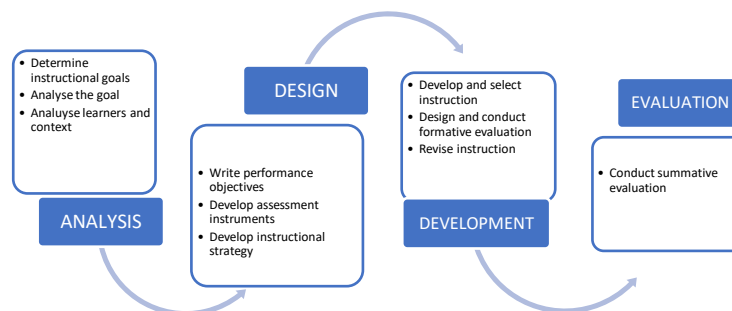
Figure 3.5: The Dick and Carey Model

According to Njenga (2005:40), the D&C model is "one of the better-known ID models and is used by educators, trainers, and instructional designers". Following this model, the instructional designer will first determine the instructional goal, then

analyse the goal, the learners and the learning context. The second phase consists of the writing of performance objectives, development of instructional strategy and assessment instruments. This is followed by the selection and development of instruction, design of and implementation of formative assessment to inform the revision of the instruction before the summative assessment can be conducted. One identified shortcoming of the D&C model is that behaviour is not always predictable. Therefore, students may not always respond in the expected manner. This may impact negatively on the instructional plan in place.

3.2.5.2 The Leshin, Pollock and Reigeluth Model

This model consists of four (4) broad headings, which are needs analysis, selection and sequencing of content, lesson development and evaluation of the instruction. The four headings are further unpacked into seven steps. What distinguishes this model from others is its attempt to address the exclusion of guidance for the selection and use of instructional strategies which may be viewed as a shortcoming of others. The model emphasises the need to pay attention to the psychological components of ID. Figure 3.6 provides a representation of the steps comprising the Leshin, Pollock and Reigeluth Model.
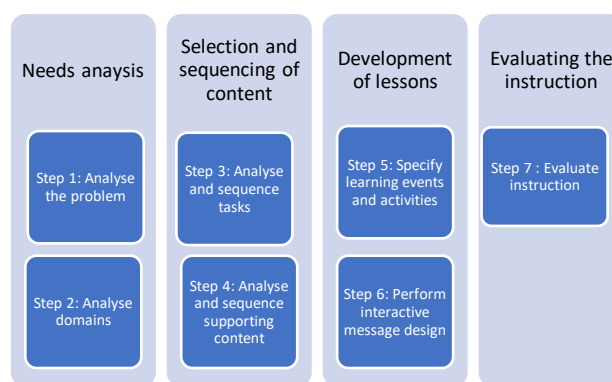
Figure 3.6: The Leshin, Pollock and Reigeluth Model

3.2.5.3 The ASSURE model

The ASSURE model based on the six steps of instruction was developed by Heinich, Molenda, Russell and Smaldino (2002). The six steps are analysis of learners, statement of objectives, selection of instructional methods, media and materials, utilisation of media and materials, learner participation, and evaluation and revision (Gustafson & Branch, 1997:41). ASSURE is therefore an acronym summarising these six steps. This model also emphasises the need to understand the target group as the departure point for the development of appropriate learning materials. The second step in the ASSURE model is the statement of objectives in specific and measurable terms to guide the development of learning material and the assessment. This is followed by the selection of methods, media and materials that will be used for instruction. Materials may either be developed from scratch or existing materials may be adapted, if available, to fit the current learning context.

Utilising the materials is the next step in this model. Here the designer plans how the materials will be implemented. The requirement of active learner participation is emphasised in the next step. The final step consists of evaluation and review. Here the performance of the learners is measured against the stated objectives and the effectiveness of the design is also assessed. Where the need arises, a review is conducted for further implementation. Here follows a summary of this model in Figure 3.7.

Analyse learners → **State objectives** → **Select methods, media and materials** → **Utilise media and materials** → **Require learner participation** → **Evaluate and revise**
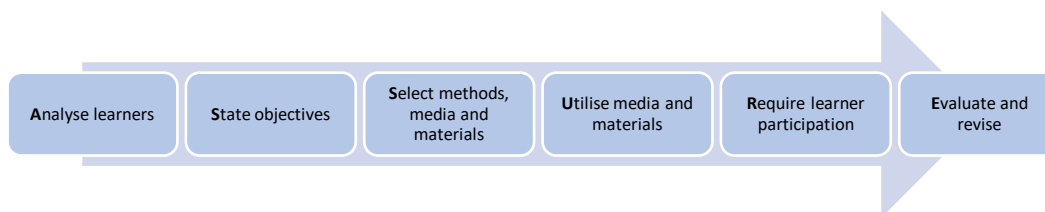
Figure 3.7: The ASSURE Model

3.2.5.4 The ADDIE Approach

The origin of the ADDIE approach can be traced back to 1975 when the Florida State University designed it for the United States of America (USA) Army. There is general consensus among some researchers that the ADDIE is the foundational framework

for many ID models (Bichelmeyer 2004; Chen 2011; Seel *et al* 2017). Chen (2011: 81) estimates that there are about 100 ID models in existence but goes on to state that the ADDIE approach is the basis for all of them. This view is also supported by Nishé, Farrell, Brunton and Costello (2022:34) who highlight that ID "has since evolved with many different models now in existence, the most referenced being the ADDIE model". Caplan and Graham (2008:258) also assert that "while there are hundreds of ID models, certain generic processes emerge from their common features", which are characteristic of the ADDIE approach.

According to Bichelmeyer (2004:5), "ADDIE is a colloquial term used to describe a systematic approach to instructional design". This approach consists of the five steps, i.e. analyse, design, develop, implement and evaluate which form the acronym ADDIE. Most recently, Charbonneau-Goody and Galdames (2021:82) have also added to this notion by stating that the "five conceptual phases of ADDIE are often used to guide the design process and ensure program quality". In Seel *et al*'s view, ADDIE can be considered as an umbrella term because virtually all models of ID correspond with its steps. Bichelmeyer (2004:3) contends that ADDIE can also be regarded as a conceptual framework for ID, or a mental frame of reference that loosely guides instructional designers towards the resolution of ID problems in a systematic way.

It is important to note that the steps of ADDIE as represented by the acronym should be applied as prescribed. This means that all ID projects should begin with an analysis of the context and the learners. The analysis can also be extended to the resources that are available. The next step should be the design which culminates in the statement of expected outcomes. Thereafter, the development of the learning material takes place consisting of content, activities, materials, media, and assessment procedures. This is followed by the implementation of the developed materials. The final step of the ADDIE approach is evaluation. This step consists of an evaluation exercise to determine the success of the ID process. Depending on the outcome of the evaluation, a review may or may not be necessary. This means

that the ADDIE approach makes for continuous iterations intended to improve the instruction to make it effective. Figure 3.8 depicts a summary of the ADDIE approach.
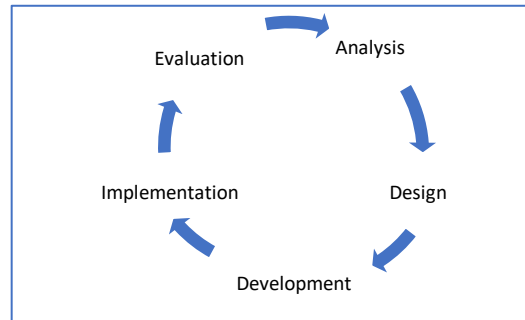
Figure 3.8: Summary of the ADDIE approach

Although the ADDIE approach has received recognition as the basis for many other models, it has its shortcomings particularly pertaining to its application to a virtual or online environment. The next sub-section discusses the weaknesses and shortcomings of current models including the ADDIE approach.

3.2.6 Shortcomings of the current ID models

The general view among researchers is that literature on the theories and models of ID does not adequately cover the existing technologically driven learning environments (Soto 2013; Debattista 2018; Halili 2019; Mehmet 2021; Nishé *et al* 2022). The reviewed literature indicates the existence of a gap in the ID practice where the current models and approaches do not adequately provide for ID in the 4IR context. Soto (2013: 365) holds, for instance, that literature on the current ID theories and models overlooks the ways in which ID models are being used to develop instruction in virtual world environments. The criticisms against the current ID models and approaches are, therefore, explored further.

Firstly, there is a view that traditional ID models using the ADDIE cycle provide little guidance for designing both the cognitive and social aspects of the technology-based learning environments (Gunawardena, Jennings, Ortegano-layne, *et al*

2004:42). Therefore, there is a pressing need to develop new design models that focus on combining the cognitive, affective and social aspects of online learning environments. Secondly, the traditional ID methodologies often come up short when applied to contemporary online instruction (Soto 2013:364). The latter author maintains that most of the traditional ID theories and ID models are based on outdated approaches to teaching and learning. Therefore, many instructional designers and researchers have suggested changes to respond to the dynamic nature of the online educational environment. An example to this effect is Slagter van Tryon (2018:127), who suggests "that the next generation of instructional designers must also keep abreast of how our understanding of human learning, ID, technology and workplace performance continues to evolve in order to remain competitive in today's ever-changing world".

A strong criticism is also levelled against the rigid format or structure of traditional ID models. Crawford (2004:418) argues, for instance, that the traditional linear nature of ID models does not fully address the complexity associated with ID and the changing 4IR environment. To support this view, Nishé *et al* (2022:34) describe traditional ID models as slow and inflexible owing to waterfall or linear design stages which must be completed step-by-step and one after the other. Soto (2013:368) accentuates that the current ID models tend to be too process-oriented, static and linear, and this makes them inadequate for the virtual world environments which are dynamic in nature. Alonso, López, Manrique and Viñes (2005:218) attribute this shortcoming to what they describe as "a serious dysfunction between the profusion of technological features that are put forward and the shortage or non-existence of teaching principles for e-learning". The responsibility to innovate is therefore, upon instructional designers, who are advised to avoid following these models as rigid templates because that does not allow for the exploration and innovation necessary for the improvement and expansion of ID (Brown & Green 2018:177).

Further support for the criticism of ID models arises from Jung's (2019:6) reference to the open distance education context, as complex, making it necessary to adopt

systemic and systematic approaches to ID, course development and implementation, assessment and revisions. Jung (2019:6), therefore, advises that the changes taking place in the teaching and learning environments require that the ID theory be revisited and updated for recent open, online and mobile learning environments. However, ID models must be applied according to the specific context of teaching and learning to produce the desired outcomes. This is also supported by Branch and Stefaniak (2019:86), who state that "ID models work best when they are matched to a corresponding learning context". The relevant context in this case is the technologically driven 4IR which is discussed in more detail later in this chapter.

Seeing that the ADDIE approach is considered as the foundation for many ID models, it also has its shortcomings regarding the online educational environments. In Bichelmeyer's (2004:4) words, "chief among these criticisms is that the ADDIE model is ineffective and inefficient, meaning that it does not necessarily lead to the best instructional solutions, nor does it provide solutions in a timely or efficient manner". Another criticism of the ADDIE approach is that it is costly and does not take advantage of the digital technologies that allow for less linear approaches to ID such as rapid prototyping. Seel *et al* (2017: 74) add that ADDIE is not sufficiently iterative to correspond with the demands of complex problems because it operates with a more or less rigid sequence of planning steps that might be appropriate only for static contexts. They also contend that ADDIE allows limited accommodation to faults or spontaneous ideas in the course of planning.

Soto (2013: 364) concludes that a "different approach to ID is needed to guide the development of learning activities that engage learners to cooperate, discuss and reflect upon their learning within a virtual world environment". This contention supports the intention of this study with the view that current models may not be adequate for the existing technologically advanced environment, which is characterised as the 4IR, because the FTA applied at Unisa is primarily based on the ADDIE approach. Here follows a brief outline of the what the FTA entails.

3.2.7 A brief glance at Unisa's ID processes

As Unisa developed over the 150 years of its existence, it also passed through various stages in terms of the mode of delivery of courses to students. To keep abreast with technological advances, Unisa has been on a trajectory of development towards full openness and online teaching and learning for two reasons as outlined by Lee (2019:27) as follows: "open education, open courses and open resources have gained popularity in the public domain". Secondly, open universities no longer need to fight for recognition and justification of their existence since their status has changed to normal, HE institutions (Lee 2019:27).

The learning theory has over the years provided insights into the manner in which learning occurs. It has consequently influenced the way in which instruction is designed for optimum results. Unisa has an approved policy on tuition which is based on its vision: "Towards the African University shaping futures in service of humanity". This Tuition Policy further informs the framework within which the curriculum is designed at Unisa – the FTA introduced in Chapter 1 of this study. It outlines in detail the steps to be followed in the design process of both programmes and individual modules. It also lists the various participants who should play a role at each step of the process. The design and development processes include four distinct steps according to the FTA. The first step is programme design, which consists of activities such as the development of the purpose of the programme, stating the intended outcomes and the outlining the structure of the programme. The second step is curriculum planning of modules which implies making decisions about the content of each module in the programme and ensuring that the modules are aligned and connected. Other decisions taken at this step include assessment and moderation strategies.

Step three of the FTA consists of the learning design where participants ensure that a rich environment for active learning is created. This is done through the introduction of a variety of resources that will be used to facilitate learning and to provide student support which is very necessary in distance learning. It is at this step

where the inclusion of electronic resources and other materials is considered. The relevant selections are then made in preparation for the development phase. The final step consists of learning development which includes the generation of experiences coupled with the production of any additional material that students will receive in their learning packages. This step incorporates consultation with other stakeholders on the draft materials such as senior colleagues and critical readers.

The FTA incorporates elements from various ID models, notably the statement of outcomes, the selection of media and methods as well as the assessment of learning. Of importance regarding the role players is the function of the instructional designers or education consultants as they are named at Unisa. The FTA identifies this group of role players as project managers in the programme and module design and development. This makes the instructional designers the central role players in the design and development process. The instructional designers were the primary participants in this study. Another set of role-players who are important to note are the electronic originators (EOs), whose role is to design the layout of the content on the learning management system (LMS). The EOs do not necessarily have any pedagogical knowledge nor experience. They usually have a technical background and knowledge of the Unisa LMS. They also formed part of the participants in this study.

The FTA has already been reviewed once since its inception after feedback was provided by various stakeholders in the institution particularly those who were directly involved in its implementation. My personal view on the FTA is that it is a useful guideline, especially in relation to all the necessary role-players in the curriculum and learning design processes. The one element which does compromise the successful implementation of the FTA is time. In its current format, the FTA requires a period no less than a year and a half for the successful design and development of a single module. This is not always possible, and modules tend to be designed, developed or reviewed within eight months.

The FTA was first approved for use in 2007, well before the advent of the 4IR. Therefore, it does not mention the important role that technology has come to play in the delivery of content. It also does not go into any detail about the use of the LMS. This suggests that it could be inadequate to provide guidance for the ID process in the prevailing era. Another observable characteristic of the FTA is that it outlines the steps and the role-players in the ID process in precise, logical and almost clinical terms, making it align with industrial processes.

3.3 ID as an industrial activity

The 4IR has necessitated Unisa to respond to the advancements of technology in teaching and learning by revamping its course offerings and mode of delivery from print to electronic format. To explain this further, an historical background of Unisa is provided within the contextual framework of industrialisation as supported by Peters (2010:11) thus, "it is important to distinguish historical periods of industrialization as each of them influenced and even marked distance education in specific ways". Peters (2007) describes teaching and learning at a distance as an industrial activity. In his words, cited by Bernath and Vidal (2007:434), he explains his view as follows:

> After studying the teaching and learning at correspondence schools, correspondence colleges, at UNISA, at European and U.S. universities, and at universities of the former Soviet Union, I found that all of them had something in common: their teaching and learning are highly 'industrialized'.

Peters (2007) uses four main characteristics of the industrialised system to compare the two activities, i.e., industrialisation and distance education. The first characteristic that he identifies is the concept of division of labour as applicable to both contexts. In industry, the production line consists of various role-players who each contribute towards the final product. The concept is also applicable to distance education where various activities are undertaken towards the implementation of effective teaching and learning. These activities would be undertaken by the various

role-players such as academic staff members, instructional designers, technology specialists, graphic artists, language editors, librarians, and many others. This characteristic is applicable to Unisa where various role-players participate in the enterprise of distance education in general and ID in particular.

Ehmann examined the characteristics of distance education as identified by Peters (2007) and concluded that the concept of division of labour is the most important element of distance education development and asserts that no distance education institution can "do without the co-operation of all those involved" (Ehmann 1981:233). However, to delineate the concept of labour further, Moore and Kearsley (2012) use the systems approach. They present distance education as a system consisting of various components that also make up sub-systems. These components are learning, teaching, communication, design and management (Moore & Kearsley 2012:9). Each of these components consists of its own parts which together combine into a sub-system. Of relevance to this study is the ID sub-system with its components and processes. The sub-system enlists the participation of various role-players such as the academic staff, instructional designers, librarians, language editors, administrators, graphic designers, electronic originators, critical readers, students, and many others. The second characteristic used to compare the two is regularisation. This stems from the consecutive arrangement that the activities must follow. In industry, some activities along the production line can only happen after others have been concluded. This, in Peters' (2007) view, is also applicable to education where the various activities from curriculum and learning development through evaluation of learning are also sequenced. Regularisation also plays out in the ID process at Unisa. The institution applies the FTA which details the process flow for ID that reflects Peters' characteristic of regularisation.

The third characteristic is the rationalisation of activities in both industry and distance education. The careful analysis of each activity, including the amount of time and resources to be spent on each activity, applies in both contexts. This is also included in the FTA that it applied at Unisa. The framework provides guidelines in respect of

the activities involved in the design process. The instructional designer, as the project manager allocates time and resources to each activity. The final characteristic is the application of technology to make the process efficient and effective. In industry, this is of utmost importance to find the most profitable way to produce goods and services. This would be applicable to distance education as well to utilise technology to increase the possible success of the education project. This characteristic does apply at Unisa where some of the activities are conducted digitally, for instance, the transmission of the learning material among the various role-players is done via email. The effective use of technology in the ID process forms the basis of this study.

The next section provides a broad contextual background to the study in terms of the developments that have impacted education in general and ID in particular, over the years.

3.4 The industrial revolutions in brief

Industrial revolutions have become the determinants of human activity over the years (Peters 2007; Morrar, Arman & Mousa 2017; Xu, David & Kim 2018). Philbeck and Davis (2019:17) describe industrial revolutions as "revolutions in the systems that surround us, step changes in the interplay between humans and technology; transformations that result in new ways of perceiving, acting and being". This sounds like an accurate description considering the extent to which technology impacts lives on a daily basis in many different formats.

According to Avis (2020:2), the first industrial revolution stretched from 1760 to about 1840. This period saw the development of the industrial society resulting from the introduction of machines, the steam engine and railways, therefore, leading to the rise of commercialism. This was owing to the introduction of rail and road traffic as well as postal services. The second industrial revolution was characterised by the further technological developments such as automation of machines and the introduction of robots. This took effect in the late 19th century to early 20th century.

A significant development in this era was the further development of the printing press and the elevation of professional work above manual labour. This era also saw the development of mass production and electrification.

During the third period of industrialisation, further advancement of technology took place through the introduction of networked computers, mobile phones, the internet, and digitisation. This period saw the development of the information society as knowledge became a currency. The 4IR is based on advanced digital manipulations such as AI, three-dimensional (3D) printing, virtual reality, and many other technologies. The distinctive feature of this revolution is the exponential rate at which it is evolving. Xu *et al* (2018:91) identify velocity, scope and systems impact as the features making the 4IR different from the preceding ones, while Morrar *et al* (2017:14) predict that the impact of 4IR "will be more profound, irreversible and much more rapid than the previous three generations".

It is important to note at this point that there are dissenting views about the existence of the 4IR. Moll (2023:2) argues, for instance that "purely at the level of technology, there does not seem to be a case that there is such a phenomenon as a 4IR". The view held is that all the developments are nothing new but "gradual evolutions of technology rooted in the defining technological transformations of the 3IR" (Moll 2023:2). While this argument may gain traction among scientists in future, the position taken in this study is that there is evidence of a new revolution, the 4IR, characterised by the advancement of various technologies and their integration.

Industrial revolutions are ostensibly about technological development, but history has demonstrated that they tend to have a broader socio-economic impact. Philbeck and Davis (2019:19) support this notion as follows:

> Industrial revolutions are more than simply eras wherein new technologies are developed and introduced. They are times of technological change that

have a particular set of characteristics that are connected to and contemporaneous with broader social transformation.

It is of interest to note that Peters (2010) delineates the various stages of industrialisation and how each of these periods impacted on the development of distance education. Figure 3.9 provides a summary of the industrial revolutions.
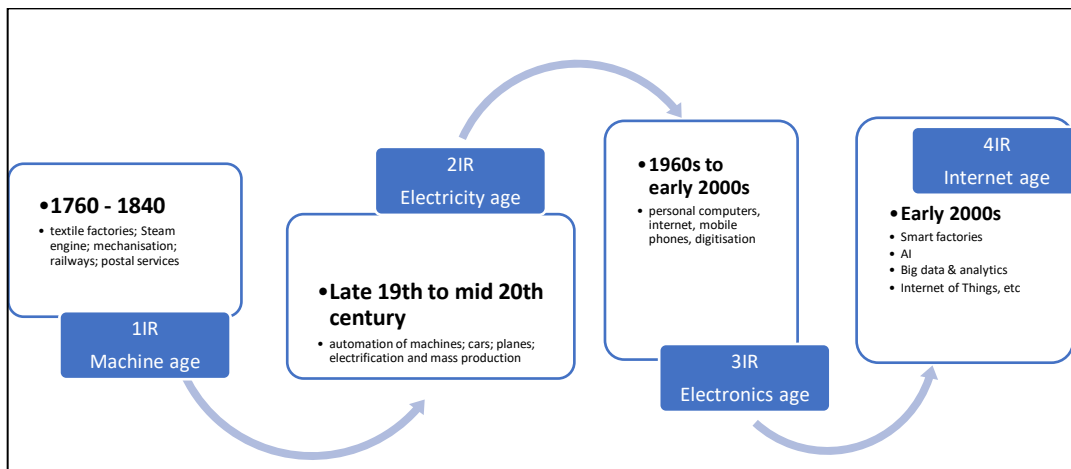
Figure 3.9: The industrial revolutions

It is important to note that distance education was, according to Peters (2010), presented in different formats throughout the first three stages of industrialisation as alluded to in Chapter 1 of this study. The current stage, referred to as the 4IR is no exception. To support this notion, Gleason (2018:3) asserts that higher education is the key player in every revolution.

The common thread running through these periods of distance education as outlined by Peters (2010) is the need for communication between the teacher and the student. Various technologies have been employed to facilitate this communication. As these technologies advance through the various industrial revolutions, the communication process should demonstrate a commensurate pace of advancement too. As previously discussed, this is one of the roles of the instructional designers. It is important to establish how instructional designers perform this role within the 4IR

context using the various affordances that are presented by the technological advancements of this era.

Unisa, as a distance education institution, exhibits the characteristics that align it with Peters' (2007) description as outlined above. It, therefore, fits the description of an industrial institution as described by Peters (2007). The next section provides a review of literature on the 4IR.

3.5 The Fourth Industrial Revolution (4IR)

The world is undergoing vast technological advances, making increased connectivity possible. Higher education is not excluded from this revolution. The current technological development is referred to as Industry 4.0 or the 4IR. Xing, Marwala and Marwala (2018:178) observed four years ago that, "the 4IR is gradually introducing a shift in the way in which production in the economy is conducted". On the contrary, Bongomin, Ocen, Nganyi, Musinguzi and Oman (2020:2) contend that 4IR will leave an impact beyond industry in the social, economic and educational sectors. To understand this impact of 4IR, there is a need to place it within context and to define the concept first.

3.5.1 Background to the 4IR

A revolution is defined as "a complete change in ways of thinking and acting" (Longman Dictionary of Contemporary English 1978). According to Gleason (2018:2), the first industrial revolution emerged in the 1780s with steam power, followed by the development of mass production and electrical energy in the 1870s. "The third industrial revolution emerged with the development of IT and electronics". Gleason (2018:2) contends that "we are now in a new phase where the fusion of several technologies is not only automating production, but also knowledge". The earliest reference to the concept of Industry 4.0 can be traced back to Germany in the early 2000s (Petrillo, De Felice, Cioffi & Zomparelli 2018:1). This was later followed by a publication by Klaus Schwab, founder and chairman of the World Economic Forum, titled "The Fourth Industrial Revolution" in January 2016 (Xu *et al*

2018; Philbeck & Davis 2019). This publication gave credence to the term Fourth Industrial Revolution (4IR), which has since been used to refer to emerging technologies of the 21st century and their impact on human development and interactions. To lay emphasis on the developmental nature of the revolutions, Xu *et al* (2018:91) state that the 4IR builds on the third industrial revolution and is characterised by a "communication and cooperation between physical systems and humans in real time, made possible by the Internet of Things and other related technologies" (Morrar *et al* 2017:13). The 4IR has made strides in various facets of human life, from the economic to the social. Education is also affected by this revolution. This study focuses on the impact of the 4IR on one aspect of education, i.e., ID, which provides strategies for effective teaching and enhancement of students' learning experiences.

3.5.2 Definition and components of the 4IR

A brief reference to the concept of 4IR was made in Chapter 1 under definition of concepts. However, the definition was neither elaborate nor adequately contextualised. This section covers the definition and the components of 4IR as presented in the reviewed literature. It is important to note that there is no conventionally adopted definition of 4IR owing to the extent of its reach and the speed at which it unfolds. In this regard, Philbeck and Davis (2019:19) buttress that it is not important to define 4IR but rather to understand and shape its impact. For purposes of this study, the concept of 4IR is used to refer to the digital revolution that is currently impacting the whole world. According to Schwab (2016:1), 4IR is "characterised by a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres". Additionally, Elayyan (2021:23) defines it as "the vital interaction between humans and machines". However, these definitions are not adequate because they do not describe the technical paradigm of the 4IR. Penprase (2018:215) attempts to unpack 4IR by describing as, "the result of an integration and compounding effects of multiple 'exponential technologies,' such as artificial intelligence (AI), biotechnologies and nanomaterials". Bongomin *et al* (2020:2) add that 4IR refers to "an assemblage of novel technologies and forms of

application" which are disruptive in nature. These technologies include AI, virtual reality, robotics, the Internet of Things (IoT), 3D printing, network security, knowledge work automation, big data and analytics and cloud computing (Yusuf, Walters & Sailin 2020:95). This list of 4IR technologies is by no means complete and final owing to the speed at which technology is currently advancing. For, instance, Rübmann, Lorenz, Gerbet, *et al.* (2015) had a different list of nine pillars of the 4IR technologies. Their list included additive manufacturing and system integration. Figure 3.10 summarises the most common components of 4IR.
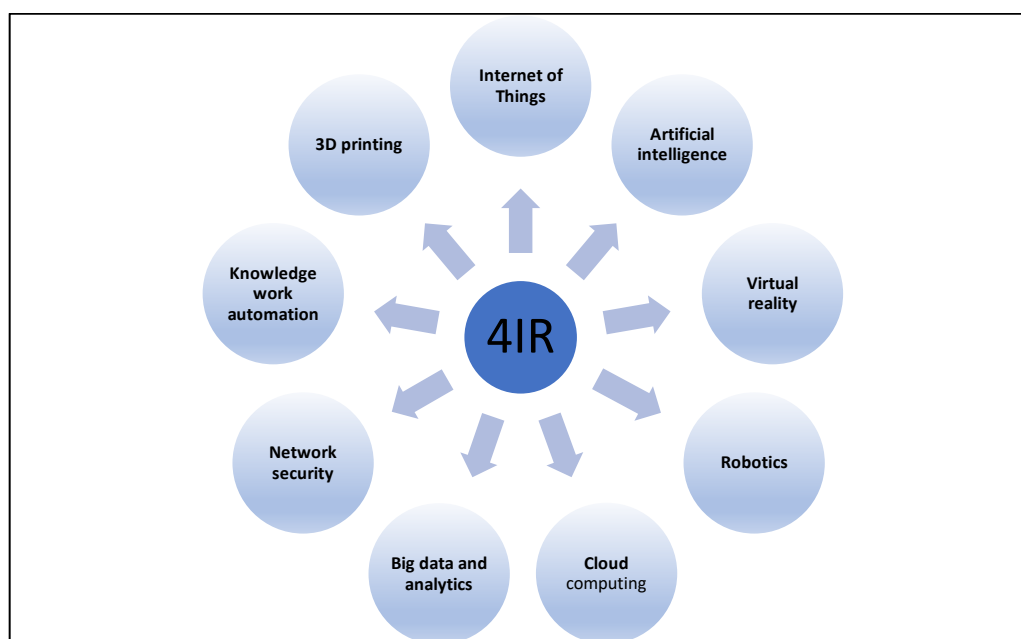
Figure 3.10: Components of the 4IR (Adapted from Yusuf *et al* 2020; Bongomin *et al* 2020)

The IoT facilitates increased interconnectedness among the various products and with humans. In education settings, it helps to establish a rapid interaction and communication between students and teachers and collaboration among students. According to Qureshi, Khan, Raza, Imran, and Ismail (2021:37), the IoT enables a collaborative learning environment, where the academics can select the best learning models and materials for the students. Cloud computing refers to the network used to host large volumes of data collected on the internet (Elayyan

85

2021:23). This technology makes easy access to data possible. Students can access their learning materials from any location. This is an additive advantage for distance education in particular.

Virtual reality is "a computer-generated, three-dimensional visual environment in which users become totally immersed" (Lenarcic 2003:6). It can be used for educational purposes to "help students to gain a deeper engagement as compared to a traditional textbook because it enhances connections between learning concepts and information effectively" (Halili 2019:64). Big data is related to the large collection, processing and analysis of structured and unstructured data with intelligent algorithms (Petrillo *et al* 2018:8). Its main characteristics are volume, velocity, complexity, veracity, value, and variety (Bongomin *et al* 2020:3). In business and industry, the analysis of these massive amounts of data can lead to smarter business decisions and innovative ideas. In higher education, big data enables administrators to maintain student data. Educators can also use it to manage MOOCs (Yusuf *et al* 2020:102). 3D printing is the technology that builds up physical objects using various materials and chemicals. It brings to existence models that could otherwise be viewed on paper only. This technology can help students to have a deeper understanding of their subjects (Halili 2019:64).

Autonomous robots are developed to work with humans or even to replace them in performing some tasks (Bongomin *et al* 2020:5). In industry, robots have been used for many years already to perform mundane, repetitive tasks that were previously performed by humans. The advancement of technology to make robots autonomous has enabled them to perform even more complex tasks. They can work alongside humans or independent of them. Autonomous robots have the ability to perform tasks focusing on safety, flexibility, versatility, and collaboration (Bongomin *et al* 2020:6). AI refers to 4IR products formed by computer science using algorithms and robot-like machines to perform tasks such as visual perception, decision-making and speech recognition (Elayyan 2021:24). When applied to educational settings, it can

improve the student learning experience and accelerate the teaching and learning process (Halili 2019:64).

In simple terms, 4IR refers to the integrated and advanced use of various types and modes of technology to facilitate many activities that were previously conducted manually or through human interaction. Schwab (2016:2) further explains that there are three reasons which make the 4IR a distinct revolution, namely, speed, scope and systems impact. Bongomin *et al* (2020:2) proceed to differentiate between sustaining and disruptive technologies and conclude that a disruptive technology demands new course content, skills and employment. Xu *et al* (2018:93) argue in support that when disruptive innovation makes its way into higher education, it necessitates a redefining of the conventional ways in which universities deliver their modes of learning. Using 4IR technologies in the academic context, therefore, refers to the application and integration of various types and modes of technology to facilitate the teaching and learning processes.

3.5.3 Affordances from the 4IR

The technological advancements of the 4IR are changing life as we have known it to be owing to the fusion of the physical, digital and biological aspects of life. In the words of Suganya (2017:2), "fast changes in physical, digital and biological technologies and generally in the way we work, we learn, and we live, make it a crucial force for economic competitiveness and social development". Oke and Fernandes (2020:2) observe that 4IR is now a buzz word which is gaining traction across different sectors of the economy. As a result, it is attracting increasing attention from policymakers, business practitioners and academics.

In the founding document of the 4IR, Schwab (2016:2) predicted that "the possibilities of billions of people connected by mobile devices with unprecedented processing power, storage capacity and access to knowledge" would be unlimited. These possibilities and affordances range from the social, economic, political, and educational spheres. At a social level, the 4IR affects our identity and all the issues

associated with it. This means that our sense of privacy, our consumption patterns, our notions of ownership, the time we devote to work and leisure, and how we develop our careers, cultivate our skills, meet people, and nurture relationships are all influenced and directed by technology (Schwab 2016:2). To support this notion, Xu *et al* (2018:90) also predicted that the 4IR would affect society and economy in a variety of ways. They proceeded to mention three possible areas where this effect would take place. Firstly, a large portion of people around the world use social media platforms to connect, learn and exchange information. In South Africa, the proliferation of cellular technology to almost all corners of the country is a positive sign for the 4IR. However, this should be accompanied by the introduction of 5G networks. 5G is described as the 5th generation mobile network, which is a new global wireless standard after 1G, 2G, 3G, and 4G networks; it enables a new kind of network designed to connect virtually everyone and everything together including machines, objects and devices (https://www.qualcomm.com/5g/what-is-5g/). Figure 3.11 demonstrates the complexity of the 5G.
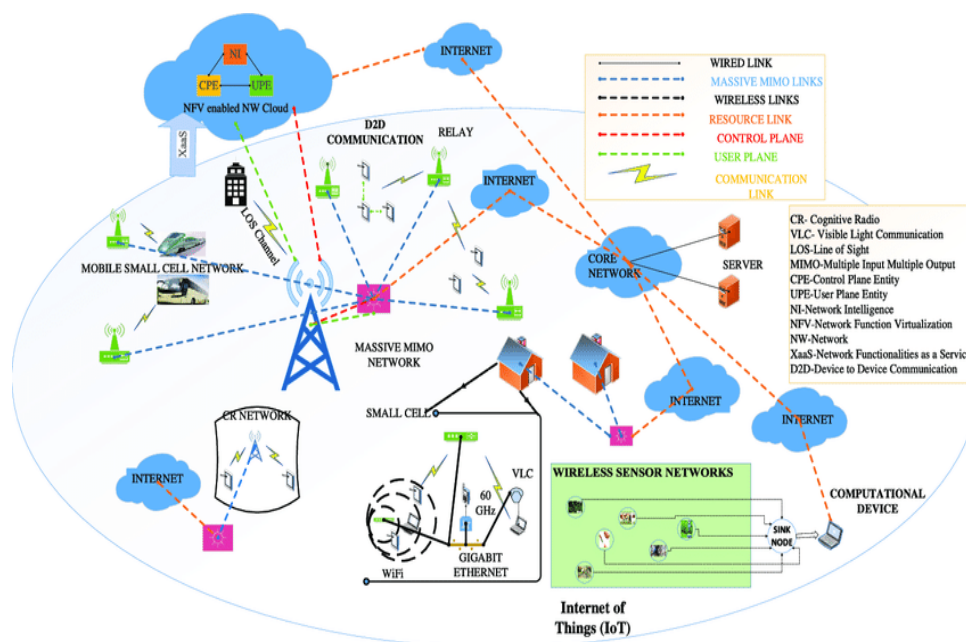
Figure 3.11: An illustration of the 5G
(https://www.bing.com/images/search?q=show+5g+networks+diagram

This process has already begun in urban areas, but it is unfolding at a very slow pace to the rest of South Africa. Secondly, a variety of innovative producers and competitors have easy access to digital platforms. For instance, in South Africa, the production of music has been digitised, allowing consumers to download music directly from the IoT instead of printed devices. Thirdly, consumers are increasingly involved in the production and distribution chains. Advertising agencies, producers and distributors access consumers through various social media channels. When one launches Facebook, for example, many focused advertisements do pop up. This is a result of analytics enabled by digital technologies. Dagada (2021:28) posits in this regard that the use of advanced technologies in South Africa for production, marketing and delivery is rapidly becoming ubiquitous leading to digitisation becoming pervasive in future.

On the economic front, the affordances brought about by the 4IR are limitless. According to Philbeck and Davis (2019:17), 4IR represents a series of significant shifts in the way that the economic, political and social value is being created, exchanged and distributed. It brings incredible opportunities for individuals, industries, and nations. For instance, AI, IoT and cloud computing systems are improved and optimised for application in industry, therefore, improving the economy through technology (Philbeck & Davis 2019:19). Petrillo *et al* (2018:7) narrow down the influence of 4IR technology to cyber-physical systems which enable data generation and acquisition, computation and aggregation of previously acquired data and finally decision support. Sutherland (2020:234) warns, however, that "South Africa is not an obvious location for 4IR, given its economy is still rooted in farming, mining and the informal sector". The country is also burdened with massive levels of unemployment owing to the lack of advanced and even basic technological skills among most of its citizens.

The 4IR technology also has an impact on the political front as observed by Philbeck and Davis (2019:21) who note that 4IR is used as a tool to "drive collective action within and across nation states in a way that results in a more inclusive, fair and prosperous future". The Arab Spring, a series of protests and uprisings in the Middle East that took place from the end of 2010 to 2012, is an example of the application of technology to mobilise the political activity. In South African politics, President Ramaphosa introduced the 4IR as part of his economic policy during his first State of the Nation Address in 2018 (Sutherland 2020:233). This would be accompanied by radical policy reviews to align with this new technological dispensation. Regrettably, there has been more talk than action to date in that regard. The country is in effect still battling to catch up with the second industrial revolution where the supply of electricity is stable and accessible to all citizens. The supply of electricity is erratic with loadshedding a part of life in South Africa. In the words of Maule (2019:1), "the population in SA have still not enjoyed the benefits of the second industrial revolution when it comes to 'the lights staying on'".

The affordances made possible by 4IR are more evidenced in education as indicated by Oke and Fernandes (2020:1) as follows, "there is compelling evidence about the disruptive capability of technology transformation… especially…in facilitating teaching and learning". Technology-enhanced learning liberates teachers from the daunting task of administrative and bureaucratic responsibilities by helping them to automate mundane paperwork. This is possible by employing AI techniques, thereby allowing teachers to concentrate on their main duties, which are teaching, conducting research and mentoring of students (Yusuf *et al* 2020:100). For students, the 4IR technologies provide an opportunity to "choose their education approach and define exactly what they need from courses and knowledge rather than passing through the traditional formal teaching approach, which leads to incremental and radical innovation in the education system" (Morrar *et al* 2017:15).

It is not possible to exhaust all affordances brought about by the 4IR technologies because of the speed at which these technologies advance. Coupled with that

positive development, however, is the possible risks that emerge when adopting these technologies.

3.5.4 Challenges/risks brought about by 4IR

The notion that the 4IR is set to transform the way people live, work and interact with one another has already been alluded to. Despite the many affordances that are made possible by the new technologies, the negative ripple effects on societies, economies and institutions cannot be ignored. These could span from income inequality to cybersecurity and many more (Xu *et al* 2018:94). The most prominent challenge brought about by the 4IR technologies is the risk of cybercrime as a result of heightened connectivity and seamless communication among users. Therefore, "a higher level of alert is raised when our lives become extensively connected to various devices from cell phones to cars to computers, etc" (Xu *et al* 2018:93). The threat of cybercrime manifests in many forms in South Africa, but Dagada (2021:172) identifies two main areas of risks, i.e., information security and banking. In an attempt to curb possible access to private information, Government passed the Protection of Personal Information Act (POPIA) in 2020. The implementation of this POPIA is underway; therefore, it is yet to be seen how it will succeed protecting users against cybercrime.

Another challenge highlighted by Morrar *et al* (2017:13) is the risk of job losses owing to the automation of large segments of operations in many industries using the 4IR technologies such as robots, AI, virtual reality and the IoT. This view is supported by Xu *et al* (2018:93) who posit that "as automation substitutes for labour across the entire economy the net displacement of workers by machines might exacerbate the gap between returns to capital and returns to labour". In the same vein, Morrar (2017:16) concurs that there is increasing possibilities of the substitution of the human role by new technological innovations in the form of artificial intelligence, robotics, drones, virtual reality and the IoT. This possibility could impact developing economies more negatively owing to what Xing *et al* (2018:178) refer to as a subtle force called lag. This is the inability to catch up with technological developments

owing to lack of congruence between the speed at which they develop and the context within which they develop. The risk of job losses is very real in South Africa where a large section of the population lacks the relevant skills to participate in the 4IR environment. This is likely to result in the amplification of current inequalities where the benefits of new technologies only benefit those who are already wealthy (Maule 2019:3), what Sutherland (2020:247) refers to as the 'paradox of plenty', characterised by a richer society with heightened inequalities between individuals and communities.

In education, the challenge is that institutions still battle to catch up with the technological advancements brought about by 4IR. Lodder (2016:1) argues, for instance that, "traditional education is badly equipped to develop dynamic skills in students. Most schools and universities are teaching 20th century education to young people who need cutting edge 21st century skills". Using Prensky's (2001) terminology, the educational institutions use 'digital immigrants' to provide 20th century education to 'digital natives' who exist in the 21st century. This misalignment is what is obtaining in South Africa (SA) as observed by Mennon and Castrillón (2019:6) that, SA "is a hybrid mix, with some sectors in society transitioning between second, third and fourth revolutions". In Chapter 1 of this study, a profile of Unisa students was presented indicating the spread across different geographical areas, age groupings, occupations, language, and technological advancement. This lack of equivalence is a cause for concern because in order to be fully conversant with the 4IR environment institutions do not have "any excuse not to reinvent themselves. It is an obligation. This time changes that are being predicted are 'brutal', almost shocking and with impacts that are very difficult to anticipate" (Neves & Ambassador 2017:1).

The impact of the 4IR on education is far-reaching as alluded to by Oke *et al* (2020:2) as follows: "While digital technology is diffusing at an exponential rate across many sectors, its ethical, pedagogical and epistemological implications, especially in the education sector remain questionable, especially with the topical 4IR". This

revolution requires a rethinking and reconceptualisation of the whole education system. It requires a new set of skills from students and graduates to respond adequately to the demands of the changing socio-economic environment. According to Suganya (2017:1), "this period requires skills such as critical thinking, people management, emotional intelligence, judgement, negotiation, cognitive flexibility as well as knowledge production and management". In addition, Elayyan (2021:24) suggests that educational policies and institutional procedures need to be revised because the educational system is not isolated from 4IR technologies. Mennon and Castrillón (2019:11) note that the current curriculum development dispensation in South Africa is not supportive of the 4IR context firstly because it is still based on outdated Classification of Educational Subject Matter (CESM) categories . Secondly, the approval, accreditation, and registration process for new programmes is long and costly while the 4IR requires quick, flexible and responsive curricula. The following section discusses the impact of the 4IR on education.

3.6 4IR and Education: The birth of Education 4.0

The need for education to respond to the demands of the technologically charged 4IR environment cannot be over-emphasised. This has given rise to the term, Education 4.0 which according to Bonfield, Salter, Longmuir, Benson and Adachi (2020:224) is a nebulous term because it has no standard definition yet. However, it is used to refer to a general approach or trend to preparing a future workforce for industry 4.0 rather than a single or specific intervention. This naming is confirmed by Bongomin *et al* (2020:8), who state that "the advancement, evolution, or revolution in the education system that accommodates industry 4.0 technologies has been coined as Education 4.0". The concept is, therefore, used to refer to all the interventions made in response to the prevailing 4IR environment using the affordances made available by the same environment.

Hussin (2018) identified nine trends of Education 4.0 which are used to frame the discussion that follows. Firstly, in Education 4.0 teaching and learning is not tied to a specific location. It can happen ubiquitously. This is made possible by e-learning

tools afforded by some components of the 4IR such as, IoT, cloud computing and big data. This trend is most applicable to ODL institutions. However, the national lockdowns necessitated by the outbreak of the COVID-19 pandemic led to increased use of e-learning tools by many contact institutions as well, to ensure that the academic project continued under the circumstances that prevailed. It also has direct alignment with the theory of connectivism as discussed in the previous chapter. As described in Chapter 1 of this study, Unisa is in its nature an ODeL institution, therefore, it forms an example of this trend.

The second trend is that learning in Education 4.0 is personalised to individual students. While this is a characteristic of distance learning, it is further entrenched by the use of various technologies to ensure that students succeed in this type of learning environment. This trend is centred in heutagogy as an approach to teaching and learning. According to Miranda, Navarrete, Noguez, *et al.* (2021:4), "through heutagogy, Education 4.0 promotes self-learning based on humanist and constructivist principles". The constructivist theory of learning was discussed in detail in Chapter 2 as part of the theoretical framework for this study. The approach requires continuous self-reflection and metacognition by the student to achieve success. Sharoom and Hussin (2018:317) describe personalisation of education as the changed logic where the system conforms to the student and not the student to the system.

Thirdly, in Education 4.0, students can select their preferred method of learning. They can decide between blended learning, the flipped classroom approach or the Bring your own device (BYOD) approach. Similarly, Salmon (2019:108) concurs that there is a need to optimise the use of digital technology, for communication and engagement as well as efficient and effective teaching and learning. This trend is fuelled by the ubiquity of technological gadgets, particularly the mobile phone among the current generation of students. It is also the trend which separates the students across various countries and environments according to their exposure to technology.

The fourth trend is the application of project-based learning. Owing to the fast-paced changes in the economy, it may no longer be ideal to subject students to four-year qualifications which may become irrelevant at graduation. Education 4.0 requires short project-based courses that a student can apply immediately. Yusuf *et al* (2020:95) note in this regards that "the present-day educational skillset has become increasingly short, requiring the future workforce in our classrooms to update their knowledge and proficiencies to meet the demands of new technologies and industries".

The fifth trend, closely related to the fourth one, is the exposure of students to practical learning through experience. This could take the form of mentoring, internships, collaborative projects, job shadowing, etc. In Education 4.0, this approach will benefit both the students and the employers directly, but it will ensure that students receive the most relevant and up-to-date training for the jobs they will perform. Even though Unisa has some modules which require practical exposure to the work environment, this is not yet adequate for the effective preparation for the 4IR industry because it is structured according to the needs of existing industrial environments. The sixth trend is that, owing to the availability of big data and the IoT, students in Education 4.0 have access to data that they can interpret using their theoretical knowledge. They can then make conclusions and inferences from using these vast amounts of available data without limitations. Similarly, Halili (2019:63) concurs that, "in Education 4.0 information is available ubiquitously and the teaching and learning process has become dynamic".

The seventh trend as identified by Hussin (2018:92), is that the method of assessment will be different from the conventional methods in Education 4.0. This trend is linked to the third one. There is a direct link between the approach to teaching and the assessment. The same level of flexibility applied to teaching in Education 4.0 should be applied to assessment. The suggestion here is that in Education 4.0, it is no longer necessary to assess students through formal venue-

based examinations. Unisa has adopted this approach as accelerated by the outbreak of the COVID-19 pandemic in 2020 where assessment is no longer venue-based.

The eighth trend in Education 4.0 is that students' inputs will be considered in curriculum design and development. This will add a level of relevance, usefulness and contemporariness to the curricula. The last trend is that students will become independent in their own learning. As a result, teachers will take a new role of learning facilitation. The role of collaborative learning will be elevated through what Miranda *et al* (2021:4) name as "peeragogy". "This refers to the set of teaching techniques that promote learning among peers" (Miranda *et al* 2021:4). Collaboration among peers will be made possible by technology through the IoT, cloud computing, drones and more.

These trends point to the important role which digital technologies will play in education and the need for society to prepare adequately for that eventuality. Education 4.0 hinges on cybergogy, which is the teaching and learning strategies promoted by technology (Miranda *et al* 2021:4). Cybergogy is a product of connectivism as discussed in Chapter 2 of this study. It is also starkly evident that there is a need to develop digital competencies throughout all areas of the society, in particular the education sector. Education 4.0 functions on basic digital education for all students, digitally competent educators, learners and employees, digital educational media (Hariharasudan & Kot 2018:1). This lays emphasis on the need for students and teachers to be technologically competent for success with Education 4.0. This requirement brings into sharp focus the diversity among students in terms of their technological advancement and access. The differentiation gives credence to Prensky's (2001) description of digital natives versus digital immigrants. He argues that the 21st century students are predisposed to technology from a very early age making them inhabitants of the digital world and era. The South African situation needs urgent intervention, where there is a shortage of science, technology, engineering and mathematics (STEM) graduates and lack of adequate

systems for re-training of individuals in information and communication technology (ICT) skills (Sutherland 2020:235).

On the contrary, there are still many teachers who are not *au fait* with the various technological applications available, who are referred to as digital immigrants (Prensky 2001). The complexity arises where the education context requires digital immigrants to teach digital natives. The result of this situation is lack of congruence between the two groupings. What Prensky's (2001) description neglects to recognise is that not all students across the world fit the description of digital natives. Kennedy et al (2008) warn against the generalisation that students entering universities in this era are digital natives. They advise that there is a need for "an evidence-based understanding of students' technological experiences" to inform educational policy and practice and the 4IR brings this paradigm shift in educational policies and reforms (Qureshi *et al* 2021:32). This is a serious challenge for educationists because the clientele they are serving is unknown to them. In the Table 3.2, Sharoom and Hussin (2018:318) depict the characteristics of a typical digital community. These characteristics add to the suggestion that the current educational approaches may not be adequate for the digital natives.

Table 3.2: Students and technology (Sharoom & Hussin 2018:318)

0% …? are addicted to the Internet	28% of people aged 10-34 engage in literary reading	90% of children and adults play video games	Students are bored by traditional lectures in classrooms	Females use the internet for social reasons	Males use the internet for video games	manifested 8 seconds of attention span

Education 4.0 provides the relevant environment to cultivate skills for the 4IR. Therefore, students and teachers should be adequately empowered to participate in this technology-based teaching and learning. Hariharasudan and Kot (2018:1) hold that Education 4.0 is a gateway to the 4IR because it aims to improve the digital technological competencies across all levels, and to enhance the use of digital technologies for teaching and learning.

The 4IR environment demands graduates and professionals who are not only knowledgeable in subject content but also have other personal and interpersonal skills as summarised in Figure 3.12.

| Emotional intelligence | Negotiation | Creativity | People management | Judgement and decision-making |
| Service orientation | Complex problem solving | Coordinating with others | Critical thinking | Cognitive flexibility |
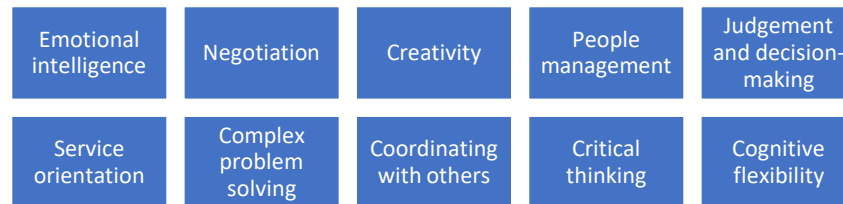
Figure 3.12: Skills for the 4IR graduates (Hussin 2018; Mennon & Castrillón 2019; Himmetoglu, Aydug & Bayrak 2020)

It is the responsibility of higher education to ensure that graduates leave the institutions with these skills for relevance to the 4IR environment. Therefore, this sector needs to develop appropriate strategies to deal with this challenge. ID is one of the areas that require attention in this regard.

3.7 ID for Education 4.0

Having established the demands of 4IR and the nature of Education 4.0, higher education institutions are saddled with the responsibility of designing curricula relevant to this environment. Mennon and Castrillón (2019:7) accentuate that a review of the current curriculum is long overdue for the South African education system. Furthermore, Ng'ambi, Brown, Bozalek, Gachago and Wood (2016) posit that the meaning of 'teaching' and the concept of 'failure' need to be revisited as these are no longer relevant to the current South African educational context. This bolsters the role of instructional designers as discussed earlier in this chapter. Effective ID and development play an important role in the outcome of the instruction. For this reason, it is critical for institutions to invest adequate resources in the ID function. Miranda *et al* (2021:2) note in this regard that there is a lack of information on design methodologies and evaluation mechanisms that allow instructional designers and teachers to use technologies and emerging pedagogy

procedures to provide innovative solutions. So, it is necessary to build reference frameworks to guide designers and the implementation processes. In addition, Bonfield *et al* (2020:224) advise that there is a need to be thoughtful in the application of curriculum design, learning environments and data, and most importantly, place the learner at the heart of any pedagogical intervention.

The task ahead for instructional designers is massive if education is to respond adequately to the demands of the 4IR. Looking at the envisaged type of graduate from Education 4.0 as presented in Table 3.13, it is clear that "learning in the digital age requires rethinking of teaching and learning and not just replicating existing practices with new technology" (Debattista 2018:94). Similarly, Miranda *et al* (2021:5) maintain that in Education 4.0 new learning methods are required to respond to the current need to build a generation of highly competent professionals. To that end, new paradigms are needed to apply current technologies to enhance the learning process.

Mehmet (2021:118) notes that design issues are raised for pedagogical contexts as learning moves from to the digital space. A rapid prototyping model of ID is required. The complicating factor in this era of 4IR is that "instructional design is still concerned with learning theories and strategies. It focuses on content, instructor and learner but may fall short on the virtual learning environment design" (Ngampornchai, Trail-Constant & Swenson 2021:437). Another complicating factor is that teachers are also becoming learners in the process of professional development and engagement with the students (Debattista 2018:94) because the environment is unknown to all participants.

Radical changes need to ensue in the ID milieu resulting in the possible conception of new ID models. The well-known ID approach, ADDIE, which experienced many changes (Mehmet 2021:119) should be reviewed to align with the prevailing digital revolution and the rapid proliferation of global connectivity (Lodder 2016:1) because the fundamental principles of ID are based on the educational paradigms of the era

in which they were created (Soto 2013:365). The FTA as discussed earlier as Unisa's approach to ID, and being based on the ADDIE, also needs to be revisited for alignment with the changed educational context outlined in this chapter. This is explored in Chapter 6 of this study.

3.8 The concept of responsiveness

In Chapter 1 the concept of responsiveness was briefly defined under definition of terms. Responsiveness is mostly situated within four main disciplinary contexts, i.e., business management, education, evaluation, and political science (Bheda 2013:9). A specific definition is provided for the concept within each of these disciplinary fields. Within the field of business and marketing, Homburg, *et al* (2007: 19) define it as "the extent to which a firm responds to market changes, and it results from a firm's proactive interaction with its external environment". They allude to the role of speed as a determinant of responsiveness. Therefore, how fast an organisation responds to the demands of the environment is critical to the description of its responsiveness. Wei and Wang (2011:267) define organisational responsiveness as "a firm-level strategic action" which is necessitated by "increasing competition and constantly evolving customer needs". Responsiveness, therefore, requires an in-depth and intimate understanding of the context. It also requires a high level of agility and flexibility to keep up with fast changing trends within that context.

In the educational context, Bheda (2013:11) notes that responsiveness refers to the "the way in which teaching takes into account the diverse identities of students within the teaching process". While this study is placed within the educational context of Unisa, this definition by Bheda (ibid) is extended in meaning beyond the confines of the student profile and concomitant teaching process.

Verdú and Gómez-Gras (2009) identify flexibility as one of the main determinants of responsiveness. They go on to list four types of flexibility in an organisation where responsiveness can be assessed. The four areas are, firstly, strategic flexibility which refers to the ability of an organisation to adapt to environmental changes. The

second type is structural flexibility which refers to the ability to provide adequate, relevant resources for a changing environment. This type of flexibility is premised within the human and financial resources sections of an organisation. The third type of flexibility is the operational flexibility which is relevant when changes in the environment do not involve a change in the relationship between the organisation and the environment. The fourth type, external flexibility refers to the capacity of an organisation to influence the environment to reduce its own vulnerability.

Responsiveness relies on the organisation or institution's ability to demonstrate flexibility in terms of its four elements of variety, time, cost, and intention. These are taken into consideration; however, the focus on the study is that the ID process dictates that the concept of responsiveness be seen within the broader framework of the relevance of the whole educational project to the changing technological environment, i.e., the 4IR.

3.9 Conclusion

This chapter provided an integrative review of literature on the subjects of ID and the 4IR. The chapter scanned a selection of various ID models that the researcher deems relevant to this study. To contextualise the study, reference was made to the FTA which is the implementation guidelines for the Tuition Policy at Unisa. The review arrived at the realisation that ID processes require continuous adjustment to suit the context. This is supported by Sharif and Cho (2015:73) thus, "the constantly shifting landscape of educational demands design that can grow and change with its context". The role of the instructional designers was also discussed with a view to demonstrate their importance in ensuring that higher education institutions respond to the demands of the 4IR environment.

On the 4IR, a definition of the concept was offered, followed by a discussion of its components, its affordances and the associated risks. The chapter also introduced the concept of Education 4.0 as harvested from the reviewed literature and found to be relevant to this study. The chapter closed off with a discussion of the concept of

responsiveness as one of the foundational concepts framing this study. In the following chapter, a description of the research methodology applied to this study will follow.

CHAPTER 4

4. RESEARCH DESIGN AND METHODOLOGY

4.1 Introduction

The purpose of this research study was to collect data to determine the responsiveness of the existing ID processes to the prevailing 4IR environment. In the previous chapters a theoretical framework and an in-depth review of literature relevant to the study was provided. The focus in both chapters was on the problem statement and the aim of the study which were outlined in Chapter 1 of this study. The current chapter delineates the process followed to conduct the research. It is referred to as research design. A chapter on the research design is necessary because research should be conducted following a carefully planned itinerary of the route to be taken to reach the research destination (Leedy & Ormrod 2015:23). Research design "facilitates the smooth sailing of the various research operations", in the same manner that a house plan provides direction for the construction of the house (Kothari 2004:32). This chapter provides information about the steps taken to gather and analyse the empirical data required to address the research questions as stated in Chapter 1. The chapter begins with a discussion of the site of the study to provide the necessary context, followed by an overview of the research paradigm which was applied to this study. It then proceeds to outline the progression of the study by discussing the population, sample, data collection method, instruments, and data analysis. The chapter closes with a discussion of other relevant elements of the research design including trustworthiness and ethical considerations. To provide a clear picture of the context of the study, a brief description of Unisa follows.

4.2 Site of the study

The study was undertaken at Unisa, Pretoria, SA. In Chapter 1 of this study, a brief historical background to Unisa was presented, followed by a description of Unisa student profile. This discussion focuses on Unisa as the unit of analysis for the study.

Unisa is a comprehensive ODeL institution with students scattered throughout the nine provinces of the country and beyond the borders as well. The institution has regional offices and student centres in various towns and cities within the country as well as a fully-fledged regional centre in Addis Ababa, Ethiopia. In terms of the application of technology to teaching and learning, Unisa is in the process of migrating all modules to fully online delivery by 2030. Currently, there is still a considerable number of modules which are offered in a blended format. Blended delivery in the Unisa context means that the students still receive printed study materials, while using technology to communicate with their lecturers and their peers.

This study commenced during the era of the COVID-19 pandemic in 2020 and the subsequent lockdown period. Mishra, Gupta and Shree (2020:1) describe lockdown "as a state of the emergency protocol implemented by the competent authorities to restrict people from leaving their place of living resulting in mass quarantines and stay-at-home" regulations. In South Africa, the lockdown period necessitated by the outbreak of the COVID-19 pandemic began on 26 March 2020. During the lockdown, educational institutions were forced to implement alternative teaching, learning and assessment procedures which would be non-venue based. In this manner the COVID-19 pandemic accelerated the migration to online delivery to a remarkable extent. Unisa was no exception in this regard. This transition was, however, not smooth for various reasons.

Firstly, the speed at which everything happened put immense pressure on the institution. When the lockdown began on 26 March 2020, Unisa already had to implement the first semester examinations in May. The preparations for these examinations took some time with the result that the examinations were only conducted in June – Jul 2020. Secondly, the Unisa LMS was not adequate to handle the massive numbers of logins per session, so it kept on crashing causing too much confusion and frustration. Thirdly, the ICT department was not adequately staffed to provide the necessary support required by both staff and students during the

examinations. Fourthly, it has already been alluded to in Chapters 1 and 3 that the Unisa student body does not homogeneously consist of 'digital natives'. Therefore, some students struggled with the examinations owing to their lack of experience with technology. This also caused more frustration to both the students and the staff. The fifth challenge can be attributed to the Unisa staff who also had to transition rather abruptly from marking printed assessment material to on-screen marking. Those members of staff who are by definition 'digital migrants' had to be trained fast to capacitate them to manage the technology-based assessments. The last challenge arose from a policy perspective where the quality and integrity of non-venue-based examinations became questionable. The institution had to find quick solutions such as proctoring to address this concern.

Having experienced these challenges, Unisa is well on the way to achieving the goal of delivering all teaching and learning activities online by 2030. This means that the ID processes also need to be adapted to service this changing environment. There is, however, lag in this area, giving rise to the need for this study.

4.3 Research paradigm

Decisions around the appropriate research paradigm are primarily based on the nature of the study and the researcher's world view.

4.3.1 Defining a paradigm

Walter (2006:12) defines a paradigm as "a shared framework of viewing and approaching the investigation and research of social phenomena". Lincoln and Guba (1994:105) simplify the definition of paradigm as the "basic belief system or worldview that guides the investigator in ontologically and epistemologically fundamental ways". Contextualising the concept in education, Kivunja and Kuyini (2017:26) define a research paradigm as the beliefs of the researcher about the world, i.e., the researcher's worldview. This means that the research paradigm provides a lens through which the researcher can examine the progression of the research project. It also guides the researcher towards the methodology that should

be adopted for the collection and analysis of the data in response to the research question. In the words of Creswell and Miller (2000:125), researchers' paradigms or worldviews shape their selection of research procedures to be followed. Therefore, a paradigm should form the basis for the crafting of a research study (Sefotho 2015:26) because the choice of a paradigm determines the intent, motivation and expectations of the study (Mackenzie & Knipe 2006:2).

4.3.2 Different types of paradigms

This discussion touches briefly on the four main paradigms applied within educational research, namely the positivist, interpretivist and critical and pragmatic paradigms, and proceeds to indicate the selected paradigm for this study. The positivist paradigm, also referred to as the scientific method, "defines a world view to research which is grounded in the scientific method of investigation" (Kivunja & Kuyini 2017:30). It is based on the idea that research can reveal knowledge or facts about the natural world through the experiences of those who participate in the process. According to Farrow, Iniesto, Weller and Pitt (2020:14), positivists aim to describe the relationships and mechanism that govern the world and our experiences of it by using rules and laws. Research in the positivist paradigm places emphasis on the validity and reliability of the evidence and how it is handled. For this reason, the quantitative approach is typically preferred when using the positivist paradigm.

Another main research paradigm is the critical or transformational paradigm. Research within this paradigm is premised within intellectual theories such as Marxism, Feminism and Critical theory. Pham (2018:691) points out that through critical inquiry "reality is socially constructed through the media, institutions, and society". It focuses mainly on issues of social justice and seeks to address social, political and economic issues (Kivunja & Kuyini 2017:35). The critical or transformative researchers use both qualitative and quantitative approaches to collect and analyse data.

Pragmatism as a research paradigm "is not committed to any one system of philosophy or reality" (Mackenzie & Knipe 2006:3). It assumes the approach that there is no one reality that should be discovered through research because all individuals have their own interpretations of reality. Pragmatists believe that research is intended to explore the behaviour of participants, establish the beliefs influencing those behaviours and describe the results of those behaviours (Kivunja & Kuyini 2017:35). Pragmatists often use mixed methods and typically vary their approach depending on the constraints of a particular project (Farrow et al 2020:18).

The key principle of the interpretivist paradigm is that reality is socially constructed. It is, therefore, aligned with the constructivist view of reality as discussed in Chapter 2 of this study (Kivunja & Kuyini 2017:33). This paradigm allows for the interpretation of reality by the participants as stated by Thanh and Thanh (2015:24) thus, "the interpretive paradigm allows researchers to view the world through the perceptions and experiences of the participants". In addition, the background and experiences of the researcher contribute to their view of reality. Kivunja and Kuyini (2017:36) assert that the choice of the interpretivist paradigm aligns with research methodology and methods that will gather and analyse qualitative data.

In light of the foregoing description of a paradigm as well as the discussion about the different types of paradigms, the researcher placed this study within the interpretivist paradigm. The data collected from the participants would, to a large extent, be used to explore whether the ID processes at Unisa are responsive to the prevailing 4IR environment. It would also inform the possible response of Unisa to the demands of the 4IR as far as the ID processes are concerned. The researcher in the study, being a practitioner in ID, brought her own background, experiences and interpretations to the data collected.

4.3.3 Elements of a paradigm

The definitions of a paradigm provided above point to four main underpinnings of a paradigm, namely the epistemology, ontology, axiology, and methodology. These

are described in brief as follows. Epistemology is derived from the Greek word 'episteme' meaning knowledge. Goduka (2012:131) gives a detailed definition of epistemology as:

> The theory or science of the methods or grounds of knowledge expanding into a set of claims or assumptions about the ways in which it is possible to gain knowledge of reality, how what exists may be known, what can be known and what criteria must be satisfied in order to be described as knowledge.

According to Kivunja and Kuyini (2017:27), epistemology is used to describe "how we know the truth or reality". In simple terms, it refers to one's view of knowledge, i.e., how one understands knowledge to be and how it is acquired. In line with the constructivist view as discussed in Chapter 2 of the study, the epistemological view adopted by the researcher is that knowledge is acquired through interaction with others. Social constructivism underscores the importance of interaction as part of knowledge creation. This is crucial within the African continent considering the African philosophy of *Ubuntu,* which is premised on communal relations; knowledge is co-constructed and mostly co-owned. It is in this sense that the researcher places premium on her interaction with her participants (individually and collectively) in data gathering. This study assumed that data collected from the participants would assist with answers to the research question. It is for this reason that the qualitative approach and the case-study design were preferred. These allowed the researcher to gather information through interaction with participants in the form of individual interviews.

Ontology refers to one's view of the world, i.e., how one views and interprets nature and reality. It is the study of being, examining the conceptions of being, reality or the phenomenon of the research problem being researched (Sefotho 2015:30). Ontology examines the underlying beliefs of the researcher about the nature of being and existence (Kivunja & Kuyini 2017:27). The ontological assumptions of the researcher about the being, reality, or phenomenon they are researching about

should be explicitly stated because ontology informs the researcher about the nature of reality and what science is supposed to study (Goduka 2012:135). More clearly, the ontological assumptions of the researchers help to orientate their thinking about the research problem, its significance, and how it might be approached to contribute to its solution. The researcher views the world as a system where elements are intertwined with a cause-and-effect relationship. The ontological views of this researcher derive from the theoretical framework that was discussed in Chapter 2 of this study. The element of the chaos theory that suggests that any change in the initial conditions, however slight, can impact the other parts of the system in a significant manner. The researcher's view is that changes brought about by the 4IR should have an impact on the ID processes. Therefore, the latter should respond appropriately to the former.

Another element of a paradigm is methodology, which according to Walter (2006:12), is "the worldview through which research is designed and conducted". It refers to the broad approach adopted in the pursuit of the truth based on its appropriateness, efficiency and effectiveness. According to Kivunja and Kuyini (2017:28), methodology is a broad term which covers the design, methods, approaches, and procedures used in the research. Sefotho (2015:31) simplifies this by stating that "methodology is concerned with why, what, from where, when, and how data is collected and analysed. Traditionally, research can adopt either a quantitative or qualitative methodology. However, some researchers apply elements of both resulting in what is termed the mixed methods. The selection of an appropriate methodology hinges on the research paradigm within which the researcher is working. The methodology for this study was determined by the nature of the research question which required qualitative data to be answered. The qualitative methodology was applied for that reason.

The element of axiology refers to considerations for both objectivity and subjectivity in the research process. According to Kivunja and Kuyini (2017:31), axiology "involves defining, evaluating, and understanding concepts of right and wrong

behaviour relating to the research". Put simply by Goduka (2012:31), axiology "refers to what is worth knowing and why". It is considered by the researcher's application of ethics and values while conducting research. These ethical considerations and values are applied in relation to the participants in the research, the data collected and analysed as well as the recipients of the research report. On ethical considerations, the researcher needs to ensure that no harm will be caused to the participants during the research. The axiology in this study was provided through the ethical clearance (Appendix J) approval granted by the ethics committee. Through this approval process, the researcher undertook to conduct the study without causing any harm to the participants. Confirmation was also made regarding the safe keeping of the data and the protection of the participants' identities.

4.4 Research approach

Traditionally, research has always been conducted using two main approaches, i.e., the quantitative and the qualitative approach. In recent years, researchers are opting for a combination of elements from both approaches named as the mixed-methods approach, which uses elements from both traditional approaches. The quantitative and qualitative approaches have often been presented as competing alternatives (Baxter, Hughes & Tight 2010:60). The decision to adopt a specific research approach stems from the research problem as well as the research questions that the study sets out to answer. This decision is determined by the research paradigm that was adopted, in this case, the interpretivist paradigm. In Richards' and Morse's (2013:23) words, the "question, method, data and analysis fit together". Further confirmation is by Mackenzie and Knipe (2006:5), who contend that the research paradigm and research question are the main determinants of the data collection and analysis method, i.e., the research approach. Therefore, the researcher's selection of a specific approach is "never arbitrary" – giving rise to the concepts of methodological purposiveness and congruence (Richards & Morse 2013:23).

The research problem identified in Chapter 1 of this study, together with the selected interpretivist paradigm, suggested the adoption of the qualitative research approach. Adopting the qualitative approach for this study gave the researcher the opportunity to gather in-depth data from the participants because in the qualitative approach numbers and statistics are not as important as in the quantitative approach. The quality of the data is most important, and this can be acquired among a small number of participants. Flick (2009:14) identifies four features of qualitative research.

Firstly, the methods and theories should be appropriate. There are, for instance, research problems that cannot be addressed within the positivist paradigm. These may require narrative responses from participants instead of experimental or statistical data. The nature of data required to address the research question was narrative and in-depth, making the qualitative approach appropriate.

The second feature is the perspectives of the participants and their diversity. The implication here is that the participants present a variety of perspectives based on their knowledge and experiences. Qualitative research considers this diversity of viewpoints and perspectives and the richness this brings to the research data.

The third feature is the reflexivity of the research and the researcher. In qualitative research, the researcher is seen as part of the research process. Their reflections on their role during the research process form part of the data and should not be ignored. The researcher in this study, being an instructional designer, came into the research with own perspectives and views about the research question. These views were reflected on during the data collection and data analysis. However, caution was taken not to allow own views to influence the data.

The fourth feature of qualitative research is the variety of methods and approaches that characterise the research practice. In qualitative research, data can be collected using a variety of tools to deepen its quality and integrity. This study considered this point and used a variety of participant groupings to diversify the data types. Flick

(2009:14) maintains that qualitative research can help the researcher to attain empirically well-founded outcomes. This was the expectation from this study.

4.5 Research design

Within the interpretive paradigm and the qualitative research approach exists a few possible designs that researchers can apply. Baxter et al (2010) and Padgett (2017) identify some primary designs to qualitative research, namely ethnography, grounded theory, case study, narrative study, phenomenology, community-engaged research, and action research. Owing to the focus of this study on the ID function within the specific context of Unisa in response to a broader context of the 4IR, the case study design was adopted. Case study is a research method involving a thorough, in-depth analysis of an individual, group or other social unit (Korstjens & Moser 2018b:277).

A case study places emphasis on what is to be studied. Therefore, the case was selected with the aim of being able to help the researcher to better understand the object of the study, namely Unisa's response to the demands of the 4IR in as far as ID approaches are concerned. A case study, in the words of Baxter and Jack (2008:544), is "an approach to research that facilitates exploration within its context using a variety of data sources". This context should be narrowed down to a unit of analysis which could be an individual, a programme, a process, or an organisation. In this study, the case of Unisa provided the context which required an in-depth exploration of its response to the 4IR in terms of its ID processes. This was the unit of analysis for the study. The study was a single exploratory case-study focusing on one context, being Unisa and one phenomenon, being ID processes all in response to the demands of the 4IR.

4.6 Population

The population for this study consisted of the selected participants involved in the design and development of learning materials at Unisa. These are the instructional

designers, the electronic originators and the academic staff. Students, as users of the developed materials, also formed part of the population for this study.

The researcher applied these sources of data as a measure of triangulation. Similarly, Baxter and Jack (2008:556) concur that, "triangulation of data sources, data types or researchers is a primary strategy that can be used and would support the principle in case study research that the phenomena be viewed and explored from multiple perspectives". According to Chenail (1997:1), triangulation refers to the use of different sets of data, a variety of analyses, researchers all studying one particular phenomenon. Creswell and Miller (2000:126) concur that triangulation is a procedure applied to ensure validity through convergence of data from multiple sources.

The instructional designers were the first category of participants. They are housed in the DCDT. The staff complement in the unit consists of 36 members performing the ID and development roles as well as project management of the module development projects. The organisational structure of the unit consists of three levels excluding the administrative staff members. The three levels are curriculum and learning development specialists, education consultants and deputy directors. The unit is headed by a director. For purposes of this study, the naming instructional designer was used to refer to all the professional staff members in the directorate irrespective of their level in the organisational structure.

The second category of participants consisted of the staff from the unit Study Material Production (SMPD) who are referred to as electronic originators at Unisa. The total population of electronic originators is 36. Electronic originators are responsible for assisting the academic staff and the instructional designers with the design and development of module sites. They were, therefore, a relevant source of data for this study.

Another category of participants is the academic staff members at Unisa. Lee (2019:33) notes that "distance education teachers are actually on the front line, interacting with distance students and supporting their learning". This made them relevant for this study because they are also the custodians of course development providing content and methodology. Academic staff at Unisa are over 2 000 members (Unisa website); however, not all of them have been involved in module design and development through the DCDT. The study focused on only those who have the requisite experience in module design and development and currently facilitate modules that are blended or fully online.

The fourth category of participants came from the student population. Students are very important stakeholders in the Unisa context and to the ID processes because they 'consume' the material designed and developed by the other three groupings mentioned earlier, i.e., instructional designers, electronic originators, and academics. The study targeted students from two colleges, i.e., the CEMS and the CEDU. However, only the students from the CEMS participated in the study. The researcher failed to acquire the participation of CEDU students owing to various reasons stated in Chapter 7 under limitations of the study.

4.7 Sampling

It is not always possible for a research study to reach the relevant population in its entirety. Therefore, it is important to select a representative sample of participants who can provide the required data. This is referred to as sampling. The sampling process requires proper planning and consideration of various elements of the research study. In this regard, Korstjens and Moser (2018a:10) indicate that a sampling plan describes how many observations, interviews, etc., are needed to ensure that the findings will contribute rich data. The research question is the starting point for developing an effective sampling plan (Leedy & Ormrod 2015: 279). Key features of the sampling plan for a qualitative study include that the sampling should be done deliberately, the sample size may be small, and is determined by conceptual requirement (Korstjens & Moser 2018a:10).

Qualitative researchers rely on non-probability sampling because "in non-probability sampling, elements of the population do not have a known or equal probability of selection. Some elements have no chance of being selected, and some have a probability of selection that is impossible to know" (Turner 2020:10). The important consideration for the researcher is that the sampled participants should have the necessary knowledge and experience of the issue or object at their disposal for providing the required data (Flick 2009:123). They should be knowledgeable on the phenomenon, able to articulate and reflect, and motivated to communicate at length and in depth with the researcher to provide rich, thick data (Korstjens & Moser 2018a:10). Therefore, sampling would be selective, or *purposive* (Leedy & Ormrod 2015:279).

A variety of sampling methods exists for qualitative researchers. This study applied purposive sampling among the different participants groupings because "purposive sampling is used when researchers wish to target certain individuals with characteristics of interest in the study" (Turner 2020:10).

Using purposive sampling, seven participants were identified among the instructional designers because in case studies, the sample can be very small (Marshall 1996:523). Instructional designers as the project leaders and the custodians of the FTA were selected based on their experience in the role. Only those with more than ten years' experience were sampled for participation because in purposive sampling, only "those individuals or objects that will yield the most information about the topic under investigation" (Leedy & Ormrod 2015: 279) are selected.

Purposive sampling was also applied to identify five members from the electronic originators as a category of participants based on their experience in the role that they play. Only those with more than five (5) years' experience were sampled. The reason for this selection is the assumption that more experienced electronic

originators would provide a rich source of information owing to their involvement with the design of study material for uploading to the LMS configured as myUnisa.

The study selected academic staff members from the CEMS and the CEDU. These two colleges have been at the forefront of applying technological innovation in their module design and development, and some of the academics in these two colleges have participated in the joint programme between Unisa and the University of Maryland University College (UMUC) for online teaching and learning. The sample of academics consisted of a total of ten. Five academic staff members were identified from each of the two colleges based on their experience in course development, integration of technology in the delivery of teaching and learning and participation in the Unisa-UMUC programme. Individual interviews were conducted with each of the ten participants.

The students included in the study were from CEMS. Purposive sampling was applied to identify five students who completed modules that were recently designed and developed following the FTA from the college. The list of these modules was acquired from the DCDT.

The staff population for this study was easily accessible to the researcher as they were all within Unisa. However, accessing the student population proved to be a challenge owing to various reasons such as time and loadshedding. As a result, four students participated in the study. The total number of participants who were interviewed across the different categories was 26. Data collection instruments are described in the next section.

4.8 Research instruments

The interpretivist paradigm and the qualitative approach make provision for the use of multiple sources of data. According to Walter (2006: 21), "the focus of the interpretivist paradigm on the role of meanings in how individuals interpret social life, mean that the interpretivist paradigm is fundamentally associated with qualitative

social research methods, such as in-depth interviews". Furthermore, Baxter and Jack (2008:554) advise that in case studies, data from multiple sources are "converged in the analysis process rather than handled individually". This design is supported by Eisenhardt (1989:534) in saying, "case studies typically combine data collection methods such as archives, interviews, questionnaires, and observations. The evidence may be qualitative (e.g., words), quantitative (e.g., numbers), or both". In line with these assertions, data collection was conducted through interviews. Individual interviews were conducted with identified instructional designers, electronic originators, academics and students. These were semi-structured interviews to allow the participants to provide as much information as possible. The interviews began with an open question and became more focused as they progressed.

Interviews were preferred for their ease of application by the researcher as well as the ability of the researcher and the opportunity they provide to probe where the information was not adequately forthcoming. The researcher was cognisant of the view by Davies and Dodd (2002:283) that "interviewing is a social interaction and as such is a shared communication, not just a one-way traffic of information from respondent to researcher". To this end, the interview took an informal approach while maintaining depth. This was done by allowing the participants to relate their role in the ID process at Unisa. They were also asked about their application of the FTA and its effectiveness in relation to the profile of the Unisa students and the context of the 4IR.

In the light of restrictions in movement and meetings owing to the context of the COVID-19 pandemic, interviews were conducted via electronic media. The researcher selected the Microsoft Teams (MS Teams) platform for this purpose owing to its ease of application and availability for Unisa staff members and students. Another advantage of the MS Teams platform is that the transcription can be made as the interview unfolds. Roberts, Pavlakis, and Richards (2021:3) note in this regard that "virtual work may afford participants and researchers greater privacy while

maintaining physical safety; participants can choose not to use video, apply a virtual background, or in contrast to in-person interviews, even ethically withhold if they tested positive for COVID-19". It must be noted that the research study was conducted during the lockdown, with the ethical clearance (Appendix J) issued based on the conditions prevailing then. As a result, the interview protocol proceeded to be on MS Teams even though these were conducted post-COVID-19 lockdown period. This approach is supported by Oliffe, Kelly, Montaner and Yu Ko (2021:3), who assert that conducting their study using a virtual platform had many benefits, some of which were reduction in travel costs, participants being freer to speak from a familiar environment and the exclusion of the awkwardness that arises from physical meetings.

Table 4.1 provides a depiction of the relationship between the research questions as presented in Chapter 1 of the study; the theoretical framework espoused in Chapter 2 as well as the research design proposed for the study.

Table 4.1: Relationship between research questions, theory, methods, and fieldwork information

Research questions	Theoretical framework	Research method	Target fieldwork information
What is the nature of Unisa's instructional design model?	Sensitive dependence on initial conditions – the effect that a slight change in one part of a chaotic system can deliver on other parts significantly. Social constructivism: ID is a social process	Individual interviews with instructional designers, electronic originators, and academics	Challenges faced by instructional designers, electronic originators, and academics during the migration from blended to online delivery. Description of the process as either orderly or chaotic.
How does Unisa's instructional design model support the prevailing learning contexts of students in the era of the 4IR?	Connectivism: the learners' capacity to acquire more information is more important than what is currently known.	Individual interviews with instructional designers, electronic originators, and academics	Participants' understanding of the 4IR; how the 4IR context influences their roles; how modules can be designed to respond to the 4IR demands.
What is the relevance of the	Connectivism: the learners'	Individual interviews with	How the FTA can be improved on to make

Research questions	Theoretical framework	Research method	Target fieldwork information
FTA to the instructional design model in the era of the 4IR?	capacity to acquire more information is more important than what is currently known. Current learning theories do not adequately explain learning through technology. Chaos theory: bifurcations occur when there is no stability in the system	instructional designers, electronic originators, and academics. Individual interviews with students	it relevant to the 4IR context.
How could Unisa's instructional design model satisfy the demands of the 4IR?	Connectivism: learning is the process of connecting specialised notes of information sources	Individual interviews with instructional designers, electronic originators, and academics	Current models and approaches used for ID Possible review of current model or approach to ID in response to the 4IR
		Individual interviews with students	Student experiences with Unisa modules in

Research questions	Theoretical framework	Research method	Target fieldwork information
			the online delivery mode. Challenges experienced by students due to migration to online delivery Views about online teaching and learning

4.9 Data collection procedure

The data collection procedure has to be administered with utmost care to ensure the integrity of the process. Interviews are a method of data collection where the interviewer asks the participants questions. It can be conducted face-to-face, by telephone or online (Korstjens & Moser 2018a:12). Accordingly, interviews in this study were conducted online for the reasons provided. Only one type of interview was used to collect the data for this study. Individual interviews were administered for the instructional designers, electronic originators, academics, and students. The participants were invited to the interviews by email and requested to accept the invitation and to confirm the date and time of the interview. The invitation was accompanied by proof that permission had been granted to interview Unisa staff and confirmation of ethical clearance to conduct the study. The participants were also informed about their right to consent or refuse participation and the right to withdraw from the interview at any point.

On the day of the interview, the researcher welcomed the participant and requested permission to record and transcribe the interview. They were informed about the

purpose and structure of the interview as well as the member-checking procedure. The interviews consisted of two sections. Section A requested biographical information while section B consisted of 13 questions for instructional designers, 14 for electronic originators, 16 for academics, and 11 for students. The questions in Section B of the interview schedule were semi-structured, meaning that they required narrative responses. The interview schedules for the four participant groups are attached as appendices A to D. Appendix A is the interview schedule used for instructional designers. Appendix B for electronic originators; Appendix C for academics and Appendix D for students. Semi-structured interviews were preferred because they "allow the researcher to control the conversation and keep it on course" (Morse 2020:3). These types of questions encouraged the participants to speak freely and allowed the researcher to probe where necessary without guiding or influencing the responses given (Korstjens & Moser 2018a:13). The researcher also extended the data by asking participants to support their statements with examples or to elaborate on short statements.

Once the interviews were concluded, the researcher sat down to listen to the recordings, checking whether the transcriptions were done accurately. This was necessary because the MS Teams transcription did not capture some of the accents of the participants with accuracy. Examples of the transcriptions are attached as appendices F, G, H and I. One example is provided for each group of participants. The analysis of data was the next step for the researcher.

4.10 Data analysis

It was expected that the data collected from the various participants would be broad and in-depth. Baxter and Jack (2008:554) note that each data source is one piece of the "puzzle," with each piece contributing to the researcher's understanding of the whole phenomenon. This convergence adds strength to the findings as the various strands of data are braided together to promote a greater understanding of the case.

There is no standard format for analysing a case's data. Eisenhardt (1989) explains that case analysis usually involves detailed write-ups for each case which are often pure descriptions central to generating insight. Therefore, the data collected was organised in a meaningful manner to allow the researcher to make sense of it. To this effect, the researcher used a computer database to store the data. The database selected for this purpose was CAQDAS. According to Wickham and Woods (2005:688), CAQDAS was initially developed to enhance the accessibility of qualitative data by overcoming the physical limitations of paper data records. There are many types of CAQDAS available. The type of CAQDAS used in this study was Atlas.ti version 22. The researcher selected this approach to reduce reliance on manually stored data and for data security.

Atlas.ti was used for coding the data according to themes because its use to code material in electronic document format enhanced the efficiency and effectiveness of this process in several ways (Wickham & Woods 2005:689). First, the interviews were transcribed using the MS Teams software. The researcher listened to the recordings and compared them with the transcriptions for accuracy. Appendices F, G, H, and I are samples of transcribed interviews. A project was initiated on the Atlas.ti site in preparation for uploading of the transcriptions. Figure 4.1 shows the initiation of the project on Atlas.ti.
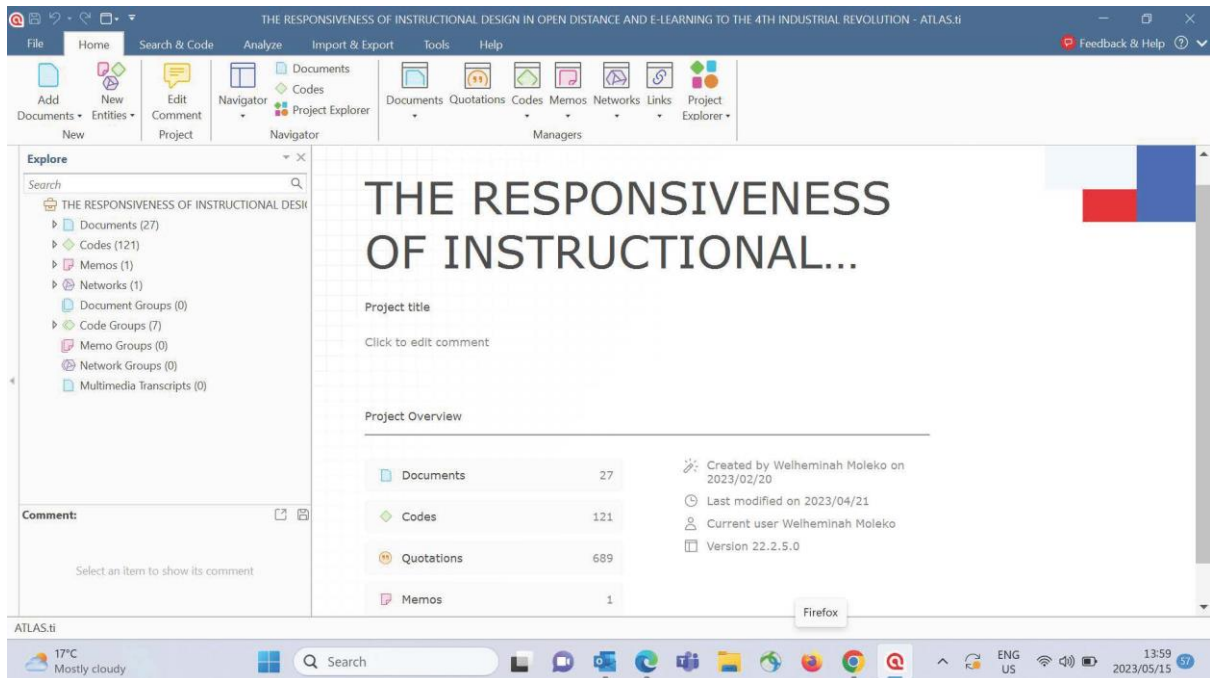
Figure 4.1: Project initiation on Atlas.ti

On the project page, information pertaining to the project is provided. The title of the project is displayed in large bold font. It also identifies the creator of the project and the date on which the project was started. On the left side is the menu which consists of items that were later populated.

The next step was uploading of the transcripts on to the platform. The final transcripts were loaded individually on the Atlas.ti platform. The interviews were given codes to identify them per participant. Atlas.ti numbered the documents from D31 to D66. The researcher found this numbering method to be confusing and preferred to rename the participants as P1 to P26 as explained in Chapter 5 of this study. Figure 4.2 shows the uploaded transcripts.
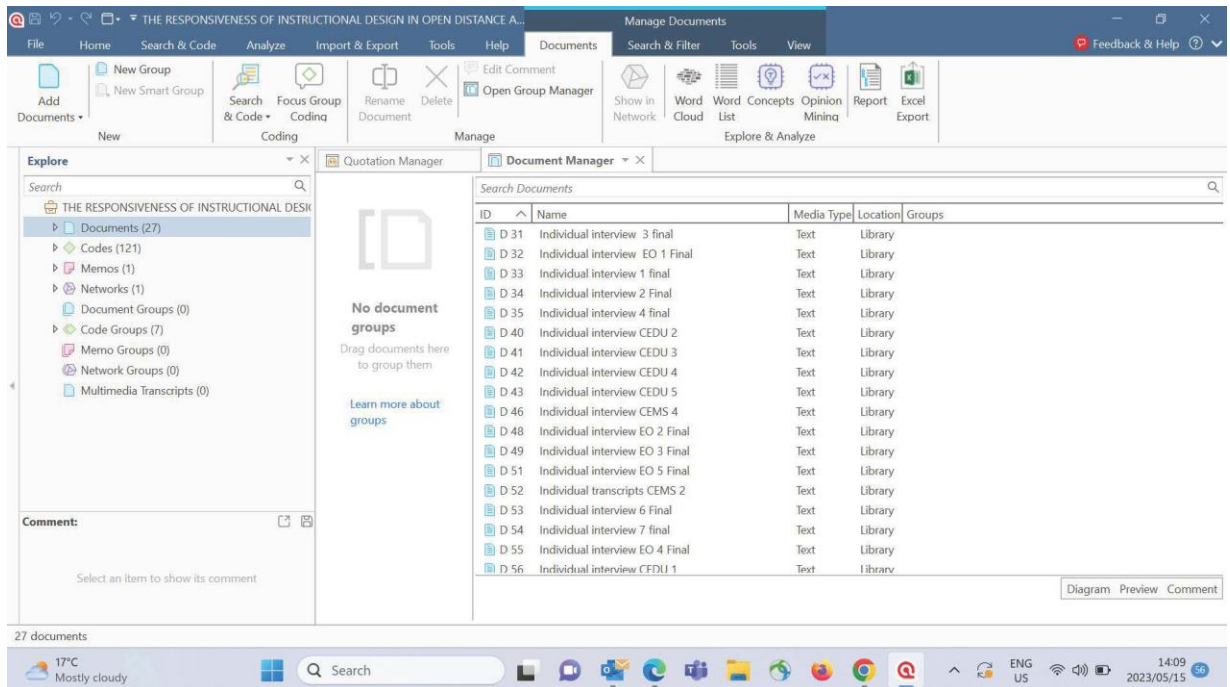
Figure 4.2: Uploaded documents on Atlas.ti

The next step was reading the individual transcripts and identifying quotations that referred to common issues. This was a painstaking exercise which had to be completed manually demanding full concentration from the researcher. The quotations were arranged according to categories based on the issue that they were addressing. This exercise yielded 121 broad categories as indicated in Figure 4.3.
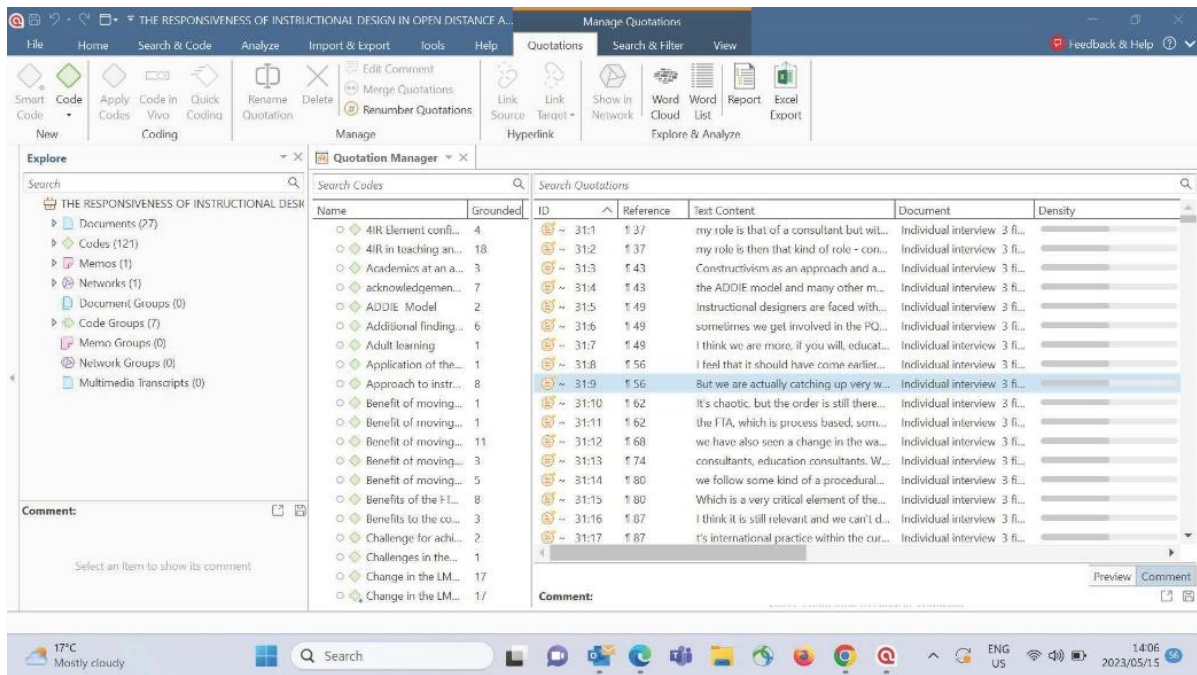
Figure 4.3: Quotations in broad categories on Atlas.ti

The software was used to develop codes from the categories of quotations identified by the researcher. Seven code groups were developed from the 121 broad categories to make the data manageable. The code groups were populated with the items from the categories indicated above. In Figure 4.4, the relationship between the code groups and the categories is demonstrated.
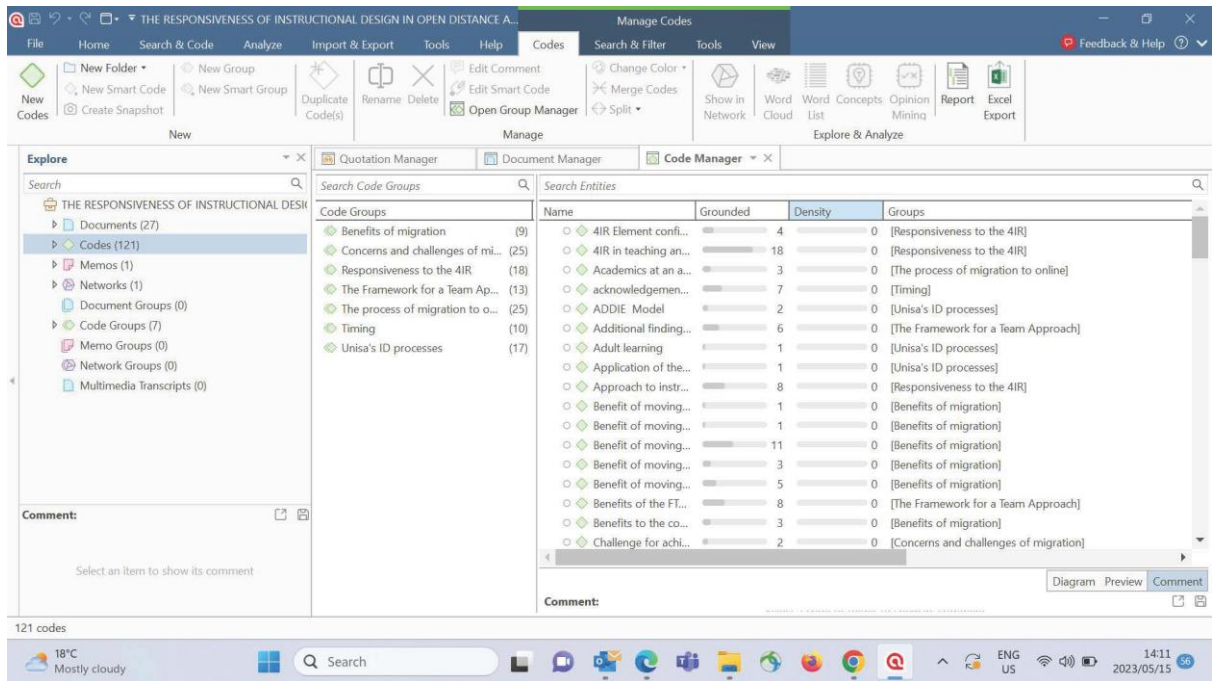
Figure 4.4: Categories and code groups on Atlas.ti

The seven code groups developed from the categories consist of a number of quotations each as determined by the coding process. The two code groups titled *Concerns and challenged of migration to online and the process of migration* consist of the highest number of quotations at 25 each. Benefits of migration consists of the lowest number of quotations at nine. This spread of quotations across the seven code groups is shown in Figure 4.5.
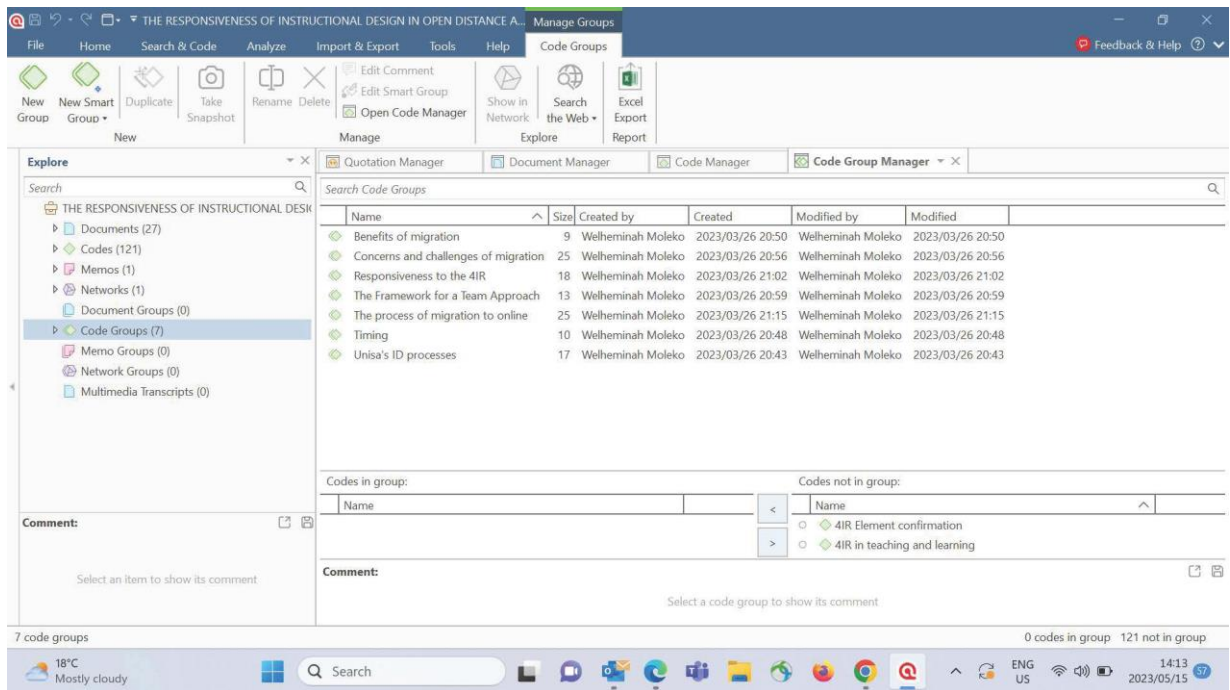
Figure 4.5: Code groups on Atlas.ti

The seven code groups were streamlined into four themes and several sub-themes which are presented in Chapter 5.

In Chapter 6 interpretation of the data is presented. Interpretation involves the conversion of the data into a sense-making format. The researcher ensured that the interpretation of the data was in response to the stated research question to maintain its relevance.

4.11 Credibility and trustworthiness

Traditionally, it has been a requirement for research to be valid and reliable. This requirement applied to research conducted through the quantitative approach. As the qualitative approach gained traction within the field of research, it became clear that this requirement was becoming inappropriate. According to Morse, Barrett, Mayan, Olson, and Spiers (2002:14), the concepts of validity and reliability as

applied in quantitative research were replaced by credibility and trustworthiness in qualitative research.

4.11.1 Credibility

Research needs to demonstrate a level of credibility and trustworthiness for it to be recognised as being authentic, ethical and contributing to the existing body of knowledge. It is, therefore, necessary to outline the measures which were taken to ensure that this study is credible and trustworthy. Korstjens and Moser (2018b:121) assert that credibility provides a response to the truth value of the research. In simple terms, credibility refers to the degree to which the data and its interpretation can be believed by those who read it. The researcher in this study applied three strategies to ensure credibility.

The first strategy applied was researcher reflexivity. This is the process whereby researchers report on personal biases, beliefs and values (Creswell & Miller 2000:127). This was applied by using interpretive commentary throughout the discussion of the findings as will be shown in the next chapter. The second strategy was triangulation of data. This study used four different sources of data (being instructional designers, electronic originators, academics, and students) for enrichment and to ensure its credibility through cross-checking. The researcher believes that the trustworthiness of the data was acquired through its substantiation by the different data sources identified for the study. The third strategy was member checking which involved sharing the transcriptions of the interviews with the participants for them to confirm its accuracy. The participants were informed before the interviews commenced about member checking. Transcriptions were checked individually by the participants with instructions given to edit, clarify, elaborate, or even delete their own words from the narratives where applicable.

4.11.2 Trustworthiness

Trustworthiness refers to the extent to which the researcher ensured that data were appropriately and ethically collected, analysed and reported. Cypress (2017:254)

defines trustworthiness as the "quality, authenticity, and truthfulness of findings in qualitative research. It relates to the degree of trust or confidence readers have in the result". Korstjens and Moser (2018b:121) delineate trustworthiness under four criteria, i.e., transferability, dependability, confirmability, and reflexivity. This study applied these four criteria to ensure its trustworthiness.

To pass the test of transferability, the researcher used thick or rich descriptions of details such as the setting and the participants, including quotes from participants. The main function of thick descriptions was to provide an understanding of relevance to other settings. The thick descriptions helped with transferability of the study to other contexts such as other ODeL institutions.

Dependability and confirmability were addressed through the application of one strategy, i.e., creating an audit trail. Dependability is intended to determine whether the analysis process is consistent with the accepted standards for a particular design. The researcher ensured that the analysis process followed the prescripts of the case study design.

Confirmability refers to the aspect of neutrality. It is intended to avoid subjectivity in the interpretation of the data. The researcher's preferences and viewpoints did not interfere with the interpretation of the data. To ensure dependability and confirmability, the researcher created an audit trail which consisted of a documentation of all components of the study including the steps followed in the selection of participants and the collection of data. The researcher being acutely aware of possible research bias arising from 'her' role as an instructional designer at Unisa, undertook to manage it by employing two specific strategies, namely, reflexivity and bracketing. Reflexivity refers to the "process of critical reflection about oneself as a researcher and the research relationship" (Korstjens & Moser 2018:121). In this study, the researcher tried to be aware of own biases, preferences and preconceptions, particularly when interviewing colleagues and when handling the data they provided. Bracketing, as an extension to reflexivity, is the act of holding

one's own beliefs about the phenomenon under study in suspension to perceive it clearly (Cypress 2017:259). The researcher in this study did not input her owns ideas into the data during the interviews and the subsequent analysis of the collected data. As the research process unfolded the researcher kept interview notes, records, calendars, and audio recordings. These components will be kept secure for a minimum period of five years.

The last criterion of trustworthiness that was applied in this study is reflexivity. This refers to the researcher's awareness about her own role in the study. The researcher, being cognisant of the possible influence that she might have had on the development of the research and the engagement of participants, kept a journal for recording thoughts, feelings, uncertainties, values, beliefs, and assumptions that surfaced throughout the research process. These reflexive notes guided the researcher towards keeping a neutral approach to the data.

4.12 Ethical considerations

Research should be conducted in an ethical manner. The inclusion of human participants in the research has the potential to affect them in a negative way in the long run. Therefore, the research community is held under very strict guidelines to ensure that ethical conduct is always exercised. Kivunja and Kuyini (2017:28) list four criteria of ethical conduct, namely teleology, deontology, morality, and fairness. Teleology refers to the fact that humans have a moral obligation to do what is good and desirable. The researcher in this study subscribes to this notion by ensuring that the research is aimed at elevating the goodness in humans. Deontology, on the contrary, is the understanding that all actions taken during research have a result. In that regard, no harmful action would be taken in respect of the participants. Morality is the confirmation that the researcher will uphold moral values such as truthfulness when handling the data. All data was handled with utmost honesty. The researcher did not rephrase nor change the original data collected. The criterion of fairness is intended to ensure that the rights of the participants are protected by avoiding favouritism and discrimination during the research process. All participants

were treated equally, fairly, and with no discrimination against anyone. Ethical considerations in this study were further implemented in the following manner.

4.12.1 Full disclosure or deception

Participants were informed fully and honestly about the purpose of the study. They were also given access to the data collected to ensure that it was accurately reported.

4.12.2 Informed consent

The researcher in this study acquired consent for participation first through an email to the participants. This email was accompanied by the ethical clearance certificate (Appendix J) for the study and the letter of consent which the participants had to sign and return to the researcher in acceptance of the invitation to participate.

4.12.3 No harm or risk to participants

The researcher acquired ethical clearance (Appendix J) from the institutional research ethics committee. This included confirmation that no harm would be brought on the participants by the research. Similarly, Leedy and Ormrod (2015:278) concur that, "The researcher must take precautions not to expose people (or animals) to unnecessary physical or psychological harm as could happen, say, if the researcher were to inquire about highly personal and emotionally charged topics". No harm was caused to the participants through this research. The ethical clearance certificate for this study is attached as Appendix J. In addition to ethical clearance, Unisa requires that researchers be granted permission to conduct research among staff and students. This is intended to further protect the staff and students from harm and also to maintain the integrity of the institution. Permission granted for this purpose is attached as Appendix K.

4.12.4 Voluntary participation

No participant was coerced into taking part in the study. Participation was voluntary and participants were informed about their freedom to withdraw their participation at

any point without having to provide reasons and with no consequence to them. This was communicated through the letter of consent which was sent to the individual participants to complete ahead of the interview. The letter of consent is included as Appendix E.

4.12.5 Privacy

The data gathered from the participants was treated with confidentiality and care. "One common way of keeping personal data confidential is to assign various pseudonyms to different participants and to use those pseudonyms both during data collection and in the final research report" (Leedy & Ormrod 2015:278). The researcher, being cognisant of the fact that some participants may prefer to be identified in the study, first enquired their preference. Those participants who showed this preference were identified by name while others were given numbers to identify them in the data. Safe-keeping of the data was done by keeping it in a password-protected folder on the hard drive on the researcher's computer. No other person had access to the data.

4.13 Conclusion

This chapter provided an overview of the research process which was followed in this study. It began by setting the context of the study through a description of the site being Unisa. The chapter then proceeded to explain the paradigmatic selection made in respect of the study as the interpretivist paradigm. Within this paradigm, the qualitative approach was followed with the case study applied as the preferred research design. The population and sample were described as well as the data collection instruments and procedure. To ensure that the research study bears the necessary rigour, steps taken to maintain credibility and trustworthiness were explained. The chapter concluded with a description of the ethical considerations made in respect of the collection of data and its analysis. In the following chapter, an analysis of the collected will be presented.

CHAPTER 5

5. PRESENTATION OF ANALYSED DATA

5.1 Introduction

In the previous chapter a detailed plan of the research process was provided. This included an identification of the research paradigm, research approach, research design and research tools that would be applied to gather the required data for this study. The researcher premised the study within the interpretivist paradigm. The selected approach for the study was the qualitative approach with the case study as the chosen research design. Furthermore, a description of the population and the sample was provided. Individual interviews were used as research instruments. The chapter closed with confirmation that ethical considerations would be applied during the data collection and analysis processes. The data were collected with the intention to address the following research question, which was stated in Chapter 1 Section 1.4 of the study:

How responsive is Unisa's instructional design model to the 4IR?

To provide a sharper focus of this research question, the following sub-questions were pursued in that chapter:

- What is the nature of Unisa's instructional design model?
- How does Unisa's instructional design model support the prevailing learning contexts of students in the era of the 4IR?
- What is the relevance of the FTA to the instructional design model in the era of the 4IR?
- How could Unisa's instructional design model satisfy the demands of the 4IR?

The current chapter presents an analysis of the collected data using the thematic approach. Data were analysed using CAQDAS. The selected type of CAQDAS used is Atlas.ti version 22. The first step was the creation of a new project on Atlas.ti where all the transcripts were added after finalisation and confirmation of their accuracy by the participants. The researcher read through the interview transcripts and identified the verbatims that responded directly to the interview questions. These were added to networks of verbatims to create codes. The process of coding was applied by segmenting the data according to common verbatims from the various participants. These were organised as independent codes which were later merged into code groups and sub-groups to create themes and sub-themes in alignment with the research sub-questions as stated in Chapter 1 of the study. This is illustrated in Table 5.5 later in the chapter.

To provide a basis for the analysis of the data, a summary of the profile of participants is presented next.

5.2 Participants' profile

The population for the study consisted of instructional designers, electronic originators, academic staff from two selected colleges, i.e., CEMS and CEDU, and students from the CEMS. The total number of sampled participants was set at 32; However, owing to challenges experienced in the process of acquiring participants, the number of participants was revised to 26. Table 5.1 provides a summary of the profile of the instructional designers who participated in the study.

Table 5.1: Profile of instructional designer participants

Participant No.	Participant	Gender	No. of years as ID	No. of modules
P1	ID DCDT 1	Female	10+	30+
P2	ID DCDT 2	Male	10+	17
P3	ID DCDT 3	Male	10+	36
P4	ID DCDT 4	Male	10+	n/a

Participant No.	Participant	Gender	No. of years as ID	No. of modules
P5	ID DCDT 5	Female	10+	30+
P6	ID DCDT 6	Male	10+	n/a
P7	ID DCDT 7	Female	10+	7

Table 5.1 indicates that seven (four males and three females) instructional designers were interviewed. They were assigned pseudonyms that are indicated in column 2 of Table 5.1. The codes used are ID DCDT 1 to ID DCDT 7. ID stands for instructional designer in this context and DCDT for Directorate for Curriculum Development and Transformation. Therefore, ID DCDT 1, for instance, was the first instructional designer from the DCDT to be interviewed. All seven of them had more than ten years' experience as instructional designers at Unisa. This means that they could be considered as adequately experienced to provide the required insights in response to the interview questions. Instructional designers at Unisa typically carry a workload of over 30 modules. The other participants fulfil managerial roles (indicated with n/a). Therefore, they do not have as many modules to design and develop. However, they do oversee the work of the instructional designers as their line managers. They also have extensive experience in the instructional designer role before assuming their managerial positions.

Table 5.2 shows the profile of the electronic originator who participated in the study.

Table 5.2: Profile of electronic originator participant

Participant number	Participant	Gender	No. of years as EO
P8	EO 1	Female	10+
P9	EO 2	Male	6-10
P10	EO 3	Female	10+
P11	EO 4	Female	10+
P12	EO 5	Female	10+

The sampled number of electronic originators was seven. However, the researcher only succeeded to acquire the participation of five electronic originators as the others did not have an appetite to participate in the study. They were allocated pseudonyms from EO 1 to EO 5 as indicated in column 2 of Table 5.2. EO is short for electronic originator and the number represents the order in which they were interviewed. EO 1, for instance, refers to the first electronic originator who was interviewed. There is a noticeable gender imbalance among participants with the majority being female. Only one participant among electronic originators is male. The gender imbalance originates from the total number of electronic originators in that department which consists of a majority of females. However, gender was not a significant variable for this study. The years of experience of the participants is more than ten for four of them. Only one participant had less than ten years' experience in the role. This suggests that the participants have adequate experience in the role to provide relevant responses to the interview questions.

Table 5.3 presents the profile of the academic staff who participated in the study.

Table 5.3: Profile of academic staff participants

Participant No.	Participant	Gender	No. of years as academic	Position	No. of modules
P13	CEDU 1	Female	11	Lecturer	2
P14	CEDU 2	Female	12	Lecturer	2
P15	CEDU 3	Female	6-10	Senior lecturer	1
P16	CEDU 4	Female	6-10	Senior lecturer	7
P17	CEDU 5	Female	10+	Senior lecturer	1
P18	CEMS 1	Female	10	Lecturer	3
P19	CEMS 2	Female	33	Associate professor	1
P20	CEMS 3	Female	6-10	Lecturer	2
P21	CEMS 4	Female	10+	Senior lecturer	1
P22	CEMS 5	Female	8	Lecturer	1

The number of academic staff members sampled for the study was ten. Five were from the CEDU and five were from the CEMS. The sample number was achieved, however, there were no male participants willing to be interviewed. As a result, the sample consisted of female participants only. Even though this may be construed as an imbalance in the sample, the gender of the participants is not an influential determinant of the data. The reason for the reluctance of male participants is not known but the researcher can suggest that they could have a level of research fatigue. In terms of the experience as academics, most of the participants had more than ten years' experience. Three had between six- and ten-years' experience as academics either at Unisa or at other institutions prior to joining Unisa. Half of the academics are lecturers, four are senior lecturers and one is an associate professor.

Table 5.4 shows the profile of students who participated in the study.

Table 5.4: Profile of student participants

Participant no.	Participant	Gender	College
P23	STUDENT 1	Male	CEMS
P24	STUDENT 2	Male	CEMS
P25	STUDENT 3	Female	CEMS
P26	STUDENT 4	Female	CEMS

The initial research design indicated that students would be sampled from the CEDU and the CEMS. The planned research procedure was to conduct two separate focus-group interviews consisting of five students each. However, the plan was not realised owing to challenges experienced in the acquisition of student participants. Only four students from the CEMS were interviewed. Constant loadshedding was an impediment to conduct focus group interviews. As a result, the researcher resorted to conducting individual interviews with the four students. Two of the students were male and two were female. All four students were enrolled for honours in various fields of study. The Research Ethics Committee was informed about this

departure from the initial research plan as was submitted in an application for ethical clearance. The committee approved the changes in the research strategy.

5.3 Themes and sub-themes

Analysis of the data yielded four main themes: Unisa's ID processes, response through migration to fully online delivery, the FTA and Responsiveness to the 4IR. These themes were developed in line with the research questions and the relevant research objectives. Each of the themes consisted of several sub-themes as will be presented later in the discussion in Chapter 6. Table 5.5 summarises the emergent themes and sub-themes. It also demonstrates the link between these themes and sub-themes with specific research sub-questions. Additionally, examples of relevant quotations are provided for each sub-theme to illustrate the relevance.

Table 5.5: Emerging themes and sub-themes from the data

Research sub-question	Themes	Sub-themes	Illustrative quotes
What is the nature of Unisa's ID model?	Unisa' s instructional design processes	Models, theories and approaches	*"I think most of the instructional design or institutions that use instructional design follow the ADDIE model".*
		Role-players	*"They come together from the different departments, which is on the project team, and everybody is held equally accountable for the quality and the success of the project to achieve a shared goal. And everybody knows exactly what they should be doing".*
How does Unisa's ID model support	Response of Unisa through	Timing	*"We should really have started to change, I think ten years ago, not now".*

Research sub-question	Themes	Sub-themes	Illustrative quotes
the prevailing learning contexts of students in the era of the 4IR?		Process of migration	*"It's a chaotic process and I think it's almost impossible to make a change of that significance in at such a huge institution, to see to it that it unfolds in an orderly fashion".*
		Benefits of migration	*"I mean we're changing for the good. We're changing so that we can be better; we're changing so that we can attract more students".*
		Concerns and challenges of migration	*"I think one of the biggest challenges when you migrate is it's going to be chaotic, and you have to retrain lecturers and other role players".*
What is the relevance of the FTA to the ID model in the era of the 4IR?	The FTA	FTA process	*"I don't know whether we follow those guidelines as strongly, but I know the team approach is where various people specialists are involved".*
		Stakeholders in the FTA process	*"The issue of team members and stakeholders becomes even more important I think, with technology".*
		Benefits of the FTA	*"It broadens your horizons. It embodies trust. And you appreciate the different frames of thinking, and it encourages unity to see that you know what, people can work together".*

Research sub-question	Themes	Sub-themes	Illustrative quotes
		Relevance of the FTA	*"I think it is still relevant and we can't do without it because we haven't actually mastered it and followed it, you know, to our satisfaction".*
		Criticism of the FTA	*"I sometimes find that all the stakeholders that are prescribed in the FTA some of them are pretty irrelevant".*
		Recommendations for improvement	*"We are in the 4IR era, you know, and then what do we need as a tool to guide us in this environment of 4IR".*
How could Unisa's ID model satisfy the demands of the 4IR?	Responsiveness to the 4IR	Understanding the 4IR	*"Fourth industrial revolution generally is about the mixing of the technology and real life".*
		Impact on role-players	*"My work will become more complicated".*
		ID in the 4IR	*"Instructional design in open distance learning and again in the 4IR is an interesting factor. However, it needs focus. It needs time".*
		Examples of 4IR in teaching and learning	*"Part of 4IR on a basic level is the creation of bots. You know to deal with general inquiries from students".*

5.4 Presentation of the data

In this chapter, data is presented according to the four themes and sub-themes that have been identified in a narrative format. The participants' verbatims are given

141

where necessary to provide an element of authenticity of the data. The verbatims are linked to the participant by a number to protect the identity of the participants as confirmed in Chapter 4 of this study as well as the ethical clearance certificate (Appendix J) acquired from the relevant institutional committee. The details of the individual participants are indicated in Tables 5.1 to 5.4 above.

5.5 Theme 1: Unisa's ID processes

The theme on ID processes at Unisa developed from references to the various role-players and their contributions. Additionally, references were made to theoretical frameworks that guide the ID processes, particularly those applied by the instructional designers. This theme is in alignment with the first research sub-question: What is the nature of Unisa's ID models?

5.5.1 Role-players in the ID processes

Interview questions were asked to determine the process of ID at Unisa in line with the sub-question stated in the previous paragraph. Through the questions, the researcher enquired what the role of the various participants was in the ID processes at Unisa. Instructional designers described their role as leaders and project managers in the ID process. In response, P3 stated, "*my role is then consultative, but yet leadership and project management*", while P7 put it succinctly as "*a combination of a project manager, education consultant, instructional designer, counsellor*". Other participants alluded to the view that instructional designers at Unisa have a hybrid role of being consultants as well as designers. P1 states, "*I've thought that the term that we use, education consultant is better because our role is become so hybrid. We do so many different things*".

What became evident from the data is that the instructional designers lead and manage the ID processes at Unisa with a team of role-players performing various functions at different stages of the process. The role-players comprise, among others, academics and electronic originators who described their roles differently. Academics saw their role in the ID process as team members contributing only the

content, for instance, *my role was to draft the module forms and then after drafting the module forms, I had to submit them to the educational consultant. And then I work closely with the educational consultant…It's like with a team* (P17).

Some academics indicated a more involved role than just providing content. P15 described their role in the ID process, *I actually started with right from the beginning of the planning of the curriculum for the new qualifications; so, I was involved in programme design and curriculum planning.*

Another participant painted the whole picture of their involvement in the ID process from a management point of view:

> "*Pretty much everything from first thinking up the qualifications and talking to the DD in DCDT about what is the pathway going to be what is our PQM going to be. Discussing it with the Tuition Manager in the Deanery and getting the strategic approval all the way through to every single module's role and content discussing with the publishers, what are our textbook needs, what the textbook development should look like. Your module content module form development. Assigning modules to lecturers, everything*" (P18).

This participant expanded the role of academics in the ID process beyond the provision of content to the management of the process. In other settings, this role is often fulfilled by the instructional designer.

Electronic originators described their role as more of a technical exercise. They are more concerned with the layout of the material, as P8 stated:

> "*We do the study material, the layout of the printed material and the online. So, we do it in such a way that it's user friendly and easily readable for the students and understandable by them".*

From the data provided, it became evident that the electronic originators do not overly concern themselves with the content of the learning material but rather focus on the appearance and presentation either in print or electronically. This, however, does not prevent them from making inputs on the accessibility of the learning material where they notice shortcomings, *"you have to edit and sometimes the lecturer will type things that don't actually make sense. So, you have to make it look understandable for the student"* (P12). Several electronic originators emphasised their empathy for students in their description of their role, such as in the following assertion:

> *"To give the student relevant up-to-date study material, whether it is print or online. What I would like to see the students have more up-to-date study material instead of outdated study material. Whatever I do, I feel like I do for the student"* (P11).

To further describe their contribution in the ID processes, participants were asked about the skills they needed to perform their roles. P1 responded that the instructional designers "*actually need to have quite a good idea of educational materials and development and how educational materials flow. And so, you have to have textual insight as well*". On the contrary, academics emphasised the need for technological competence as stated by P22 that "*we need a lot of skills, especially computer related. There's still a lot of things that we don't know of*". P7 added that:

> "*In an online learning environment, it's even more pronounced in the sense that you also need to have computer skills and the Internet skills in order to use that to facilitate the learning development as your responsibility as a lecturer at Unisa*".

For electronic originators, the focus was again on technical skills. They responded by mentioning the various programmes that they were required to be competent in using as the main part of their role:

> "*You need to be computer literate within the programmes that you use, and we just don't use one. We use a couple, so you interchange between the programmes as is needed. Sometimes you're working Corel draw, sometimes you're in Teams, then you run your Outlook, then you're in InDesign. Then you're in Abortext. So, you need to be adaptable and interchangeable between the different programmes*" (P11).

The responses from the three groupings of participants, i.e., instructional designers, academics, and electronic originators all suggest that ID at Unisa is a team effort. This is further reflected in the application of the FTA which is discussed as a separate theme arising from the data.

5.5.2 Models, approaches, and theories

Instructional designers were asked whether they apply any models or theories in their practice. The researcher's intention was to determine whether the designers applied the theoretical framework provided for through the FTA only and the possibility of reviewing the current approaches in response to the changing technological environment. In general, the responses indicated that the instructional designers do apply various theories in their design projects. All of them indicated the ADDIE approach as the basis for their design strategies. ADDIE is short for a model that consists of the steps analyse, design, develop, implement, and evaluate. This was discussed in detail in Chapter 2 of this study. For instance, P3 stated, "*our operations are informed by the ADDIE model and many other models that influence what we do, when we either plan or when we develop and when we evaluate what we are doing*".

Additionally, P2 stated that *"there are various frameworks that really influence our practice starting from the instructional design, we are influenced by the ADDIE model".*

There is, however, an inclination towards an eclectic approach where elements of various theories, models and approaches are applied in conjunction to achieve intended outcomes. The theory of andragogy was mentioned by several participants, while two major learning theories, i.e., constructivism and connectivism also featured strongly in the responses. For instance, P3 stated, "*One can just mention a few. Constructivism as an approach and a paradigm and also connectivism*". P1 agreed*, "for me, the bedrock that I started from was constructivism*". Other participants included theories such as community of inquiry and self-directed learning as their additional points of reference during ID.

> "*With ODeL you want to bring students together. You want to create a sense of togetherness, that they are in a community. You know you want to create communities of inquiry with your students, with your lecturers*" (P13).

Another participant explains what the community of inquiry entails, "*with the community of inquiry approach where we talk about the different presences, the teaching presence, cognitive presence and social presence to be built into a site or a learning environment*" (P1).

The data in this section demonstrates that the ID processes at Unisa are premised on the ADDIE approach in the form of the FTA, which is the guiding framework. There is inclusion of various models, approaches and theories which enrich the ID processes. There are various role-players in the process. However, their roles are clearly defined and understood.

5.6 Theme 2: Response of Unisa through migration to fully online delivery

Unisa, being an ODL institution, embarked in recent years on ensuring that students access their learning material online. This approach was referred to as the blended approach ostensibly because students still had access to the printed material or the study guide in PDF format on the learning management site. This was also the point at which the e for electronic was introduced to the description of the institution as ODeL. The next phase was then to migrate all learning to online delivery. Initially, this process was approached gradually as intimated by P1,

> "…*moving from blended to online has been going on for a long time. I mean, I remember from what 2012, 2013, it was said that we'd be moving online and gradually transitioning to online*".

With the outbreak of the COVID-19 pandemic and the resultant lockdown, the pace had to change drastically. The general view among participants is that COVID-19 had an accelerating effect on the migration to fully online delivery. Participants alluded to this impact of COVID-19:

> *"We were forced into online because of COVID"* (P15).

> *"From 2020 after those COVID issues, the lockdowns where we could not do the face-to-face part of the blended learning, we had to swiftly switch over to fully remote teaching and learning"* (P17).

> *"In essence, we were forced by COVID-19"* (P16).

> *"I was the happiest person on earth when the COVID pandemic forced us"* (P6).

In line with this view, the participants were asked about the timing of the migration from print and blended delivery to fully online delivery. This question intended to establish whether Unisa was moving at the right pace and on par with its competitors.

5.6.1 Timing

Responses on the timing of the migration from print and blended to fully online delivery at Unisa were varied. Some of the participants felt that Unisa is on time. It is not lagging behind nor ahead of other institutions. They plot the view against the broader landscape in which Unisa exists. P19 holds, for instance that "*given our circumstances, given masses of students who may not be as computer literate, I think we are on time*". This view is supported by P26 who stated:

> "*I think it is the right time as the times are changing. Since COVID we have learned that it is possible to do paperless. I think we are right on time to learn and adjust in this change. It's never been late to adjust to change. I think we are on time*".

Another participant provided justification for the view that Unisa is not behind schedule with the migration to online delivery. The view expressed is that the pace is determined by the national climate of change. P25 stated*, "I think it is the right time. I wouldn't say we are behind because in any case, South Africa we are not like first in so many things*". This statement is very interesting because it suggests that South Africa as a country is lagging behind other countries, and this is acceptable. One participant who did not share this view suggested that Unisa should have adapted in spite of its Third World positioning and went further to provide examples of institutions that Unisa should have followed as pioneers in the ODeL space:

> "*We should have long, long, long adapted. And you are right, coming to contextualise it on with Unisa, I think we should have embraced what the other best or open and distance learning institutions worldwide have been*

doing. You know, we've got very, very good examples. Yes, we know we are in a third world or we're in a developing country, but we could have followed the trends, Open UK, Athabasca, you know, Malaysia Open University" (P2).

Conversely, strong contrary views were also expressed by more participants in terms of timing. Some of them were participants who were already implementing online teaching well before 2020 when the lockdown was announced. Their general view is that Unisa is way behind schedule with the migration to online delivery. According to P2, "*We should really have started to change ten years ago, and not now*". P3 shares the sentiment,

> "*I think we should have done it a bit earlier, maybe some 10 years ago. But we are catching up very well now. It seems like it's overwhelming, but it shows that we should have done it earlier*".

Other participants who also felt that Unisa is behind schedule with the migration to online delivery stated their views as follows:

> "*It should have happened earlier. We are rather late. Unisa as the first, ODeL, distant learning institution, we should have been ahead in online equipment. We shouldn't be like found wanting like we are now*" (P10).

> "*I actually think we're a little bit late to the party*" (P15).

> "*I think we are going at a snail speed at Unisa, being the elephant of ODL, being the mother of ODL in Africa*" (P14).

The data around the timing also points to the migration being non-negotiable when it happened owing to the need to compete with similar institutions. P5 asked in this regard, "*If our competitors are doing it and we are in the business of selling education and we are not offering the best, how are we going to compete?*" In response to the

149

question, P5 stated, *"technically, I would say we are late on a big scheme of things because I think most universities that are on the front line have already long time ago gone fully online"*.

The urgency with which the migration process has had to be implemented owing to the COVID-19 pandemic was alluded to by a few participants thus:

> *"I think it was just quick. It was quick and I think that you had to just swim"* (P13).

> *"Our hand was forced at least to accelerate moving from our traditional way of doing things"* (P6).

> *"Everything needs to be done very hastily so that we can adapt to the changes worldwide"* (P11).

The late adaptation to online delivery by Unisa has as impact on the pace at which the process must unfold to make up for lost time. This is according to P2, *"Timing now poses a challenge because the expectation in terms of the speed that we need to move up with and the allocation of resources"*.

The question of timing is succinctly concluded by one participant who points out that there is never really the right time. Their emphasis is on the need to manage the change effectively since it cannot be avoided, *"the timing of the change is always going to be problematic because there's never a proper time to implement such a huge change, which represents a paradigm shift"* (P4).

The divergent views on the timing of the change to fully online delivery at Unisa pointed the researcher to another sub-theme focusing on the process followed to implement this change.

5.6.2 The process of migration to online delivery

Interview questions were asked to determine the nature of the migration process from print and blended to online delivery at Unisa. Participants were asked to describe the process as either being orderly or chaotic. The responses varied with some participants describing the process as well managed and orderly.

"You know that there's one thing about Unisa as an organisation. The one thing that I like about it, Unisa is very organised. They have a lot of systems in place, and I know there is no chaos there whatsoever. No, there's no chaos. There's a lot of order there, good systems that have been put in place and the implementation of those systems as well. I believe that it's good" (P22).

On the contrary, some participants described the process as chaotic. What complicated the process was that too many things were happening at the same time. The migration process coincided with the change of the LMS from SAKAI to modular object-oriented dynamic learning environment (MOODLE). This frustrated many participants who described the process as chaotic and messy as follows:

"You could see that this thing is really getting messy in certain areas certain periods. Because, you know, you had to simultaneously do training in the LMS system" (P8).

"I wouldn't say it's been rolled out in a specific ordered way, but that's also, I think circumstances because of the times we were living in" (P15).

"Complete and utter chaos. If I had more English adjectives that I could use. The first six months of this year, I never ever want to have over again in my whole life and to give you some perspective" (P21).

"It was horrendous. The fact that most academics are not completely burnt out is just a testament to our dedication to our jobs. Honestly, it was complete chaos" (P21).

The foregoing quotations demonstrate the level of frustration brought about by the change in delivery mode coupled with the change in the LMS. They also point to apparent lack of planning on the part of the university management to ensure that the transition happened smoothly. Data also suggest that there was confusion among staff about the various roles that they were expected to play. This is evident from the comments by two participants:

"It's definitely chaotic. Chaotic because nobody knows ... You get a sense that people don't know where to go when they need help" (P14).

"It's chaotic. You know, we have been sent from pillar to post and we don't ask" (P17).

The lack of leadership was also cited as a cause for the chaotic approach to the migration process. In the words of P21,

"I find it astounding that our executive management haven't realised that they have to look at all the systems, processes, policies, and procedures because we have moved online. I find it frightening".

This same participant went further to state,

"Our executive management have not realised that because we're now fully online, all our structures and systems and processes and policies and procedures need to change because the old bureaucratic model doesn't fit the new online mode".

Data relating to the migration process further revealed that there was a host of challenges experienced by all stakeholders. Each participant presented the challenges they experienced while performing their roles during the process of migration to online delivery. There was a thread connecting the challenges experienced across the various participant groupings, but the students also added challenges that applied uniquely to them.

5.6.3 Concerns about and challenges of migration

Several challenges experienced by individual groupings of participants emerged from the data.

5.6.3.1 Workload

The first challenge brought about by the process of migration which was consistent among the instructional designers, electronic originators and academics is the increased workload. Participants from these three groupings expressed extreme concerns about the amount of work brought about by the online dispensation. For academics, online delivery requires them to interact more with the students, something that was not part of their role during the print era. The availability of the Internet and the online platform makes it possible to interact with students both synchronously and asynchronously. This is an added activity to the role of the academic. The design and development of learning material for the online platform requires extensive investment of time, effort and thought as well. This is supported by the following statements from participants:

"Going full online, people are just over their heads. It has a lot of work" (P5).

"I think it's always in this workload. We don't have enough time to do what we want to do. There is too much stuff that we need to do" (P20).

"I cannot be split in half to focus on online transition when I have still the same amount of students and workload to contend with" (P6).

"There's also, you know, the conflicting arguments of the current workload while moving and adapting so that's also really difficult" (P15).

In addition to the increased academic activities, there is an increase in administrative duties that academics must perform, for instance, during examinations, they must oversee the online activity of writing. Thereafter, they ensure that the grades are submitted to the directorate for student assessment.

"The admin workload that has just landed on us, I cannot tell you how much our admin workload has increased and it's not because it's our job. It's not because it's actually academic work" (P21).

Additional workload brought about by administrative work is also affecting the instructional designers as noted by this participant.

"The way we do work, we need to enable people to think more and do less administration. For example, now in our work there's a lot of admin work we're doing" (P5).

Linked to the increased workload is the amount of time required to cover all the responsibilities linked to each role. There is a general lamentation among participants that time is a scarce resource that they need to be able to perform their added roles as well. When asked what the biggest challenge for academics is in the process of migration to online delivery, P17 responded, "*it's the way things are done quickly. They don't have breathing space*". Two other participants also singled out time as a major factor impacting their performance in the online dispensation:

"I think it's time. You must do your academic work. You must do your working. You must produce research outputs" (P19).

"Time is a big factor. I do sometimes feel overwhelmed, like I don't even have time today. Also, designing online takes time, like the lessons on MOODLE, just to add content pages, it takes a long time to do that" (P13).

Data suggest that online delivery places more demands on the academics, the instructional designers and the electronic originators. It requires proper planning. An increased amount of time needs to be invested in the design of online teaching and learning on the one hand while on the other hand there are competing responsibilities which also require time such as research and community engagement. For instance, P16 stated in this regard:

"Online delivery really needs a lot of time and looking at the fact that as academics, we've got different KPA's and we've got diverse responsibilities other than teaching and learning, that's where now the challenge is because we find ourselves not giving the time that we are supposed to give to online delivery, because you still need to sit down".

Data point to another complicating factor in the migration to online at Unisa being the concurrent conversion of the LMS.

5.6.3.2 Change in the LMS from SAKAI to MOODLE

To add to the demands of migrating to online delivery, the institution chose to convert the LMS from being hosted by SAKAI to MOODLE during the same period. This increased the amount of learning that all role-players had to undertake, and it caused a fair amount of stress, confusion and frustration among all stakeholders, especially the academics and the students. P16 describes the experience, therefore,

"That's where we have to go down and learn new systems, for example from SAKAI to MOODLE in terms of teaching because I used SAKAI a lot and when MOODLE came in, it only affected us as we had to adjust".

Other participants observed the impact of the change on both academics and students and alluded to the need for all involved to learn the mechanics of the new LMS.

> *"With the new LMS it was also a very big adjustment for students and for lecturers. That was another curve, learning curve that we just had to swim with. I can't speak for the students, but I can believe that if lecturers, well I can presume that we felt that way, students probably also had some kind of feelings towards the new LMS"* (P13).

> *"You know, it was a culture shock for them also to feel, see like, oh! OK, it's a new system that we have to work now. So, they also have to learn how they're gonna receive the study material and it's a new thing. You know. So, they also have to learn in the process of receiving it and communicating with the university on this learning management system where they were used to the old one"* (P8).

One of the concerns raised around the process of converting the LMS was the lack of clear delineation of roles and the resultant overlap thereof which created some amount of friction among the stakeholders. For instance, the electronic originators felt that they now had to perform the roles originally meant for the academics. P8 explained:

> *"In the past when it was on SAKAI, we just used to populate the site and the content, and it was there. And creating the forums and the frequently asked questions, but then other things like you know, all of those that we feel like it's a lecturers' responsibility, it gets transferred to us. At times we experience that the lecturers sometimes shift the responsibility to the EO because they also, in the process of learning this new learning management system".*

The dovetailing of the migration to online delivery and the change in the LMS did not receive positive views in general from the various participants. Some participants described the process as follows:

"It was not the ideal way to do this. I don't think it was right towards anybody. It was unfair towards staff. It was unfair towards the student" (P18).

"I think when we moved over from SAKAI to MOODLE was a little bit chaotic, but I think Unisa has managed it as well as they can and as best as they can" (P20).

There were, however, conflicting sentiments about the process from other participants who were less forgiving. One participant described it in very strong terms,

"It was horrendous. Honestly it was like a war. And we were fighting the war with no equipment. It was terrible. I never want to have that again in my life" (P21).

5.6.3.3 Resistance to change

While it seems safe to criticise the institution for various challenges experienced during the migration process, the staff and students were also implicated as being resistant to change owing to a fear of the unknown. This was alluded to by a few participants. P15 stated, for instance, *"there are some people that actually don't want to change. They've done things in a certain way for so long that you first must almost convince them to change before you can actually change".* And in support, P9 lamented, *"one challenge that I can pick is where you need to teach people who are already ready for pension you know. Other people are not ready to do new things, especially when coming to technology".* Therefore, to succeed, *"you have to convince lecturers because change brings about resistance so you have to convince them that it would be beneficial for them"* (P4).

Some participants alluded to their own preference for printed learning materials. This may be construed as an indication of their resistance to change.

> *"For me personally, even though I have access to the computer at work, as a student, I still prefer printed material. For me, I can highlight something I can print something. If my battery is flat, I can still take my material and I can go sit wherever I want. So, it's a challenge, some say yes they like the online. Others say they like the print, but I don't think printing will ever come to a stop"* (P8).

> *"I still like my print. I still like my print because I like art and I like my paper. And I like that. And I, but I still see that there is a space for printing"* (P11).
> *"I think that would work better for everyone at large whereby you find that students like me, who prefer to just get the PDF documents and just do things without the lecturer and a few projects"* (P23).

It would appear from the data that the resistance may have emanated from fear of the unknown. Some participants felt that there is no need to change what has been working for so long to something that we do not have certainty about. P2 stated for instance in this regard, *"For me, the biggest challenge would be that we're getting to unexplored territory. You know, we have never explored that before".*
This was supported by another participant who observed that, *"Some have just got personal fears to say why do we need to go and change what has been working into something that we don't even have an idea that it will work. It creates a whole lot of uncertainty and unnecessary fear"* (P8).

5.6.3.4 Student readiness
These challenges of resistance to change and fear of the unknown point to the lack of readiness among the various stakeholders. Students in particular emerged as the least prepared for the migration to fully online delivery. Data indicate that Unisa could

be having a critical mass of students who do not have access to resources that would enable them to participate in the fully online modules. According to P8, *"if you look at the country South Africa, you know there are still very underprivileged areas. Not everybody has the opportunity to own a laptop. You know, and with parents not working. It's a data thing"* (P8). This concern is shared by other participants:

> *"Then you have students with poor reception. Low data capabilities"* (P4).
> *"I'm also severely aware that some of our students don't have the facilities, so I don't have the solution for it"* (P19).

In addition, another participant wondered, *"one may also ask to say are we carefully considering our clientele, you know, the students that are out there, will they really, really be able to get into this environment and succeed?"* (P2).

The general unreadiness of the students to participate in the fully online modules is a concern for the academics, especially those who are already familiar with the online environment. This appears to cause a level of frustration for both the academics and the students. Some participants attribute this unreadiness of the students to their socio-economic and educational backgrounds. P19 noted in this regard, *"there is a lack of infrastructure often, and when so many of our students come to the university, it's for them a very, very big jump. And I don't know how we going to bridge that gap in terms of digital skills, digital literacy"*. In agreement, P13 added, *"we have students with different digital literacies. I don't know if you can say for sure that all of them benefit in the same way from information they receive online in terms of how they interpret it"*.

An illustration of the issues arising from inadequate digital literacies of students was provided by this participant:

> "*Having to work online and they can't really learn as you can upload things and find that students do not see what you have uploaded. They will send an*

e-mail and ask about something that's on the learning platform, which is the myUnisa platform" (P16).

In response to these concerns, P12 concluded that *"if they want to go fully online by 2030, unless if the target market is a different type of student, not a South African student".*

The participants acknowledge that the students may not all be ready for a fully online dispensation. Therefore, the challenges arise partly from the socio-economic environment in South Africa.

5.6.3.5 Lack of support

Data further suggest that the institution could have provided adequate support to both staff and students before and during the process of migration to fully online delivery to ensure a smooth transition. However, both staff and students seem to have experienced lack of support. According to P5, *"we've gone fully online without providing support on the basics".*

From the students' perspective, there was frustration owing to inefficiency in the support structures set for them. The institution provided a helpline that students could call when they experienced challenges with the system. However, their experience is that the helpline was not effective because *"that telephone number that was given, it did not help"* (P25). The participant described their experience with the helpline as having borne no fruit at all:

"I phoned the number that was given. The number was just ringing and then there was this voice, as if I'm on the queue but not accessing the person who can be able to assist me. So, it was taking forever, and I couldn't even get help through the phone" (P25).

For those who could submit their concerns, their experience was that the turnaround time for responses was very slow. This points to a general lack of commitment to the task of supporting the students who may be struggling with the systems.

Participants recommend that the institution could have done more to support them. One participant suggested, *"Unisa should have a platform that caters for its students so that they know where to go if they need to access any type of problems"* (P12). Another participant indicated:

> *"If the university can afford to support students, then I think it can make sense going forward whereby no student will be left behind. So, I think it can work, but only if there's a support system from the university that can allow each and every student to move towards the Fourth Industrial Revolution"* (P23).

It has to be noted that the lack of support indicated by the data here is from the technical and administrative spheres. On the academic front, student participants were generally satisfied with the support received from the lecturers. P26 states for instance,

> *"I would say yes lecturers are competent in teaching and supporting and they give guidance. They are willing to assist and give support. They respond to your emails"*.

5.6.3.6 Challenges of online systems

Evidently, there were many systems challenges experienced during the migration process. The Unisa ICT system was seemingly not adequate for the amount of traffic that it had to carry once the migration got under way. As a result, there were many disruptions caused by system crashes. P8 observed, for instance that, *"the network systems were in the beginning more down than up. And then ICT you feel like at times don't come to the party also".* This was confirmed by P4 who stated that there were *"systems crashes that take place, but one can understand that this was the*

implementation of a new business model". Other participants also alluded to the inadequate capacity of the system to carry the load that was brought about by the migration.

> *"I think the systems get overloaded"* (P20).

> *"The system is not stable. Not being able to log on"* (P18).

> *"The system crashes because there's too much traffic on it. So, they need to install larger and more updated servers, or they need to rent space, enough space on servers so that the system won't crash"* (P21).

The systems challenge had a huge impact on the functioning of the institution particularly with the submission of the assessments. Students trying to log on for submission at the same time in large numbers, overloaded the system and caused it to crash. The subsequent effect of the crash would then be failure to submit on time and requests for extensions. According to P18:

> *"Every day there's some sort of issue and then everybody's just like, you know, welcome to Unisa or it's handling 3-4 hundred students queries a day because it was the assignment due date, and the students couldn't submit because this system crashed".*

From the data it is suggested that the institution may have not been adequately prepared to handle the transition to online delivery smoothly and efficiently without any disruptions. P2 indicated that even prior to the commencement of the process, they already wondered, *"Are our systems ready for these changes? For me, systemic and systematic changes, do we have resources to really move into this online delivery?*

Dissatisfaction among the students has the potential to harm the integrity of the institution. Continued systems disruptions are not ideal for both the institution and the users. In this era of social media usage, students vent their frustration out on various platforms with the possibility of damaging the image and reputation of the institution. As soon as the system crashes, students communicate on social media with one another and the world at large. This concern was raised by P5:

> *"On the negative side is that we make reality as we go along. We are learning from our mistakes and it's not good to make mistakes in public. Hence, we have so much negative publicity and it just breaks one's heart to see how things are being done".*

5.6.3.7 The impact of loadshedding

Loadshedding in South Africa refers to the periodic outage of the electrical power supply to prevent the collapse of the whole system. It is very disruptive for the whole society. On the socio-economic front, it affects businesses and employers negatively. This results in job losses owing to poor performance of the businesses. The education sector is not spared from the effects of loadshedding. Students need electricity to perform their tasks. In the era of online teaching and learning, it is imperative that a constant supply of electricity be provided. For an ODeL institution such as Unisa to achieve its goals, a constant and stable supply of electricity is critical.

Data from this study indicated loadshedding as a stumbling block in the performance of various tasks by both staff and students.

> "*At the end of the day, this loadshedding also has an impact on your online learning*" (P8).

> "*Well, loadshedding is affecting all of us, that is the whole country, including our students*" (P22).

The institution does provide back-up generators on the campuses, but the power generated is not sufficient to cover all activities. Since Unisa is an ODeL institution, the students are based in various parts of the country where loadshedding will affect them in their spaces.

5.6.3.8 Inequality among students

The nature of ODeL is that it attracts students from different parts of the world with diverse backgrounds. As described in Chapter 1, the profile of Unisa students indicates that there is diversity in terms of geographical spread, language, economic activity, technical skills, and academic literacy. This places a huge demand on the institution to provide adequate support to those students who are not at par with the rest especially in technological skills. Data indicate that Unisa does receive some students who cannot operate a computer. It is, therefore, the duty of the institution to upskill such students. To this effect, one participant states:

> *"But as we move into that era of technology, we need to take cognisance of the demographics of South Africa so that we do not leave other people behind. Those who do not have resources to do so, because education in any case, is a right to everyone"* (P25).

Another participant emphasises the need to support students who may not have access to the required resources owing to their economic backgrounds:

> *"Well, we have to consider the socio-economic problems we're facing as a country at this period of time because not everyone can afford the digital thing like your computers, your laptops and everything"* (P23).

5.6.3.9 Diverse skills levels among academics

Inequalities also exist among staff in terms of technological skills. Academics are not equally competent in technology. On the one hand, there is a critical mass of

academics who have taken it upon themselves to keep abreast with developments in technology, then there are those who have attended various training interventions provided by the institution. On the other hand, there are those who have not moved from the print era and are dragging down the process of migration to online delivery. One student participant observed:

"From a holistic point of view, I would judge most lecturers as very competent, and yes some might need a few trainings here and there, but I think with a bit more training and a bit more improvement with the system then the lecturers, I think can be much better" (P23).

Other participants noted the disparity in technological skills among academics as being glaring and quite concerning. P20 puts it succinctly that, *"not everybody is technologically on par"* while another participant explains the situation in more detail thus,

"I think you've got two different types of academics. I think we still have a cohort of academics who are not computer literate. It sounds a bit unbelievable, but I work with them. And it's very frustrating for the rest of us to work with people who cannot edit a Word document" (P18).

One participant referenced a study conducted among academics to determine their technological skills:

"I know that in my study we found out that people don't have computer skills, basic computer skills, just opening the computer and finding files within their computers, resetting their passwords. And when I say people, I'm talking about everybody, including the professors and management" (P14).

Another participant observed:

"At Unisa sometimes not everybody is at the same level of either understanding or skills and capabilities to do what needs to be done. There are very varying degrees. Some people are excellent and other people really need a lot of guidance and handholding and training and development to get to that place and where they can offer fully online and teach for the online" (P15).

The diversity of skills among academics is a concerning matter because they are expected to drive online teaching and learning. Those who lack the necessary skills for this approach may not be able to support the students as expected. P21 expressed grave concern with this situation, "*my other concern is, and this is very concerning to me. The reality is most of the academic staff don't even know how to develop printed learning material".*

It is indeed concerning because the students rely on the academics for their tutelage. Therefore, their academic knowledge must be supported by adequate technological skills for that purpose. P19 voiced uncertainty in how this shortcoming could be addressed*, "I don't know how we going to bridge that gap in terms of digital skills, digital literacy, but this also applies to our academic staff members".*

5.6.3.10 Concerns about quality and integrity

When the COVID-19 pandemic struck and the lockdown was implemented, the institution had to urgently find alternative approaches to assessment. The lockdown began in March 2020 at the point when Unisa students would be preparing to sit for their venue-based examinations from May. It was in the interest of the institution not to compromise the students' progress by not assessing their performance for that semester. They had to apply alternative assessment methods to the usual venue-based examinations. As a result, summative assessments for that semester were conducted online.

It would, however, appear that the integrity of the assessments suffered somewhat because there was inadequate preparation for the assessments to be taken online. Students were also not fully prepared for the assessments. P4 observed in this regard that, "*it is generally assumed that students were able to work together in groups during summative assessment sessions*". This meant that the summative assessments for that semester were not fully reliable. The same participant further expressed the view that, "*there's a huge concern now about assessment and integrity*" (P4). Another participant introduced the element of authenticity during online assessments particularly in work-integrated learning:

> "*What I am a little bit worried about is authentic learning and teaching in terms of work integrated learning, which is now in a lot of modules, being replaced by project-based learning and they talk about simulated work experience, but the thing is that at the moment with the technology we can't really fully simulate a work situation. I'm sometimes a bit worried that we're getting so involved in the technological side of things that we neglect aspects where you do need authentic experiences*" (P1).

Data suggest that the migration to online delivery, if not properly managed, will lead to compromised quality and integrity. The concern is expressed by P15 thus, "*and I just hope that whatever gets done is of quality because it's almost easier with things online to substitute quality*". This is supported by another participant who suggests that training will be needed to ensure that quality is maintained as delivery of teaching and learning migrates to online.

> "*I think it's going to have an enormous impact on the quality of our qualifications and the credibility our qualifications because as I said, the training in terms of how to operate the system lag*" (P21).

Of greater importance is the speed and agility with which the institution moves to cover the bases and fill the gaps brought about by the migration to online delivery.

Unisa being a massive institution tends to take a while to implement changes and the circumstances in this instance did not accommodate that slow approach to change. Confirmation of this notion is provided by P6 as follows:

"But now with this semi-chaotic environment where we have to get into transitions and move from one phase to the next of our lives. The disruptions, we don't have time for our quality assurance processes to mature because they are forced, we are forced to come up with quality assurance instruments now. And that's not in our nature to do things. We sort of take forever to mature".

A stable and tight quality assurance system is necessary in an institution of higher learning. The recognition and integrity of qualifications from an institution is influenced by the ability of the institution to maintain high quality standards in the processes of and around teaching, learning and assessment. Where there is doubt about quality of processes the integrity of the qualifications tends to suffer somewhat. According to P6, if this happens:

"We will be seeing elements of quality that are not on par with what we should be designing, delivering, or even implementing in our classroom from design, even from ourselves as instructional designers. We would be seeing particular corners that would be missed because we do not have a quality assurance system that is designed to be agile, and responsive in this semi chaotic environment".

There is a sentiment that Unisa will lose its credibility if quality standards are not adhered to. It is the view of P21,

"In five years' time Unisa is going to be an institution that nobody with any pride in them will want to be associated with because our qualifications are going to lose credibility. It's just a fact, nobody's concerned about quality".

5.6.4 Benefits of online delivery

One goal of Unisa of the strategic plan is that all modules must be offered fully online by 2030. All activities henceforth should be focused on the achievement of this goal. Some participants alluded to their role in the achievement of this goal, for instance, P9 stated that *"my role is to make sure that Unisa is achieving what it's required, especially on the print and online. So, yes, my role is to make sure that the Unisa achieve its 2030 strategy"*.

Besides this process of migration being a strategic direction that the institution has charted, data present ways in which various stakeholders stand to benefit from online delivery of teaching and learning. Benefits were identified for the academics, instructional designers, electronic originators, students, the institution, and the community at large.

5.6.4.1 Benefits for the academics

Teaching and learning at Unisa, being a distance education institution, has always meant that there is hardly any interaction between the students and the academics. Traditionally, students received their learning material through the postal services and later as PDFs on myUnisa. They would then be left to work through the material on their own or with peers in a small group. Formative assessment would be completed mostly in the form of assignments also submitted either by mail or through myUnisa. Summative assessment would be conducted through venue-based examinations. A student could easily complete a module without ever interacting with the responsible academic individually or even in a group.

The online dispensation provides an opportunity for a different approach to teaching and learning. The e in ODeL provides a platform that academics and students can use to interact. Migration of delivery to online means that academics can facilitate learning beyond making the learning material available to students. P7 states in this regard that,

"It is making a constructive contribution in terms of improved learning facilitation in the sense that online learning makes it easier for us to engage the student and facilitate the process of constructive engagement right from the start to the end".

Engagement with the students means that lecturers can respond to questions, provide explanations and guidance where needed, leading to improved performance in general. Academics note that working online improves their functioning.

"You know things are easier. Reports are made easier. We have access to so many different platforms and apps and resources that really make things a lot easier. If I think of how I used to have to go knock on people's doors for a paper-based response to how everything is now collated in a central place" *(P15).*

"The way the academics will be doing things it's going to be a little bit easier for them; easier and quicker than previously" (P9).

A notable advantage for all is the bridging of time and distance through technology. According to P22, in this context,

"*It's nice because now we can work anywhere. Yeah. I mean, we can work from home anytime, anywhere. So, it's actually nice. It has made life quite easy. In terms of that".*

Another advantage of working online from an ID perspective is that learning material can be adapted easier and quickly. Whereas the printed materials could not be adapted once distributed to students, with online delivery, the academic can always make amendments to the learning material during the course of the semester or

year. This is impacting the roles of academics, instructional designers and electronic originators.

5.6.4.2 Benefits for the electronic originators

Even though the role of electronic originators has not changed drastically, they also pointed out some advantages of online delivery for their function. The benefit derived for them is in the smooth and quick processing of learning materials for uploading on the LMS. Online delivery makes it easier to interact with other role-players as well. This is most important for electronic originators because their input comes at the end of the process.

P8 notes, for instance,

> *"I think it will improve in certain areas because it also teaches one to keep on learning something new and we mustn't be afraid of taking a challenge. And you need to keep abreast up-to-date with the changes".*

5.6.4.3 Benefits for students

Students, being the clientele in the academic project, stand to benefit most from the migration to online delivery. Even though they may be hampered by lack of resources to perform efficiently in an online environment, when they do participate in online activities, their learning experiences are enriched. In the words of one participant, "*for the student also, they might be complaining now about maybe the things that are not yet in order. But then it's going to be good for them*" (P10). This was elaborated by P7:

> *"Online learning underscores active learning by making sure that the students are engaged right from the start, especially if we can integrate continuous assessment with that. So, online learning provides all the affordances for that type of active learning for students and also making it easier for the students to work on different platforms at the same time".*

This notion was supported by P1, who stated:

"I think that as we grow into the system, it promises to make learning more active, to promote active learning if it is applied well. That is the requirement though, if it is applied well, if it is designed well, then I think it promises positive developments in learning and teaching more active learning and teaching, more interactive learning, and teaching. Also, in terms of assessment with continuous assessment being implemented more fair assessment".

One student participant expressed the same view and elaborated on how online learning is benefitting them:

"But having to learn now using myUnisa, information being given electronically, I think it has helped a lot because one is able to communicate. You can get information in the quickest time rather than to wait for information to be delivered. Even when it comes to you, don't even have to make a phone call because you can just send an e-mail. You can have a conversation electronically, even with the lecturers. So going digitally, I think it's an added bonus or it's helping a lot because I do have access to electronic media" (P25).

The efficiency of communication with the institution, particularly the academics, emerged as an important benefit for the students. In an ODeL environment, it is imperative that students be provided with channels of communication with the academics since they do not meet face-to-face on a daily basis. It is important to bridge the distance and technology provides that solution. This point was made by two participants as follows:

"The impact will be felt by our clients, the students that are out there. They will really, really feel to say now there's a change in terms of their approach

and also in the way that we need to learn at Unisa, so that will also have a great impact on the students or clientele" (P2).

"They can also have all their other interactions with peers and other knowledgeable people you know, on other social media in an informal manner. I think online learning is better suited to the needs of the distance education students" (P7).

Student participants in the study also pointed this out as a benefit they are deriving from online delivery.

"But speaking for myself, I think really it has helped a lot. It eliminated that panic and that delay in terms of getting information on time" (P25).

"So, it's an opportunity for the online because you receive your material on time, there are no delays because you can easily access them online without waiting for the post that you don't know when it will arrive. And if sometimes there are strikes, you don't receive them on time and the assignment due date sometimes you miss that, so accessing online it's very convenient to the student. I find it very effective" (P26).

5.6.4.4 Benefits for the institution

Unisa was established as a distance education institution more than a century ago. Over the years it has developed into an ODeL institution. Focus, in current years, is on the full development and implementation of the e element of ODeL, being electronic communication. Migration of teaching and learning to online delivery is the biggest step towards the achievement of the 2030 Unisa strategy. This step is necessary to keep Unisa abreast with developments in the ODeL space and at par with its competitors as observed by P22:

"It's gonna make life way too easy, I think because remember now people are talking about the Fifth Industrial Revolution or something like that. And so, having a system like this, which is fully online system is making us on par with the world system as well".

Competition with peers is critical because the ODeL space is becoming highly contested particularly after the onset of the COVID-19 pandemic when contact institutions realised that they could employ technology to bridge the teaching and learning distance. Essentially, the pandemic introduced some contact universities to the space previously set aside for Unisa and other distance education institutions. Attracting and keeping students is, therefore, a point of serious competition among institutions. For Unisa it could be considered as an unfamiliar phenomenon because in the past the institution did not have the need to compete for students. P10 notes in this regard that, *"we are changing so that we can be better. We are changing so that we can attract more students"*. And it is the responsibility of Unisa *"to prepare them for the world of work and what is to come in the world"* (P15) by exposing them to technology through the e of ODeL. Moreover, the need to attain a competitive edge is important to dispel the myth that Unisa is an alternative institution that students only consider as a last resort. P2 asserts that,

"If we move to online we'll have an impact in terms of those that see Unisa, as a last resort. I suspect many people will have shifted to say now it was one of the best things. No longer a last resort".

Another benefit for the institution lies in the improvement of systems within the institution. An example provided by one participant is the summative assessments which are no longer venue-based. At its inception, it was a strange practice which was faced with many challenges but as the institution matures into it, there is a promise for smoother assessment processes. This is summarised by P2 as follows:

"There'll also be an impact in terms of our systems. What systems we need to have in place for students that are learning online. For example, we know we have changed our exam systems. Already there will be an impact to say now you no longer have the venue-based exams. You have the timed exam online and so on. There'll also be an impact in terms of the institution".

Data further suggest that online delivery stands to improve the profile of the institution among South Africans because its impact will be felt by communities where students are based. Two participants brought this notion to the fore:

"It's the biggest step that the institution can make to improve the lives of South African students who opt for studying via an ODeL model" (P4).

"The impact is that the institution will be able to achieve its mission of reaching out to communities, offering the ODeL institution and us as individuals, also will support it the way we should so that we can achieve the mission of implementing the ODeL teaching" (P21).

Data around this theme indicate that the institution responded to the prevailing technological environment by taking the decision to migrate all academic activities to the online space. The strategic decision was that this process would unfold slowly with 2030 as the target for its completion. Furthermore, data further suggest that the onset of the COVID-19 pandemic and the resultant lockdown put a spin on the plan and accelerated the process. This meant that the readiness of all stakeholders for online teaching and learning was significantly challenged. While there was general appreciation for the quick decision to move all academic and non-academic activities to the online platforms, participants lamented that the process was generally chaotic and disruptive. As the migration process is still being refined, there is appreciation among participants of the various benefits that stand to be derived from it once it has reached fruition. Participants were probed about the timing of this migration to online delivery to determine whether Unisa is adequately responsive to technological

175

advancements. The general view is that the response is rather late, particularly that it was fuelled by the COVID-19 pandemic. There are, however, participants who maintain that the institution is moving at the right pace when placing it within its geographical context even though comparatively with its international peers; it is rather behind schedule.

The focus of the study (ID) led to revelation by the data that the ID processes follow a team approach as a guiding framework at Unisa. This developed into another theme from the data and is presented next.

5.7 Theme 3: The Framework for a Team Approach (FTA)

The FTA emerged as a significant element of the ID processes at Unisa. Participants were asked about their understanding of the FTA, whether they follow it, their role in it, their views about its continued relevance and recommendations for its improvement, if any.

5.7.1 The FTA process

The FTA derives from Unisa's Tuition Policy as a framework that is intended to guide the ID processes at Unisa in general. It is therefore imperative that all its purported users should be aware of it. These users include the instructional designers, academics, electronic originators, language editors, librarians, graphic designers, and many others who are referred to as stakeholders in the FTA. Each stakeholder has a specific and defined role to play in the ID process. Participants were asked about their understanding of the FTA and their role in it. Most participants demonstrated knowledge and understanding of the FTA and its intended purpose.

> *"FTA refers to a team working together to develop a module, but I still say I witnessed that, and I guess it worked very well because the first thing when people say we develop a Form 1 where each and every specific discipline has to say what they will contribute, that's teamwork to develop firstly a qualification and going down to a module"* (P16).

"The FTA is the vehicle that takes us through the process of qualification design and module design. The very essence of the various steps of the FTA propose on how it used to be done" (P5).

The most important element of the FTA is the team effort. It is intended to guide the roles of the various stakeholders in the ID process. This was recognised by some participants as considerably critical to the process.

"Team approach where the lectures, the people from the DCDT, the educational consultant form a team where they discuss the study material before it can start being developed for printing" (P9).

"We don't work in isolation. And you know, there are different departments, directorates, persons, stakeholders, students, and services that all need to come together to put out at the end of the day a module on the table, our curriculum on the table, and quality offering to our students" (P15).

"There are various experts in various fields, and they must all collaborate to deliver an end product. For instance, with the sourcing of the images" (P19).

One of the participants explained the mechanics of the FTA in more detail and emphasised that it is an approach used to confirm commitment to the process by the various participants who sign a certificate of due diligence (CDD), *"and this contracting formalises our relationship. So, I think we follow that process to the letter because we even have to report on it on a weekly basis"* (P3). P7 added that they *"would regard the FTA as a guidepost"*. Or even a "*sort of a consultative framework that gives guidelines to how you go about designing programmes*" (P13).

There were participants who were not fully conversant with the FTA even though they are from the stakeholder groupings according to the framework. P22 is one

participant who was completely oblivious of the FTA, *"I have no idea what that is. What is team approach?"* But after listening to the explanation of what the FTA entails the participant conceded,

> *"I didn't know that we had a formal framework put in place. I think it's good to have. Well because if you are gonna be working alone, I mean, like, that's a lot of work"* (P22).

P11 also indicated that they were not fully knowledgeable about the FTA:

> *"I've always known about the framework, and I didn't know what it all entails. So, I've read the documents with regards to the framework, and which explains it a lot better. And I can have a better understanding and of how it all comes together. And when it comes to online and who fits where and who works with what. And I found that it's more. It's not just, it's not just a narrow thing. It's a very broad, how can I put it? There's a lot of people involved in getting things online for the students and making sure that everything is up to date".*

The essence of the FTA as indicated by the data is that ID is a process that cannot be efficiently completed by a single individual. It requires participation by various role-players, each bringing their expertise to the process to enrich the final product. The premise of the FTA is that teams tend to be volatile when not properly managed. Therefore, the framework endeavours to manage the team by guiding the specific contributions from various role-players. P20 concluded that the FTA is a necessary tool for effective management of the ID processes:

> *"I think for me it's about working in a group. This is my understanding. I think it's a very, very good model to do. We can't develop things on our own. It's about having support from different departments. It's about learning from each other. It's about developing competencies".*

5.7.2 FTA stakeholders and role-players

The stakeholders and role-players in the FTA are identified according to the needs of each project. There are, however, basic ones such as the responsible academic, the instructional designer, the language editor, the librarian who will feature in every ID project. The framework sets out the stages where each role-player features in the process which makes it easy to apply. One participant described the composition of the team in some detail as follows:

> *"From my experience, it has been the integration of the different administrative and academic departments, so it was working together with the EC's and with print production, with the people doing the audio-visual stuff, the people doing the development for our differently abled students. Umm, who else was there? Language services. Yes, very important. Lots of time going into the communication between us and language services. So much time. And then academic planner"* (P18).

Another participant listed some of the departments that form part of the FTA process as follows:

> *"We also work with sister colleges. And then departments like DCDT who are supporting us in all the steps. But then also AIMS and DPAR, DSAA, DSAR, DISS. And then when the actual writing is taking place, SMPD, language services editing. So, there's a whole lot of people involved in the various steps and the various steps are also not in isolation"* (P15).

P8 had additional views about the composition of the team and the contributions of the various role-players:

> *"All the relevant role players meet. They come together from the different departments, which is on the project team, and everybody is held equally*

accountable for the quality and the success of the project to achieve a shared goal. And everybody knows exactly what they should be doing, for example there's a project leader, and then there's a secretary that maybe takes notes and then you find there's an EO. There's a quality person. There's a DCDT person. The lecturer is there, the author, the external author. You know everybody like the copyright person is there. So, everybody that's gonna play a role in the finishing of the product is there".

It is interesting that this participant stated that all role-players know exactly what to do as per the FTA because another participant expressed an opposing view that suggests that the FTA fails to provide clear-cut guidelines on the role of each member of the team.

"We also mention the various stakeholders that must be there. One of the grey areas is not having listed particular aspects that the role players must play, and that also led into, I mean at times some form of competition, some form of nonpartisan to say, no but I was just listed here. I don't know my role and I don't know my purpose. So, I think we should have expanded it a little bit more" (P2).

Additionally, there is a suggestion that some of the stakeholders may not have a sufficiently clear role to play in the process. As P6 purported, *"I sometimes find that of all the stakeholders that are prescribed in the FTA some of them are pretty irrelevant"* (P6)*.*

Despite this mild criticism of the role-players, the FTA is generally viewed in a positive light by the participants. A few participants highlighted the benefits of following the FTA during ID projects.

5.7.3 Benefits of the FTA

The FTA is applauded for bringing together stakeholders to play a variety of expert roles. Its benefits to the role-players and to the ID process is rooted in team development and team management theory. The participants emphasised the value of interacting with others in a team as an enrichment of self and of the process. P8 states, for instance, in this regard that when you follow and work within the FTA,

> *"It broadens your horizons. It embodies trust. And you appreciate the different frames of thinking, and it encourages unity to see that you know what, people can work together".*

The participation and contributions by different role-players bring added richness to the product. Participants also noted that an important process such as the ID of programmes and modules in an institution as large and comprehensive as Unisa, cannot be completed by individuals single-handedly. It requires diverse skills and expertise.

> *"I don't think we can do anything by ourselves. I believe that. We need to bring together all kinds of knowledge, skills, experience, expertise even different personalities to module development, even student support strategies and services that we design; it cannot be one person's brain"* (P14).

There is also a view that working with others in a team alleviates the workload of each role-player because the work is spread among the team members. This is expressed as a positive point for the application of the FTA:

> *"I think it's good to have. Well because if you are gonna be working alone, I mean, like, that's a lot of work. If you are gonna work with other people then it means it reduces the workload on your side as well as a primary lecturer and also it also helps then working with other stakeholders as well, like your reviewers because they assist with quality assurance"* (P22).

Similarly, P5 agrees with this notion that working in a team helps to lighten individual workloads of the role-players,

> *"The FTA helps with being structured and it provides direction and in a way, it provides some relief working with other people from SMPD. I think I tend to do more than what I'm supposed to"* (P5).

Another benefit of working as a team is cited as making it possible to see the full picture of the expected outcome because as a role-player you are exposed to what individual team members are due to add to the project. According to P9, *"you must understand when you working as a team you've an overview of what's happening before the study guide can be printed or designed online"*.

An important contribution of the FTA to the academic project is the role it plays as an additional quality measure. Participants indicated that working with others in a team provides another layer to the quality assurance regime.

> *"I think from a procedural point of view. I do believe that it's important for lecturers to work in consultation. Also, it creates another level of quality, and it creates standardisation in terms of departments knowing that they've done the right thing"* (P13).

> *"The FTA process is there; somebody needs to check your work. Somebody needs to help you"* (P18).

A quality assurance measure established by the FTA process is the appointment of a critical reader for each ID project. Critical readers are ideally experts in the field of the module under development. They are mostly sourced externally from either the relevant industry or other institutions of higher learning. One participant emphasised the use of critical readers as an important element of the FTA as follows:

"I would say the team approach works well, even if it's not only academics. If I have to get a writer and I'm the academic critical reader and I give it out to another academic in another institution to do critical reading of the content, especially because I specialize both in content and methodology in ODL, but also we need a critical reader out there to critical read the content that's still a team that works around a module to design and to develop a module" (P16).

5.7.4 Challenges with the FTA

Even though the FTA is generally viewed in a positive light as a guiding framework for the ID processes at Unisa, it is not without criticism. One participant indicated that not every person favours the idea of teamwork. There are those who prefer to work alone on projects. Their view is that in a team:

"Interpersonal conflict also arises, and some people might piggyback on others that is working and not accountable for the task at hand. In time, feedback is delayed because some prefer also to work on their own and some want to work in a group and then that dynamic is also there, whether you like it or not, it's there" (P8).

These are valid views, however, it must be noted that working in a team requires a team leader whose responsibility is, amongst others, to manage the interpersonal relations of the team members for achievement of the common goal. One other participant was very critical of the FTA stating lack of value in its application, *"I thought for me to like an obstacle that I have to get over because I personally do not see the value in it. Some of my colleagues have told me that they've had value from it. I personally don't see the value in it. It's a paper exercise for me"* (P21).

It should be noted that the negative sentiments about the FTA were expressed by few participants while the general views were in support of the framework.

5.7.5 Relevance of the FTA

Participants were of the view that the FTA is still relevant for ID however, there were suggestions for its light review in line with the changing technological environment. P3 stated for instance, *"I think it is still relevant and we can't do without it because we haven't actually mastered it and followed it to our satisfaction"*. The emphasis still lies on the importance of working in a team as asserted by the FTA. Participants expressed positive views about the need to work with others regardless of the environment. Therefore, the FTA is perceived as a pillar in the ID process for collaboration and cooperation and teamwork. Participants stated the following in this regard:

> *"I think no man is an island and we're a huge ship at Unisa so, I don't think you can work out of a team approach in all the different facets from qualification, conceptualization all the way through to the finalisation of your material"* (P15)*.*
> *"There's definitely still a need for the team approach, but maybe we must add the layer of new technologies across all facets of the team approach"* (P19).

There are opposing views about the relevance of the FTA in the technological era. Some participants believe that it is more relevant now while others state that its relevance is declining. The view expressed by P21 is that the FTA is needed to assist in the process of empowering role-players in the ID process to design for online delivery:

> *"I think the FTA is even more relevant now because people don't know how to design for online and they need help with designing for online and they need help with designing assessments. So, the FTA is definitely relevant there"*.

Further support for its continued relevance is voiced by P6 who suggested that the framework needs some revision, *"it's well grounded by the way, it needs revision at the moment, but it's still well-grounded a framework from our curriculum policy"*.

Other participants did, however, point out the diminishing relevance of the FTA to the technological environment. This view was also evident in the data detailing the various stakeholders and role-players in the FTA process. The data suggests that the framework was developed with the printed study material in mind. For instance, P1 stated:

> "*The issue of team members and stakeholders becomes even more important I think with technology, you know, the more you involve technology because you're gonna need more stakeholders, more parties coming to the design to help"*.

To bring the FTA to relevance to the online environment, a few participants made recommendations for its improvement.

5.7.6 Recommendations for improvement of the FTA

Linking with what one of the participants intimated about some of the role-players being irrelevant, a recommendation was made for the revision of the workflow to ensure that the various role-players feature at the right stages of the process. A proposal is made as follows:

> "*What could change though could be perhaps the stages, because of the technological infusion we might like to tweak a little bit of the stages and how they happen. Because we have too many role players that are feeding into the system and that might actually affect some of the workflows and I've seen it in the risk register that some of our role players actually can affect the smooth running of the process itself, so they need to be checked or they need to be engaged further"* (P3).

One participant put this criticism succinctly that the system has *"too many people, too many role players"* (P12). The data suggests that the role-players may need to be revised because some of those mentioned in the current FTA are no longer relevant to the current technological environment. This participant expressed confusion about the naming of the role-players because the FTA does mention EOs as role-players, *"I don't know where we fall, because they talk about the technical team which is web editors and graphic designers. So, I don't know what they completely mean by web editors"* (P11). There is, however, an effort under way to revise the FTA and one of the considerations is the changing of the terminology used. The naming of the role-players might be reviewed in the process:

> *"Well, yes, we are adapting it in terms of terminology and a little bit in terms of process. But, you know, the thing is at the moment the FTA speaks to the context we are now, it has to do that because it has to give us guidance for where we are now"* (P1).

Another EO is displeased with the point at which they get involved in the ID process. According to this EO they only get involved at the tail-end of the project. Their view is that they should start with the project and interact with the other role-players from the beginning to make their contribution effective and valuable:

> *"I think I should actually be in the beginning, but unfortunately this is how it works. I'm the last step and it's a problem because if, let's just say for instance, I get a study guide now and it's wrong, it must go back to language services. And when it goes back to language services, it's another process. And between language services and me, there are other people involved. Because before the job comes to my table, it must go through planning, coordination, and all these other people"* (P12).

The composition of the team must be addressed through the addition of relevant role-players as proposed by this participant:

> *"To help with advice and the practical technological skills. If we're going to eventually be involving things like, you know, gaming or even virtual reality or things like that, we're gonna need more technical people, and I don't think we've got enough. For example, for years, well, I've been saying that we should have people like the artists, but who are dedicated to making interactive learning objects and animations and that kind of thing and Unisa just doesn't have that, and I think Unisa is going to have to get that. So, we'll have even more people joining the team"* (P1).

It was determined that the FTA is based on the ADDIE approach to ID. ADDIE is an acronym from the five steps in ID, i.e., analyse, design, develop, implement and evaluate. P4 explained the ADDIE thus:

> *"The FTA is based on the ADDIE model. It's informed by the ADDIE model whereby when you meet up with the lecturer and you had your initial discussion you analyse the module and then you embark on the design phase and then the new design is developed and implemented and then at the end of that particular cycle it is evaluated for instance, student module evaluations are done and those then are used as input for the analysis".*

P1 agreed about the relationship between the FTA and the ADDIE approach by stating that, *"it's an elaboration of the ADDIE model in a way, because it's sets out those steps that should be followed when you're using a design down methodology"*.

A shortcoming noted by some participants in the application of the FTA as having its origins from the ADDIE is that it does not cover all the five steps that were unpacked by P4 in the quotation above. Two participants indicated that their roles

tend to end at development leaving them in the dark about the success of the product that they helped to develop.

> *"The FTA is based on the ADDIE model and ADDIE model has the I for implementation and the E for evaluation, but we tend to stop at the D, the second D. We don't do the I and the E which means we do half the job" (P6). "We don't get feedback to determine whether the learning design that we developed, whether it's actually working from this for the students to see, you know, whether the learning design is effective or not. So that needs to be incorporated"* (P7).

The recommendation made in this regard is that the instructional designers should be involved in the background during implementation and evaluation to provide a full picture of their role according to the ADDIE approach.

A further recommendation for the improvement of the FTA is that it should take advantage of the technological environment by reducing its reliance on face-to-face interactions among the various role-players. This will save time and other resources.

> *"Perhaps how it works might change a little bit, sort of face-to-face meetings or engagements, we now doing them online and forms that are filled in might be, collated in a different app or whatever the story is. Reporting might be using smart data"* (P15).

The recommendation if developed further by suggesting the use of smart data as a tool for reporting. P3 supports the need to use technology to expedite various activities in the ID process:

> *"If we had a system that is meant mainly as a project management tool, for facilitating those kinds of formalities online, we would cut on the downstream*

problems of having to wait for the CoD and the author to sign or the critical reader to be appointed".

There was an observation that *"the FTA is process based, sometimes linear, but also multifaceted in nature"* (P3). Therefore, a recommendation was made to address this concern. *"But I do think that maybe we should stress more the need for iteration. There needs to be this constant iteration between the steps"* (P1).

The data on the FTA suggests that there are divergent views about its value and continued relevance to the changing technological environment. However, the majority view is that the importance of the FTA should not be questioned. There are, however, some shortcomings emerging due to the changing technological environment with consequent suggestions and recommendations for adjustments to the framework in response to these changes. The dissenting view is from a very negligible minority. While discussing the FTA, some participants mentioned its relevance within the 4IR environment with the latter emerging as a strong identifiable theme from the data.

5.8 Theme 4: Responsiveness to the 4IR

5.8.1 Understanding the 4IR

The 4IR is a concept that is being used in many different contexts; educational, political, economic, financial, technological, and more. The researcher enquired whether the participants understood what the concept entails. They were asked to explain the 4IR, in their own words, according to their own understanding. The responses received generally focused on the impact of technology on daily lives as part of the explanation of the 4IR. Three participants highlighted the impact of technology on social life to present their understanding of the concept.

"It represents change in the way we do things, in the way we live, in the way we work and relate to one another" (P10).

"It deals with the fundamental change in the way we live, the way we work, and the way we relate to one another" (P9).

"Generically my understanding around 4th Industrial Revolution is that the way that we have enhanced how we do a lot of social activities, social life, how we do life" (P2).

The common thread among these three quotations is that the 4IR is affecting daily life and consequently, how humans interact with one another. Education being part of human activity is not excluded from this "daily life". Further to that, there were references to the interaction between humans and technology as part of the description of the 4IR. According to P14, *"Fourth industrial revolution generally is about the mixing of the technology and real life. In my simple understanding is transcending life and using technology"*. The basis of the description of the 4IR as a technological development was emphasised by P3, *"the 4th is your deep application and dependence on technology and machine learning, you know the use of machines to direct our activities. The use of machines to manipulate things and processing of information happens faster"*.

Other participants placed the 4IR within the historical context of civilization as a successor to previous industrial revolutions. They indicated that the 4IR is a phase which will most probably pass like the previous industrial revolutions. However, they lay emphasis on its positive impact on human life. One participant stated in this regard that:

"It is a phase in the civilization of human beings which really presents great opportunities to humankind to the improvement of life for humankind in almost every sphere of life. And, of human life. Let me say that and this revolution has that potential to improve and in fact to level playing fields in so many ways" (P6).

In the same vein, others averred that:

"It's another period in our history and I think the Internet was the beginning of the 4IR and how the world just opened up. Information is accessible and people are accessible, and things are just changed because of the Internet" (P15).

"It's a vague concept that I find very interesting. The 4th Industrial Revolution is nearly becoming, people are saying there's a next wave, but let's say it's the new wave of technological development" (P19).

Some participants lifted specific elements of the 4IR in an attempt to demonstrate their understanding of the concept. P9 stated for instance, *"I can describe it as an advance in Artificial intelligence, robotic. It's a rapid change to technology, industry, and society as a whole"*. Mentioning only two elements of the 4IR in its description suggests that this participant may have a limited understanding of the concept as the 4IR comprises many more elements which were presented in chapter three of this study. A more comprehensive description of the 4IR was proffered by P11 thus, *"the 4th Industrial Revolution for me is, everything is automated, Internet based"*. While there may be an element of truth to this statement, this automation is considered by others as a threat to humans because it could render them jobless. This is the view of P12, "*fourth industrial revolution for me I think it's a way of taking people's jobs*". Again the description here demonstrates a narrow understanding of the concept.

Having established the level of understanding of the 4IR concept by the participants, the research proceeded to enquire about its impact on the roles of the various participants. These roles were described in section 5.5.1 of this chapter. The researcher sought to establish whether the various participants were impacted by the 4IR in their various roles and how this happened.

5.8.2 Impact on role-players

The first set of role-players who responded to the questions around the impact of the 4IR on their role are the instructional designers. One participant expressed the importance of knowledge of the particular subject in order to be able to provide adequate support in the design and development process:

"The instructional designer must know what 4IR offers in a particular subject. And so there must be a basic - not that deep - but just a very basic understanding of what 4IR does or can do and especially in an educational setting" (P4).

This has not always been a requirement for instructional designers at Unisa. The suggestion is, therefore, that the role has been elevated somewhat by the changing environment bringing new demands on the instructional designer. This is alluded to by another participant who lamented the impact of the 4IR on their role from the perspective of an increased workload:

"My work will become more complicated, but hopefully I don't know if only this can be achieved that we have fewer modules to work on because I would like to see us do more quantity, I mean more quality and less quantity. I think it will enrich our roles immeasurably and it will be very exciting, but it will make it more complicated as well" (P1).

One of the electronic originators was disinclined towards the introduction of new technology and the impact it might have on their role. The view they expressed suggested a sense that they were intimidated by the likely impact of technology on their role.

"They're getting rid of print. Now we're gonna do online and online is limited. So where do I fall in? I'm no longer designing like I want to explain to you I'm no longer designing. I'm just copying something and I'm pasting it

somewhere. That's what I'm doing. I'm no longer designing. I'm no longer laying out, I'm just checking if everything is fine the way it is. The only thing I'm doing maybe is the icons. I animate the icons and I animate the banner. But that's it" (P12).

There was also the possibility of resistance to change. P11 quoted experiences from another country to suggest that print might not be completely done away with. This would mean that the role of the electronic originator would not be immensely affected.

"I know that some countries, instead of letting the students go onto tablets, they went back to printing for the handbooks that the tutorials, yes they went back for printing, and I know Australia was one of the countries that did that because they feel that the students weren't learning enough on the tablet. So, they went back to printing" (P11).

On the other hand, there were participants who expressed enthusiasm to perform their role within the 4IR environment purely because they felt that they are sufficiently prepared for the changing environment.

"We are ready to any changes that will go the technological way, so it won't affect the electronic originator negatively at all" (P9).
"As EOs, we are using software to enhance our work as graphic artists" (P10).

This software requires the users to undergo training to equip them with the necessary skills to use it efficiently. Two participants noted in this regards that:

"The way that the software works is totally different than what we used to. Yeah. So basically, it's the software that we use. You need to be adaptable and change because this software keeps on changing to adapt to the environment and what the clients need" (P11).

193

"You are forced to go and learn new ways of living, the new ways of working, the new ways of relating, and having meetings and it's a world where artificial intelligence plays a role, cloud computing, robotics, 3D printing" (P10).

The academics also noted the need to learn new approaches to remain relevant to the technological environment, *"we have to be able to adapt and evolve and that means changing the way we do things, changing our comfort. Your role, as an academic, needs to adapt to the pedagogies that suits the various technologies"* (P15). Emphasis was placed on the need for training.

"First step: let lecturers understand what is meant by fourth industrial revolution. They must be taken on board what is meant by fourth industrial revolution. All the digital devices that are put in place, they must be made to understand what these devices are and how can you use them in teaching and learning" (P17).

The general view among the academics was the prospect of a simplified way of performing their functions. They maintained that technology brought about by the 4IR can only simplify the many facets of their work. This is, therefore, a positive step.

"It simplifies my teaching. It simplifies our way of communication, our way of addressing them and their way of talking to us and their way of comprehending other things that they have to do related to their modules" (P16).
"It's made it so much easier for me because information is available everywhere, so the last couple of years my module development has become easier than ever. It's made my job so much easier, so I don't have to spend hundreds of hours writing case studies" (P18).
"It makes life both easy and more difficult, but I think it gives flexibility which is good, and I think it gives especially Unisa students flexibility. We don't just have students that come out of school and that are not working" (P20).

The anticipated impact of the 4IR on the various roles of the participant suggest that approaches to ID might need to be revised in line with the changing technological environment.

5.8.3 ID in the 4IR

The data indicates that Unisa is making a concerted effort of responding to the demands of the 4IR. This is evident in the plan to migrate all teaching and learning activities to the online platform by 2030. P15 asserts in this regard that, "*Unisa as an open distance learning institution that can have a much more flexible educational model*". This flexibility of the model may include an element of blended approaches where students do not yet have access to technology. However, the general direction taken is of fully online delivery for all modules.

This places demands on all role-players in the academic project and since technological skills are not equally present among them, there is also a need to develop those who should be brought to a sufficiently operational level of technology. For the various role-players:

> *"It just means that I need to think outside the box. It just means that I cannot do everything by myself. With the speed of technology, I need to have people that I can always bounce ideas with, because as a lecturer I can't know everything. But I can come to you and ask for help when I need it."* (P14).

The point about interaction with colleagues and other role-players is emphasised as a necessity for effective functioning within the 4IR. *"I think one can understand the industrial revolution even better by engaging more with people and getting different perspectives"* (P5). From an ID perspective, interaction with other role-players is of paramount importance. This explains the intention of the FTA premised on the notion that ID should be a team effort with the instructional designer taking the lead. At

Unisa they are assigned as project managers. Their importance in the process is noted by other role-players:

> *"We need a person like an instructional designer so that me as a lecturer I'm bringing in content and instructional designer is bringing in the pedagogy. And how this topic can be handled using different digital devices and this person would advise me I'm bringing in content I don't know but an instructional designer is knowledgeable about how to do let me say module settings and then after my module settings how to upload, where to upload my materials and which technological devices should I use for different topics, you know he or she would advise me by saying, "No, you can use blogs for this."* (P17).

The preceding statement suggests that instructional designers are expected to be fully knowledgeable about the various technological tools that can be applied to facilitate teaching and learning. It suggests that instructional designers should be ahead of the pack with the application of technology for education. One of the instructional designers painted a picture of their thinking around the use technology for education in the 4IR era:

> *"How do I let technology assist me in doing this kind of design? As such you start to identify various technological tools that can assist you in that. And when you implement those, well, when you utilize those tools. That is how 4IR will affect what you do"* (P2)*.*

The whole focus of the ID process is on the student. In the context of the 4IR, the purpose of ID is to ensure that students are equipped with the skills necessary for functioning in the technological environment. Participants proffered ideas of how technology can be used to develop these skills for students. They generally indicate that the ID process should begin at the end by describing the expected outcome then working backwards to design the learning experiences.

"I think it's just to look at that whole. What is the end outcome of doing all of this when we design a qualification. We want certain attributes of our graduates. We want certain exit level outcomes and if we take that end goal in mind and we design backwards in our instructional design to achieve that and then bring in all the tools and all the processes of what 4IR holds" (P15).

"*I think maybe we need to also start right from the beginning when we design our modules, we need to purposefully pick the skills. What skills do we want in the learning content? We should look at the skills we want our students to have so they can fit into the future. So, maybe think more consciously also not just about how to package the learning content, but how do we package the skills."* (P13).

The emphasis here is that ID should not only focus on delivering learning content but also on developing technological skills that students need to use to navigate the 4IR environment. These skills do not necessarily need to be taught separately as per the data but could be weaved into the learning content. The question which instructional designers and academics should then grapple with is, *"How do we combine the skills with the learning content?"* (P13). The ideal approach is *"harnessing the skills set through the learning content and then also coupling that with different types of technology"* (P13).

A positive observation from the data is the availability of various technological tools that are intended to make the ID process easier, efficient and more effective. What is expected of the various role-players is to develop a broad knowledge and understanding of these tools to apply them to the ID process. According to P14, the starting point in this regard is to ask: *"What kind of tools are we talking about, or do we think we can use to bring together a team of instructional designers to develop modules that appreciate technology?"* And in response*, "one would really, really need to understand our role as an instructional designer to say what is the role of*

instructional designer and depending on the approach, if you are using the ADDIE model" (P2) where and how can you use technology to enhance the ID process?

One of the tools mentioned in the data for possible application to the ID process is analytics. This is made possible by the use of algorithms that are part of the 4IR technology. Two instances in the ID process are suggested where analytics can be used. Firstly:

> *"FTA is primarily based on the ADDIE model and thinking about learning analytics at the A part of the ADDIE and including that maybe would be one way of improving on the FTA ensuring that the analysis part is not done manually, but it we use the information from the learning analytics that would have been in real data"* (P7).

Secondly:

> *"I'm also thinking that in terms of project management, learning analytics can help us a lot, you know, so that we would have like a dashboard in terms of how for your module development is and then it's easy"* (P7).

These were primarily examples of how analytics could be applied to the ID process at Unisa. Furthermore, there were examples from the data of the application of 4IR elements in teaching and learning.

5.8.4 Examples of 4IR in teaching and learning

To demonstrate their understanding of the 4IR, participants advanced examples of how it is and could be used in teaching and learning. It is intriguing that most of the participants mentioned two specific elements of the 4IR which were discussed in Chapter 3 of this study, namely, robots and artificial intelligence. There was also mention of other elements as well but not as much these two. Data are presented

here to indicate all mentions of the 4IR elements and how they can be used in education.

One participant explained that artificial intelligence can be used to assist the teacher with certain tasks:

> *"And to my knowledge, for instance, AI can help you to reduce repetitive tasks and also from what I've read that one should not feel threatened by technology. You must regard it as something that will help you and it will increase your outputs"* (P19).

Two participants mentioned robots:

> *"You know for every module there should be a designed bot that can take care of the general kinds of questions that students submit to lecturers on a daily basis and that also provides students with let's say confidence in the online learning experience because they will see that it's useful, that it works, and that it's human like, if I could put it like that"* (P4).

> *"The issue of using robots and what I haven't yet seen that happening in my context, but I understand that other people can still appoint the robot to stand there and talk to people and teach"* (P16).

On virtual reality and augmented reality, two participants cited examples of how these can be used in teaching and learning. The first example applies to the veterinarian discipline.

> *"And then in learning, technologies like virtual reality and augmented reality would be very valuable. This is actually what simulated work experience would be like. Let's say you're training the animal technician who's got to go and inject a cow. If he puts on or she puts on that headset and could feel like*

a cow in front of them and have to handle a syringe and hold it correctly, you know, and but this can all be done in a virtual reality world as a simulation, you know, if we have that of course" (P1).

The second example is from teacher education where student teachers perform teaching practice in the absence of the lecturer, especially in the ODeL context.

"I need to think how they operate within the classroom, how they can use visual, or how I can use, for example, virtual reality to help them see certain things or module or a portion of module and how they can apply technology themselves in the classrooms" (P14).

The use of mobile technology was also indicated by one participant as a resource for education:

"But today any person anywhere with this small little phone or a phone with basic features can access quality education that can prepare them to take part equally with someone who was born advantaged in the best part of the world" (P6).

Participants also mentioned the other elements of the 4IR in general terms:

"We talk about big data, Internet of Things, and things like that. So, we have moved slightly into a technological language and things that we have never seen before" (P3).

"You are forced to go and learn new ways of living, the new ways of working, the new ways of relating, and having meetings and it's a world where artificial intelligence plays a role, cloud computing, robotics, 3D printing" (P10).

"Architecture students can design something using electronic software, which is what architects do these days. They don't draw by hand anymore. And upload it for assessment. Or the engineering students do engineering drawings using a computer programme instead of by hand because in workplaces that is used for engineering drawings. They don't draw by hand anymore" (P21).

These were examples from the data of how the 4IR can be harnessed to deliver teaching and learning in an ODeL context. The examples indicate that Unisa staff have some ideas about the 4IR and how it can be used in their context. One participant commented in this regard, *"in ODeL we need technology to survive. So, we should actually investigate as many possibilities as possible that we can identify where the technology of the fourth industrial revolution can help us"* (P19).

The limited number of 4IR elements in the data suggests; however, that there is still some lag in knowledge of the 4IR. P5 observed this shortcoming, "*the fourth industrial revolution proposes very good things about what we can do. But can we function at it's optimum? I don't think we're at that point yet"* (P5).

5.9 Conclusion

This chapter presented an analysis of the data in its raw form. The analysis was conducted with the use of Atlas.ti version 22 which is a type of CAQDAS. It revealed four broad themes in line with the research questions and a number of sub-themes within each of the themes. Presentation of the data was organised according to the identified themes and sub-themes. Direct quotations from the participants were used to provide authenticity of the data. The data revealed four broad themes with varying numbers of sub-themes of each theme. The first theme identified was around Unisa's ID processes where participants specified their different contributions as well as the models, approaches and theories that they apply. It emerged from the data that instructional designer at Unisa is a team effort based primarily on the ADDIE approach. There was also mention of other theories such as andragogy,

constructivism, connectivism and community of inquiry as applied to ID processes. The data further pointed to the application of the FTA as a guiding document for ID at Unisa. Secondly, the FTA emerged as a strong theme which was discussed in detail. The data revealed that users of the FTA are generally satisfied with it. However, there were some recommendations for its revision to bring it in line with current technological developments. The third major theme was Unisa's response to technological advancements through migration of all teaching and learning to fully online delivery. Participants were divided on whether this move was overdue or timely. However, the general view from participants was that it was not an orderly transition. Data presented various challenges that arose from these migration. The last theme identified from the data was the 4IR, which is a major contextual focus area for the study. Participants shared various views about the 4IR and its perceived impact on their roles. However, they mentioned only a few elements of the 4IR, suggesting a limited understanding of the concept in general. In the next chapter, an interpretation of the data will be presented. This will be done following the themes and sub-themes as identified in this chapter.

CHAPTER 6

6. INTERPRETATION OF THE ANALYSED DATA

6.1 Introduction

The previous chapter presented an analysis of the data collected by applying the methodology described in Chapter Four. In this chapter, the researcher provides an interpretation of the analysed data. Links are drawn between the theoretical background presented in Chapter 2 and the literature reviewed in Chapter 3 with the focus on addressing the research questions as stated in Chapter 1 of this study. The interpretation of the data follows the themes and sub-themes which were developed from the data as presented through the findings in Chapter 5.

The general research question sought to establish how responsive Unisa's ID model is to the 4IR. This research question was unpacked into four sub-questions which provided a sharper focus on its intended outcome. The interpretation of the data is presented in response to the four sub-questions as stated in Chapter 1, which are:

- What is the nature of Unisa's instructional design model?
- How does Unisa's instructional design model support the prevailing learning contexts of students in the era of the 4IR?
- What is the relevance of the FTA to the instructional design model in the era of the 4IR?
- How could Unisa's instructional design model satisfy the demands of the 4IR?

6.2 Unisa's ID processes

The sub-question of relevance to this theme sought to establish the nature of Unisa's ID model. ID processes generally follow selected theories, models or approaches. A selection of models was discussed in Chapter 3 of the study, namely, the Dick and Carey Model, the Leshin, Pollock, and Reigeluth Model, the ASSURE model as well

as the ADDIE approach. These models and approaches are based on broad learning theories and a selection was presented in Chapter 2 of the study. These include the chaos theory, constructivism and connectivism.

Two major sub-themes emerged from the data about ID processes at Unisa. Firstly, Unisa ID processes follow a team approach which is guided by the FTA. The notion of working in a team can be linked to the theory of social constructivism as discussed in Chapter 2 of this study, which underscores the importance of working together in a learning context. According to social constructivism, interaction among role-players is critical for success in the learning environment. The inclusion of different role-players in the ID process is premised on this theory of social constructivism. Various participants described their roles in the ID processes, demonstrating the team approach and its strengths and shortcomings. This linked directly to the definition of design as presupposing "multiple working steps carried out by several people" (Seel, Lehmann, Blumschein & Podilskiy 2017:7). The data demonstrated that the various role-players have a clearly defined role in the process. However, it emerged that the electronic originators' role was becoming compromised in the online dispensation. This would suggest a review of the FTA to define the roles clearer, particularly for the electronic originators. The FTA further developed into a separate theme which is discussed later in this chapter.

Secondly, P1 - P7 suggested that the Unisa's ID processes are based on the ADDIE approach which was discussed in Chapter 3 as the foundational framework for many models of ID (Chen 2011:81). The first three steps, i.e. analyse, design and develop are completed by the team comprising various role-players which are led by the instructional designer as the project manager who was described as a change agent in the data. The fourth step of implementation is carried out by the academic and to a limited extent, the students. The findings further suggest that there is a shortcoming where the evaluation step of the ADDIE is not adequately addressed. This was emphasised by P1 who indicated the role of evaluation in the iterative nature of ID processes. In the literature, the ADDIE approach is criticised for its

rigidity and linear format (Seel *et al* 2017:74). However, there were hardly any negative views about the ADDIE from the data.

Unisa's ID processes appear to be solid as deduced from the data. There may be a need to review the FTA slightly to address the separation of roles in the process to avoid overlaps and gaps in the process. The data emphasised, however, that the FTA is still relevant to the current ID environment at Unisa.

6.3 Migration to fully online delivery

In responding to the advancements in the technological sphere, Unisa embarked on the process of migrating the delivery of modules from print and blended to fully online delivery. The strategic plan is to have all modules fully online by 2030. The migration to online delivery of teaching and learning sheds light on how Unisa's ID model supports the prevailing learning contexts of students in the era of the 4IR. The data demonstrates that the process of migration was not managed in an orderly fashion. For instance, P8, P15 and P21 described the process as chaotic and messy. In Chapter 2, the chaos theory was discussed as part of the theoretical framework for the study. The premise of the inclusion of this theory is that it is useful for the explanation of the characteristics of modern societies such as diversity and the speed and unpredictability of change within them (Lancu & Lanteigne 2022:133).

The characteristics of chaos as explained in Chapter 2 are evident from the data pertaining to the migration process at Unisa. The complexity of chaos is its first notable characteristic. Data from this study suggested that the migration process to online delivery at Unisa was very complex. This is evident from the number of challenges that were cited by the participants. The challenges ranged from increased workloads to lack of support to diverse skill levels among both staff and students as well as the impact on quality and integrity of the offerings.

The second characteristic of chaos is non-linearity which means that chaos does not follow order. The findings about the chaotic and messy nature of the change taking

place at Unisa align with this characteristic of chaos. Furthermore, P1 and P3 indicated that the linear nature of the current ID processes at Unisa is a shortcoming because it does not allow for iterations which are necessary for a changing chaotic environment. This point relates directly to another theme which developed from the data, i.e. FTA. This is discussed later in this chapter in more detail.

The third identified element of chaos is dynamism which implies unpredictability in the system. In Chapter 3, the dynamism of the current technological environment was discussed with reference to its impact on education. The data confirmed that a chaotic and dynamic environment can also be unpredictable. In this instance, P4, P8, P11, P14, P15, P27, P19 and P21 all agreed that the process may have been carefully planned but as it unfolded, it degenerated into chaos. This is a result of its unpredictability. According to the chaos theory, a slight change in the initial conditions can affect the whole system in a significant manner. In the case of Unisa's ID processes, there were changes in the initial conditions which affected the system. For instance, changing from venue-based to online assessments had an enormous impact on the whole system affecting, students, academics and administrators in various ways.

The analysis also revealed conflicting views about the timing of the change. Regarding this, P3, P5, P6, P10, P14, P15, P18, P20 and P21 opine that the change was long overdue while others thought it was on time. The data further suggested that there were diverse technological skill levels among staff and students. Those who thought it was overdue were ostensibly participants with advanced technological skills who had been impatient with the institution to implement the migration process, while those with limited technological skills considered the process as timely. The discussion of connectivism as a learning theory highlighted speed as a factor in the sustenance and longevity of knowledge with Foroughi (2015:13) stating that the time between the introduction of knowledge and its obsolescence is very limited. Taking into consideration this speed at which technology advances, it would suggest that Unisa is behind schedule with its

process of migration to fully online delivery since the plan targets 2030 for completion.

The data further suggest that the process was fast-tracked by the outbreak of the COVID-19 pandemic and the resultant lockdown period. According to Szabó, Kóródi, Szél, and Jagodics (2021:153), "the COVID-19 pandemic forced teachers to use online tools and methods regardless of their motivation, experiences or competences". There was an urgent need as Deschaine (2021:3) stated that "teachers" became an open-ended definition as many educators appropriately struggled to effectively provide content in new modalities with little, if any training". In the case of Unisa, data suggest that the institution may have been lax in its approach to the migration process if the pandemic had not struck. There would have been no urgency to introduce online assessments, for instance, which brought about confusion and frustration for students when it was implemented. This points to another finding of lack of support by management for both staff and students. The general expectation is that the current connectivist environment is applicable to all students. However, many students are based in very rural areas where technology is not yet sufficiently mature to sustain the educational experience from teaching and learning to assessment. For those students, the migration to fully online delivery is an exclusionary step. For its part, the institution made laptops and data available for needy students. However, the network and bandwidth issues are beyond its control. This is complicated further by the fact that it is the responsibility of the government, not Unisa, to provide the networks for socio-economic development.

The issue of bandwidth is highlighted as a critical factor in the success or failure of online teaching and learning. In Chapter 1, the number of Unisa students was presented at 397 801 in 2020, the year of the COVID-19 outbreak. Data suggest that when Unisa embarked on the process of migration, adequate provision of bandwidth was not implemented because 397 801 is a very high number of students to make provision for in a developing country. This resulted in system crashes especially when students were uploading their assessments because they would

access the system at the same time in large numbers. Consequent to the system crash, students would fail to submit their assessments on time. This had an impact on the quality and integrity of the online assessments. In this light, P4 mentioned expressly that the integrity of assessments in the year of migration was questionable. There were no tools available to invigilate the online examinations, for instance, and the sudden surge in pass rates is indicative of this lapse.

A further finding from the data is the increased workload for academics brought about by online delivery. The traditional ODL mode of teaching and learning did not provide for interaction with the students. Academics typically sent out the learning material to the students and left them to their own devices. Interaction was at the initiation of the student where they needed clarity or assistance from the academic. According to Bravo, Flores-Alarcia, González-Rubio, *et al* (2022:10), "a greater workload for professors leads to greater anxiety and stress, especially due to the increase in the number of hours spent in front of the computer to tend to the students' demands". This is evidenced by the number of academic participants who cited increased workload as a challenge.

The online dispensation, on the other hand, makes provision for interaction with the students. This observation was made by Tynan, Ryan and Lamont-Mills (2015:13) that, "new teaching tools and pedagogies have increased both the number and type of teaching tasks undertaken by staff, with a consequent increase in their work hours". The "e" in ODeL provides a vehicle that academics can engage synchronously or asynchronously with the students. This places more demands on the academics to prepare for such interactions in that way increasing their workload, especially in non-teaching related tasks (Szabó *et al* 2021:152). It is for this reason that P5 noted interestingly that the online dispensation puts pressure on the academic to be adequately prepared when engaging with students because there is no chance to go and refer for answers to students' questions.

Linked to the increased workload is the preparation of the academic staff for online teaching through training. According to the findings, there were many training interventions offered. However, their focus was mainly on the new LMS. The double transition presented a challenge for the staff and students alike. While adapting to the online environment, the institution also introduced a new LMS based on the MOODLE platform. This caused some degree of uneasiness. For instance, P8 pointed out the frustration caused by a simultaneous change from blended to online and from SAKAI to MOODLE. This showed a lack of proper change management on the part of the institution. Furthermore, regarding the subject of change, the analysis indicated that there was a level of resistance to change among some staff members, particularly those who did not possess adequate technological skills to operate in the online arena. Hence, P4, P9 and P15 alluded to the resistance to change among staff which also calls for a strategy to manage the change.

The phenomenon of loadshedding was also cited as a challenge for online teaching and learning. Loadshedding means that there cannot be any guarantees for access to the Internet at any given time. Online assessments were most affected by loadshedding because some students were unable to access the network during the period of assessment leading to frustration for all involved parties.

Besides the numerous challenges experienced during the transition to online delivery, the data present significant benefits for staff, students, the institution, and the community at large. Online delivery provides tools for bridging the distance between the institution and the students to enrich the academic experiences of the latter. The social constructivist view of learning as discussed in Chapter 2 underscores the importance of interaction with others for success in learning. In the ODeL context where students do not physically meet with one another, technology is the one vehicle that is used to facilitate the interaction. Migrating to online delivery, therefore, makes this interaction possible, in that way benefitting all stakeholders because online education supports "social negotiation and inter-personal construction of meaning through collaborative discussion with peers and tutors"

(West, Hill, Abzhaparova & Alexander 2023:2). This collaborative approach to learning is premised in constructivism and has led to the development of the community of inquiry framework, which was mentioned by P1, P5 and P13.

The community of enquiry framework identifies three presences that are necessary for success in online teaching and learning, i.e. teaching presence, cognitive presence, and social presence (West et al 2023:2). Teaching presence refers to the facilitation of learning offered by the teacher in an online setting. Cognitive presence is the construction of knowledge by students in an online environment. The framework postulates that this process takes a different format from that which happens in a face-to-face environment. Social presence refers to the ability of students to participate in a learning environment. Boling, Hough, Krinsky, Saleem and Stevens (2012:120) concluded that students benefit more when there are interactions with staff and peers through the use of technology. It should be noted that making this interaction possible was earlier considered as increasing the workload of the academics by some participants. However, the benefit is more prominent with some academics emphasising that online teaching makes their work easier to manage.

6.4 The FTA

The FTA was a notable element of the interviews as the third sub-question sought to establish its relevance in the prevailing technological environment. It developed into another theme from the data. Almost all participants alluded to following the FTA in the ID processes. They described their roles in the process with clarity, safe for the electronic originators who expressed a level of confusion about their role in the online dispensation. Electronic originators explained that during the print and blended delivery, their role was clearly defined but in online delivery, there seems to be overlaps between the roles of the academics, the instructional designers and the electronic originators. One example cited was the responsibility of uploading content on the module sites. The FTA, having been drafted during the era of print delivery, is silent on this responsibility. Participants proposed a review of the framework to

align it with the process of designing for online delivery. This revision should clarify the roles of all stakeholders in the design and development of learning materials for online teaching and learning.

Unisa's ID processes appear to be solid as deduced from the data. There may be a need to review the FTA slightly to address the separation of roles in the process to avoid overlaps and gaps in the process. The data emphasised, however, that the FTA is still relevant to the current ID environment at Unisa.

6.5 The 4IR

The 4IR is the broad technological context for the study. It featured in three of the research questions as the context and developed into a theme in the data. In Chapter 3, the 4IR was discussed in detail. This discussion included its various elements which continue to develop at an alarming speed. The research sub-question focusing squarely on the 4IR sought to investigate how Unisa's ID model could satisfy the demands of the 4IR. To adequately address the question, the researcher enquired about the participants' understanding of the concept of the 4IR. Interestingly, no common understanding of the 4IR emerged from the data. The responses indicate that the participants generally have a limited comprehension of the concept of the 4IR. Their focus was mainly on the impact of the 4IR on daily lives. Furthermore, their knowledge of the elements of the 4IR extends to AI, robotics, IoT and 3D printing. The other elements as discussed in Chapter 3 of this study were hardly mentioned by the participants. Even those who expressed enthusiasm to apply 4IR technologies could only mention these few elements. This casts doubt on their ability to respond to the demands of the 4IR in their respective roles in the ID process considering the array of 4IR elements that exist and continue to be developed.

An inquiry into the impact of the 4IR on the roles of the participants in ID revealed that there were those who saw it as a threat. It is in this view that P12 stated that 4IR is a threat to job security, while others saw it as adding to their workload. Xu,

David and Kim (2018:92) stated in this regard that "artificial systems that rationally solve complex problems pose a threat to many kinds of employment" (Xu *et al* 2018:92), but they further contend that 4IR "offers new avenues to economic growth". The general view among participants was that the 4IR will make their work easier to perform because "customized robots will create new jobs, improve the quality of existing jobs, and give people more time to focus on what they want to do" (Xu *et al* 2018:92). Therefore, they alluded to the need to upskill themselves to keep abreast with 4IR technology. In this regard, the findings revealed that the institution offered training even though the focus was on the new LMS rather than on the technological advancements brought about by the 4IR. P1 conceded that more learning still needs to happen in the technological affordances of the 4IR.

The data further revealed that role-players in the ID process rely on instructional designers to lead and guide them. Academics, for instance, have in-depth knowledge of their discipline. However, they generally lack the pedagogical knowledge and skill required to facilitate learning, particularly in a technological setting. This finding impresses upon the need for training and upskilling of all role-players in the ID process which according to the findings should be provided by the instructional designers. This puts immense pressure on instructional designers to advance their technological skills faster than all other role-players. From the findings, it would appear that instructional designers at Unisa are not advancing their technological skills at the requisite pace.

6.6 Conclusion

This chapter provided an interpretation of the data in response to the research question and accompanying sub-questions. The data collected succeeded in providing adequate responses and further explanations to the research question and sub-question. The question on the nature of Unisa's ID model was addressed through various responses which pointed to the FTA and its origin as the ADDIE approach. The roles of various stakeholders in the ID process were extensively described. In response to the second sub-question, the findings focused on the

process of migration from print and blended modules to fully online delivery. There were conflicting views about the timing of the change with some participants suggesting that it is timely while others strongly holding that Unisa is a late adopter in this regard. Issues and challenges experienced from the migration process were highlighted. The many benefits to be derived from the migration were presented in the data. Unisa's ID was described as supportive to students. However, issues of concern were raised around the technological and administrative support that is not adequately provided to students. The FTA was described as a useful tool in the ID processes at Unisa. Its continued relevance was emphasised by the data and some revision was suggested to align it with the prevailing technological context. This step would make the FTA fully responsive to the 4IR environment. The 4IR was further discussed with the data showing that there is a limited understanding of the concept. Moreover, the findings showed that the most commonly known elements of the 4IR are robotics, ID and IoT. The other elements as discussed in Chapter Three of this study were hardly mentioned by the participants. In the following chapter, a summary of the study is provided. The researcher also makes some recommendations based on the findings of the study. The limitations of the study are also briefly explained.

CHAPTER 7

7. SUMMARY OF THE STUDY, LIMITATIONS, CONTRIBUTION AND RECOMMENDATIONS

7.1 Introduction

In the previous chapter, an interpretation of the findings from the analysed data was presented in response to the main research question and sub-questions. The researcher provided links between the four sub-questions and relevant responses from the data. The current chapter concludes the study by providing a summary of the study, including the summary of the main findings, accounting for the contribution of the study, proposing some recommended actions, pointing out the limitations of the study and proposing possible extensions for future studies.

7.2 Summary of the study

Chapter 1 began with a discussion of the background to the study which included the description of its various contexts. The macro-context was indicated as the 4IR technological environment while Unisa as an institution provided the micro-context. The description of the micro-context included a brief historical overview of Unisa as an ODeL institution followed by a discussion of the profile of Unisa students. It showed the diversity of Unisa students particularly with regards to their technological abilities where some are "digital natives", and others are "digital immigrants" (Prensky 2001). The 4IR environment as the macro-context, and the demands it places on education was discussed in brief in Chapter 1 with an elaboration of the four characteristics of an industrialised system and how these apply to the ID processes. The outbreak of the COVID-19 pandemic and the resultant lockdown period was also discussed as part of the context of the study owing to its impact of society in general and education in particular. Furthermore, links were drawn between the concept of industrialisation and distance education using the four characteristics of the former concept as advanced by Peters (2007). The

characteristics are the division of labour, regularisation, rationalisation of activities and the application of technology.

Following the orientation and background, a problem statement was drafted and a rationale for the study developed. To address the identified problem, the main research question was set with four sub-questions. This gave rise to the main aim and the four objectives of the study. The research question was, *How responsive is Unisa's instructional design model to the 4IR?* The four sub-questions were:

- What is the nature of Unisa's instructional design model?
- How does Unisa's instructional design model support the prevailing learning contexts of students in the era of the 4IR?
- What is the relevance of the FTA to the instructional design model in the era of the 4IR?
- How could Unisa's instructional design model satisfy the demands of the 4IR?

A brief definition of the main concepts ID, ODeL, 4IR and responsiveness were defined in this chapter to give the reader a clearer understanding of how these concepts would be applied in the study. This chapter closed with an outline of each of the chapters that follow it.

In Chapter 2, the researcher provided a theoretical framework for the study. The chaos theory was discussed as the main theory underpinning the study. The three elements of chaos were identified as sensitive dependence on initial conditions, non-linearity and unpredictability. Factors that influence chaos and the limitations of the chaos theory were also discussed in the chapter. Furthermore, the learning theory of connectivism as postulated by George Siemens and Stephen Downes was presented as a supporting theory to the chaos theory. The elements, principles, limitations, and relevance of these theories to the study were discussed. This was followed by the description of yet another learning theory as a second supporting theory, i.e., constructivism, whose elements, limitations and relevance to the study

were discussed. It was shown how the three theories connect. Chapter 2 concluded with an explanation of how these theories would be applied to the study.

Chapter 3 presented an integrative review of the literature focusing on the main concepts of the study. Existing literature on the concept of ID was reviewed. This review yielded a presentation of the definition of ID, its history in brief, principles, and selected models. The presentation also touched on the role of instructional designers. The literature on the 4IR was also reviewed and presented in this chapter focusing on the background, definition, components, affordances, and challenges brought about its implementation. In addition, the concept of Education 4.0 was introduced and its link to ID demonstrated. Chapter 3 closed with a review of the literature on the concept of responsiveness. Flexibility was identified as one important element of responsiveness particularly in the educational context.

Chapter 4 outlined the research design and methodology for the study starting with a description of the site of the study being Unisa and placing it within the context of the COVID-19 pandemic and the 4IR. The selected research paradigm, research approach, and research design for the study were presented, motivated and substantiated with the relevant literature. The population and sample were described with an inclusion of the research instruments that were used to collect the data. The procedure for collecting the data was identified as virtual individual interviews. For the data analysis, the CAQDAS selected for the study was Atlas.ti version 22. It was used to analyse the data which yielded four main themes and several sub-themes which were presented in Chapter 4. To ensure that the study can be accepted as being authentic and ethical, the elements of credibility and trustworthiness were explored as they applied to this chapter. In closing the chapter, five ethical considerations applied to the study were described, i.e., full disclosure, informed consent, risk to participants, voluntary participation, and privacy. The researcher explained how each of these elements of ethical research were applied to ensure that the study was conducted in an ethical manner that caused no harm to the participants and the environment.

In Chapter 5, an analysis of the data was presented. The researcher read through the transcripts of the interviews and identified responses which were aligned to the research sub-questions. The verbatims were loaded on to the Atlas.ti platform where they were used to develop four main themes and several sub-themes. Each theme and sub-theme was supported by the relevant verbatim quotations from the data to confirm its authenticity. Chapter 6 consisted of the researcher's interpretation of the data in response to the research sub-questions. Links were draw between the theoretical framework discussed in Chapter 2 and the literature reviewed in Chapter 3. This final chapter provides a summary of the study, key findings in brief and limitations of the study. The researcher also discusses the contribution of this study to the existing body of knowledge and makes recommendations based on the outcomes of the research. All the chapters begin with an introduction and end with a concluding paragraph. A list of consulted references is provided at the end of the study.

7.3 Main findings

The main research question in this study was to determine the responsiveness of ID in ODeL to the 4IR environment. A set of sub-questions were developed to guide the study towards a response to the main question. The research focused on Unisa as the research site and unit of analysis owing to its nature as an ODeL institution operating within the context of the 4IR.

7.3.1 Unisa's ID processes

The findings revealed that ID at Unisa is led and project-managed by the instructional designers with the assistance of the academics. There are other role-players involved at different stages of the process. Another finding is that the ID process at Unisa is based on the ADDIE approach which is described as linear and inflexible in the literature. From the ADDIE approach, Unisa developed an approach in the form of the FTA which provides the framework for guiding ID process. The FTA developed as a separate theme.

7.3.2 The FTA process

The study found that ID at Unisa is a team effort guided by the FTA which specifies the various role-players and their contributions to the process. However, there seems to be overlaps and resultant confusion about certain roles in the online dispensation. The general view from the data is that the FTA is still applicable and relevant to the online environment. A minor review is needed to streamline the activities of the various role-players to avoid overlaps and possible gaps.

7.3.3 Migration to fully online delivery

The main finding from the analysed and interpreted data is that Unisa has responded to the demands of the 4IR environment by taking the strategic decision to migrate delivery of all teaching and learning to fully online. The plan is to complete this process by 2030. The findings revealed that this step was timely but chaotic in its implementation. A finding related to this step is that the workload of the role-players was significantly increased by the migration to online delivery because it requires extensive preparation during ID and continuous interaction with the students. The latter was not present as part of the job description of the academics during print delivery. Another related finding is that the support provided to students during the migration process was inadequate. Students struggled to access the LMS owing to reasons ranging from lack of resources, poor network, systems crashes and incessant loadshedding. Inefficiencies in the IT system were also identified as a challenge to the process. Whereas the Unisa systems were developed to carry a certain amount of traffic, the increase brought about by the migration of more modules to online delivery led to an overload to the system.

7.3.4 Responsiveness to the 4IR environment

Responses to questions about the 4IR revealed that there is no common understanding of the concept. The 4IR is a nebulous concept for most of the participants. It, therefore, stands to reason that the various participants are not adequately responsive to the 4IR environment. On the part of the staff participants,

there is still a need for upskilling technologically to meet the requirements of the 4IR environment. Students also need to be able to operate efficiently in the online environment for maximum benefit from their studies and preparation for the 4IR work environment.

The findings also revealed that there is limited knowledge of the various elements of the 4IR technology. AI, robotics IoT and 3D printing are the only three elements mentioned by most of the participants.

An interesting finding from the data is that 4IR is considered as a threat by some participants who fear that technology might limit their job security. However, there is a strong view from the data that 4IR technology makes life and work easier, but to keep abreast and to benefit from it, continuous training is needed.

7.4 Contribution of the study

The purpose of every research study undertaken is, among others, to enrich the existing body of knowledge. This study is no exception. The main aim of the study was to determine the responsiveness of ID in ODeL to the 4IR environment. This determination would also identify possible shortcomings in the current ID process' alignment with the ODeL context and the 4IR environment. In Chapter 1, the researcher stated one of the objectives of the study as the development of a model of ID at Unisa that can satisfy the demands of the 4IR. This objective was not realised because the findings revealed that the FTA, based on the ADDIE approach, is still relevant to the ODeL context and the preferred approach by participants. However, minor amendments may be required to align it fully with the 4IR environment. A development of a new model is, therefore, not recommended.

From the migration process from print and blended to fully online delivery at Unisa, the study revealed the need for a change management strategy when implementing large scale amendments to processes to avoid confusion, frustration and loss of credibility. This is a lesson to be learnt by institutions of higher learning in general.

Increased workload was cited as a consequence of the migration process. It would appear that the institution had overlooked this possibility. This study has revealed the level of dissatisfaction brought about by unintended increases in the workload of staff. This study contributes to making institutions aware of the need to manage staff workload as part of managing change.

7.5 Limitations

The research process encountered some challenges which resulted in limitations to the data collected. The identified challenges proved to be beyond the control of the researcher. These are briefly described in the next sub-sections.

7.5.1 Individual instead of focus-group interviews

The data collection procedure consisted of individual interviews only. The initial plan was to conduct focus-group interviews with the sampled students. However, this became untenable owing to various reasons. Firstly, the researcher, being a non-teaching staff member, battled to identify students for the sample. Secondly, being in an ODeL institution, some students are in full-time employment. Therefore, it became a challenge to find a suitable time to accommodate the interviews. These challenges were unforeseen in the planning of the study. Thirdly, incessant loadshedding made it difficult to conduct interviews because the network becomes unstable when there is no electricity. To address these challenges, the researcher requested permission from the Ethics Committee to convert the data collection method to individual interviews and it was granted. This allowed a much flexible arrangements with the participants who agreed to participate in the study.

7.5.2 Reluctance to participate in the study

Another limitation encountered was the reluctance of participants to be interviewed. The initial plan consisted of seven electronic originators. However, only five of them availed themselves for participation. This means that there may be a gap in the data.

In terms of the student participants, the initial plan was to conduct focus-group interviews with two groups of five participants each from the CEDU and the CEMS. Owing to challenges mentioned earlier, the researcher resorted to individual interviews and only students from the CEMS agreed to participate in the interview. The interviewed students were from postgraduate courses only. The researcher found it difficult to convince student from undergraduate courses to participate in the study. It would appear that at undergraduate level students did not already have an appreciation of the value of research. This was a significant limitation of the study because instead of ten students only four postgraduate students could participate in the study resulting in another possible gap in the data.

7.5.3 Gender imbalance

A notable limitation is the gender imbalance among participants. Even though gender was not an important variable in the data, absence of the male voice from the data can be viewed as a limitation of the study. The researcher experienced reluctance to participate in the study by males among the electronic originators and the academics suggesting another possible gap in the data.

7.5.4 The impact of loadshedding

The impact of loadshedding in South Africa is felt in all spheres of life. This study was not spared from the effects of lack of electricity at selected times. Since data collection was done virtually, it was necessary to have uninterrupted power supply. Loadshedding made it difficult to achieve that. For example, focus-group interviews could not proceed because the participants were in different parts of the country and loadshedding occurs at different times in each area. It was, therefore, impossible to find a timeslot when all participants would have uninterrupted power supply.

7.5.5 MsTeams

MsTeams was used as a channel for data collection. One of its advantages is that it transcribes the interviews as they happen. However, its shortcoming is that it did not capture some of the accents of the participants with accuracy in the transcription.

To address this, the researcher had to listen to the recording and make corrections to the transcriptions.

7.6 Recommendations

The following recommendations are made from the findings of the study. To the DCDT, the following is recommended.

- Review the FTA to align it with design and development for online delivery. It is important to ensure that the FTA excludes steps such as layout and printing and includes steps relevant to the online environment.
- Clarify and streamline the roles of all stakeholders in the FTA to avoid overlaps and gaps. The findings revealed that there is no clarity regarding the responsibility to upload material on the module sites between the electronic originators, instructional designers and academics. This led to confusion and possible friction among the role-players in the ID process.

To Unisa as an institution, the following is recommended.

- Adopt an agile approach in responding to technological advancements. Unisa, being a large institution, tends to take time to make the necessary changes to keep abreast with developments. The findings showed that the decision to migrate to online delivery was not timely for an ODeL institution.
- Implement a change management process that considers the implications of change on role-players. Changing the LMS and migrating to online delivery at the same time had a significant impact on staff and students.
- Develop a workforce plan that considers increased workloads for staff involved in ID. Online delivery requires extensive preparation and continuous interaction with students, adding to the workload of the role-players.
- Provide adequate support for students to address IT related challenges. One unattended helpline is not sufficient to support more than 300 000 students.
- Provide on-going training for staff on the integration of 4IR elements in the design of their modules.

7.7 Conclusion

This study set out to determine the responsiveness of ID in ODeL to the demands of the 4IR. It used Unisa as the context owing to its nature as an ODeL institution. The problem statement, research questions, aim, and objectives were also stated. The chaos theory, constructivism and connectivism provided the theoretical framework for the study. A review of existing literature was conducted, focusing on the main concepts of the study, i.e., ID, 4IR and responsiveness. The research design was outlined in detail. An analysis of the data using the Atlas.ti CAQDAS was presented, followed by its interpretation.

Generally, the study unfolded according to plan with slight disruptions that resulted in minimal departure from the original plan. The researcher views this study as a success.

While the study focused on the 4IR, there were already references made in the literature to the fifth industrial revolution (5IR). Future studies may be conducted as the technology continues to evolve to respond to the demands of the 5IR technology.

REFLECTIONS ON MY PhD JOURNEY

My interest in researching this topic was sparked by observation of developments around me and my role as an education consultant at Unisa. I noticed that there were questions among role-players in the FTA process for curriculum and learning development followed at Unisa about the beginning and end of their various roles as a consequence of migrating to fully online delivery. I decided to investigate this through a PhD study. I approached Prof MT Gumbo as a potential supervisor after being referred by a colleague.

I started the journey with the naïve thought that it was going to be a quick and easy exercise. The proposal phase went fairly fast. I managed to finish within the first year of registration. Chapter 1 was also not burdensome; however, after receiving feedback on my draft Chapter 2, I felt so dejected I decided I was quitting. The feedback indicated gaps in my presentation of the chapter. Prof Gumbo explained what I needed to do to fix the chapter. He also encouraged me not to give up so early on and appreciated that the problem that I had identified was important to investigate. He also appreciated my line of thinking about the problem.

My biggest challenge was the identification of student participants. Not being in academia meant that I had to rely on other colleagues to get students to interview. This proved to be almost impossible. Undergraduate students do not seem to have an appreciation for the importance of research yet; so, they were reluctant to participate. Eventually, I found postgraduate students for my sample. This also impacted the initial number of participants that I had planned to interview. Another reluctant group to participate was male academics. I could only receive participation from female academics. I do not have an explanation for this experience.

My study began in 2020 and coincided with the lockdown resulting from the COVID-19 pandemic. The lockdown period allowed me time to focus on my study without leaving home. I also benefitted extensively from the electronic service provided by

the Unisa Library. It is an advantage to be able to access material without physically visiting the library.

I was awarded Research and Development leave for nine months to focus on my study which also gave me the opportunity to cover a significant scope of work. I thank the institution for the opportunity. The guidance received from CEDU in the form of tutorial letter for PhD students is highly beneficial. I found the guidelines very clear to follow. I also received immense support from the Research Ethics Committee of CEDU.

Prof Gumbo, as my supervisor, provided invaluable guidance throughout the study. I also appreciate the fact that he allowed me to express my views and intentions with the study. I am eternally grateful for the support.

I learnt a few lessons as well:
- I learnt to be patient with myself, with processes and with other people. I believe now that doctoral studies also test your patience and tenacity among other things.
- I developed an analytical mind particularly at the literature review stage and during data analysis and interpretation.
- I learnt that things do not always unfold according to a plan, requiring agility and quick thinking.
- Research is an interesting enterprise that opens one's eyes to many possibilities.

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APPENDIX A: INTERVIEW SCHEDULE FOR INSTRUCTIONAL DESIGNERS

Title of study: The Responsiveness of Instructional Design in Open Distance and e-Learning to the 4th Industrial Revolution

Researcher: WGN Moleko

Institution: University of South Africa

Email: molekwng@unisa.ac.za

Section A: Biographical information

1. How long have you been at Unisa for?

Less than 3 years	3 – 5 years	6 -10 years	More than 10 years

2. How long have you been in the DCDT for?

Less than 3 years	3 – 5 years	6 -10 years	More than 10 years

3. How many modules are you responsible for as project manager?

Less than 10	10 - 20	20 - 30	30 - 40

Section B: Interview questions

1. How do you describe your role in the DCDT?
2. Is your practice as an instructional designer informed by any theoretical framework? Elaborate
3. What is the biggest challenge facing instructional designers at Unisa during the process of migrating from blended to online delivery?
4. What is your view regarding the timing of this change? Explain.
5. Would you describe this process as chaotic or orderly? Give a reason for your answer.

6. What is the likely impact of this change on teaching and learning at Unisa?

7. What is the likely impact of this change on your role at Unisa?

8. Do you follow the Framework for a team approach (FTA) in your designs? Please elaborate on your answer to this question

9. In your opinion and experience, is the FTA still relevant to the current technological environment? Please elaborate on your answer to this question.

10. What is your understanding of the Fourth Industrial Revolution (4IR)?

11. How has or will the 4IR affect your role as instructional designer?

12. How can the FTA be improved on to ensure that it is relevant to the 4IR environment?

13. Do you have any other comments on the topic?

APPENDIX B: INTERVIEW SCHEDULE FOR ELECTRONIC ORIGINATORS

Title of study: The Responsiveness of Instructional Design in Open Distance and e-Learning to the 4th Industrial Revolution

Researcher: WG Moleko

Institution: University of South Africa

Email: molekwng@unisa.ac.za

Section A: Biographical information

1. How long have you been an electronic originator at Unisa for?

Less than 3 years	3 – 5 years	6 -10 years	More than 10 years

2. Which college/s do you get allocated modules in?

CAES	CAS	CEDU	CEMS	CHS	CLAW	CSET

Section B: Interview questions

1. How do you describe your role at Unisa?
2. How long have you been performing this role for?
3. What specific skills does one need to perform this role?
4. Are you aware of the Framework for a team approach (FTA)? Please explain
5. How has the FTA affected your role?
6. In what way has your role been affected by the change from print to online delivery?
7. What is your view regarding the timing of this change? Explain.
8. Would you describe this process as chaotic or orderly? Give a reason for your answer.
9. In your view, what is the likely impact of this change on teaching and learning at Unisa?

10. What is the biggest challenge facing electronic originators in the process of migrating to online delivery?

11. What is your understanding of the Fourth Industrial Revolution(4IR)?

12. How has or will the 4IR affect your role as electronic originator?

13. How, in your opinion can the FTA be revised to make it relevant to the 4IR environment?

14. Do you have any other comments on the topic?

APPENDIX C: INTERVIEW SCHEDULE FOR ACADEMIC STAFF

Title of study: The Responsiveness of Instructional Design in Open Distance and e-Learning to the 4th Industrial Revolution

Researcher: WGN Moleko

Institution: University of South Africa

Email: molekwng@unisa.ac.za

Section A: Biographical information

1. Please indicate your gender with a cross

Male	Female

2. In which age range are you?

20 -30	31-40	41 - 50	51 -65

3. How long have you been an academic at Unisa for?

Less than 3 years	3 – 5 years	6 -10 years	More than 10 years

4. What is your current position?

Lecturer	Senior lecturer	Associate Professor	Professor

5. How many modules are you responsible for as primary lecturer?

Section B: Interview questions

1. How do you describe your role as an academic?
2. You have been involved in module design and development at Unisa. What was your role in that process?

3. What is your understanding of the Framework for team approach in programme/ module designs and development?

4. How has the change from blended to online delivery at Unisa affected your role as an academic?

5. What is your view regarding the timing of this change? Explain.

6. Would you describe this process as chaotic or orderly? Give a reason for your answer.

7. What is the likely impact of this change on teaching and learning at Unisa?

8. Would you describe this process as chaotic or orderly? Give a reason for your answer.

9. What specific skills do/did you need to manage this transition?

10. What is the biggest challenge facing academics at Unisa during the process of   migrating from blended to online delivery?

11. What is your understanding of the Fourth Industrial Revolution?

12. How does the 4IR impact on your role as an academic at Unisa?

13. In your opinion, how can the 4IR be best harnessed to advance Open distance and e-learning?

14. Do you think that the FTA is still relevant to the 4IR environment? Elaborate on your answer, please.

15. In your opinion, how can the 4IR be best harnessed to facilitate instructional design at Unisa?

16. Do you have any other comments on the topic?

APPENDIX D: INTERVIEW GUIDE FOR STUDENTS

1. Unisa is referred to as an Open Distance and e-Learning institution. What does this mean to you in terms of the delivery of the programmes or modules which you are enrolled for?

2. Unisa is changing the mode of delivery from print to fully online, how is this affecting your studies?

3. In your opinion, is this the right time to make this change? Explain.

4. Would you describe this process as chaotic or orderly? Give a reason for your answer.

5. Thinking about the modules you are currently taking, how well do their design meet your needs and expectations in the current era of technological demands? Explain

6. Again, thinking about the modules you are currently taking, what is your thinking about the lecturers' technological competency to teach and support your learning? Elaborate

7. You have probably heard the term Fourth Industrial Revolution being used around you. What do you understand by 4IR?

8. What are the characteristics of a module that indicate to you that the module is responsive to the demands of the 4IR?

9. Do you think that the modules you take at Unisa are in line with the demands of the 4IR? Elaborate

10. Do you have any suggestions for the improvement of module design to fit the 4IR context?

11. Do you have any other comments on the topic discussed today?

Title of study: The Responsiveness of Instructional Design in Open Distance and e-Learning to the 4th Industrial Revolution

Researcher: WGN Moleko
Email: molekwng@unisa.ac.za
Institution: University of South Africa

Dear Colleague

This letter is an invitation to participate in a study that I am conducting as part of my research as a doctoral student titled, "The Responsiveness of Instructional Design in Open Distance and e-Learning to the 4th Industrial Revolution" at the University of South Africa. Permission for the study has been given by the Ethics Committee of the College of Education, UNISA. Furthermore, permission has been granted to conduct research among Unisa staff and students. I have purposefully identified you as a possible participant because of your valuable experience and expertise related to my research topic.

I would like to provide you with more information about this project and what your involvement would entail should you agree to participate. Instructional design is an important precursor to teaching and learning. It is therefore necessary to ensure that the process of design and development of teaching and learning keeps abreast with technological developments. The emergence of the 4IR technology has impacted various sectors, including higher education. In this interview I would like to have your views and opinions on whether instructional design at Unisa is still responsive to the context of the institution, particularly the technological context of the 4IR. This information will be used to guide the design and development processes at Unisa towards responding to the 4IR environment.

Your participation in this study is voluntary. It will involve a virtual interview of approximately 45 minutes in length at a time convenient to you. You may decline to answer any of the interview questions if you so wish. Furthermore, you may decide to withdraw from this study at any time without any negative consequences.

With your kind permission, the interview will be recorded to facilitate collection of accurate information and later transcribed for analysis. Shortly after the transcription has been completed, I will send you a copy of the transcript to give you an opportunity to confirm the accuracy of our conversation and to add or to clarify any points. All information you provide is considered completely confidential. Your name will not appear in any publication resulting from this study and any identifying information will be omitted from the report. However, with your permission, anonymous quotations may be used. Data collected during this study will be retained on a password protected computer for 12 months in my locked office. There are no known or anticipated risks to you as a participant in this study.

If you have any questions regarding this study or would like additional information to assist you in reaching a decision about participation, please contact me at 0822005431 or by e-mail at molekwng@unisa.ac.za.

I look forward to speaking with you and thank you in advance for your assistance in this project. If you accept my invitation to participate, I will request you to sign the consent form which follows on the next page and return it to me by email to the above address.

Yours sincerely
WGN Moleko

CONSENT FORM
I have read the information presented in the information letter about the study, "The Responsiveness of Instructional Design in Open Distance and e-Learning to the 4th

Industrial Revolution". I have had the opportunity to ask any questions related to this study, to receive satisfactory answers to my questions, and add any additional details I wanted. I am aware that I have the option of allowing my interview to be audio recorded to ensure an accurate recording of my responses. I am also aware that excerpts from the interview may be included in publications to come from this research, with the understanding that the quotations will be anonymous. I was informed that I may withdraw my consent at any time without penalty by advising the researcher. With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

Participant's Name (Please print):

Participant Signature:

Researcher Name: Gaba Moleko (WGN)

Researcher Signature:

Date:

APPENDIX F: EXAMPLE OF TRANSCRIPT OF INTERVIEW WITH INSTRUCTIONAL DESIGNER

Moleko, Gabaiphiwe

So, the title of my study is the responsiveness of instructional design in open distance and healing into the fourth industrial revolution. So, the way I set out my questions is I focus on the instructional design element then, I also look at learning - that transition and then I bring in the element of responsiveness and so when I look at e-learning and instructional design because I'm focusing at Unisa, I will talk about the FTA a little bit and then we will bring in the fourth industrial revolution at the end.

ID DCDT 3

Yes. Hmm. OK.

Moleko, Gabaiphiwe

So, but it's not many questions. I should have actually sent you the questions before, but I forgot about it. Sorry about that. But they are not difficult questions since it's questions are about what you do and what you think about this. So my interview consists of two sections. Section A is just three questions that are about your role at Unisa.

ID DCDT 3

Ohh no problem. OK.

Moleko, Gabaiphiwe

The first question is how long have you been at Unisa for?

ID DCDT 3

Yeah.

Moleko, Gabaiphiwe

So I have less than three years, three to five, six to 10. More than 10.

ID DCDT 3

It's about 7 years now.

Moleko, Gabaiphiwe

The third question is how many modules are you responsible for currently as project manager?

ID DCDT 3

36.

Moleko, Gabaiphiwe

Those are the questions in my Section A. Now section B is the actual interview questions, and the first question is how do you describe your role in the DCDT?

ID DCDT 3

OK, my role is that of a consultant but with a bit of a project management and leadership role, due to our nature of work where we extend some help to academics and authors through training and also through informing them and updating them on the things, they have to do during module development. And I think the consultancy part is when we do inform them or train them on instructional design itself, in other words how to package materials. What are the policy environment bringing in the elements of industry, professional bodies and trying to standardize what they do so that they can incorporate this. And one of these, which is very topical now, is the bringing in of elements like UNGC principles, transformation and the 4th Industrial Revolution. So, my role is then that kind of role - consultative, but yet leadership and project management.

Moleko, Gabaiphiwe

Thank you very much. And then my second person is, is your practice as an instructional designer informed by any theoretical framework? If any, elaborate.

ID DCDT 3

Yeah, OK. My role is mainly informed by a number of theoretical frameworks, I think. I've had some encounter with a number of instructional design theories and approaches. One can just mention a few. Constructivism as an approach and a paradigm and also connectivism. And then from there you have got outcomes-based education, which is oldish but also which also changed the way things are done in the teaching and learning sector during after post 1994, which influence a lot of what we did prior and also even today. Although in terms of constructivism, we still have your level descriptors - the information that we get from higher education department DHET. And also through SAQA. We also get influence and mainly in our activities through those kinds of frameworks from SAQA, DHET, Uh, and industry standards such as your ECSA for science and health professions, it will be for your nursing qualifications. So our operations are informed by those kinds of things, but there's a lot of models that we also align ourselves to but I don't want to get into them, but the Seels and Glasgow the ADDIE model and many other models that influence what we do, when we either plan or when we develop and when we evaluate what we are doing. So, we are informed by quite a number of these frameworks and approaches and theories, I would say.

Moleko, Gabaiphiwe

Thank you. And the third question is, what is the biggest challenge facing instructional designers at Unisa during the migration from blended to online delivery?

ID DCDT 3

Well, I think there's a quite a number of challenges. Instructional designers are faced with what I often refer to as we have to evolve with the process as it changes, then we change, but the changing landscape of the DHET, the higher education

landscape has influenced what we do and the way we do things. For example, we are now forced to or obliged to assist academics and authors closely by getting involved in what they do in order to understand them. So, when they do their analysis we should be involved or be aware of what they do and design profiling of students and gauging of materials from that end. And sometimes we get involved in the PQM - program qualification mix and then we also are obliged to inform them about policy dimensions that influence the design. And so in a way, we have evolved from doing what we normally did in the past, which was just advisory. And then we have now gotten into the technicalities of the design process where we now have to blend what we are doing with technology. So, a bit of infusion of technology has changed the way we do things. We now have to grapple with design tools, authoring tools and also various platforms such as your MOODLE platform, or the SAKAI platform. So, I think in a way moving online has compelled us to think very broadly out-of-the-box and open collaboration with SAKAI and other SAKAI associated organizations that provide platforms of that nature. So, our role has changed dramatically from that end. And I think we are more, if you will, educational technologists than your normal instructional design, we are more technology orientated than ever before.

Moleko, Gabaiphiwe

OK, that is very interesting. So, what is your view? This is the 4th question. What is your view regarding the timing of the change from blended to online delivery at Unisa?

ID DCDT 3

Umm. Ohh. Well, I think the timing is OK. It shouldn't have come, you know. In fact, I feel that it should have come earlier when the whole movement from a hard copy-based material design to online started. The whole explosion about mode two type of institutions of teaching and learning to online and where we actually moved from putting just things onto the platform and then just PDFing what we are doing to actually coming up with something that is life that can actually be offered during real time and also during offline. So, we have that kind of blending and I think we should

have done it a bit earlier, maybe some 10 years ago. But we are actually catching up very well now. But it seems like it's overwhelming, but actually it shows that we should have done it earlier.

Moleko, Gabaiphiwe

Yeah. So, following on to that, would you describe this process as chaotic or orderly?

ID DCDT 3

I think at the moment it's a mixture of the two. It's chaotic, but the order is still there because we are still sticking to the processes that we follow, which is the FTA, which is process based, sometimes linear, but also multifaceted in nature. So, as a result, I think we are blending the two processes quite nicely.

Moleko, Gabaiphiwe

OK, the next question is, what is the likely impact of this change on teaching and learning at Unisa?

ID DCDT 3

Well, I think in the long run, it's gonna change the way academics have always viewed themselves. And the way they've always operated. They are no longer just lecturers that transmit knowledge, but now they are forced to become designers and with us. So, in a team-based approach their nature of work has changed dramatically. And I think also we have also seen a change in the way we do things now we have to be featuring prominently in all the stages of learning, design and development, and that has not been the case in the past, we would let the process unfold up to the completion of units of a module and then from there leave it to them and the other role players to continue the process. But I see that we are now getting involved in a multi-faceted fashion up to the design, uploading and perhaps the distribution of some materials. And so, where we do some evaluation of what we've done to see whether things have been put in order you know harmoniously.

Moleko, Gabaiphiwe

Thank you. And I think you've touched on my next question. In fact, you've answered it to a point. So, I'll read it just so that you can tell me if you want to still add. If not, we can pass. What is the likely impact of this change on your role at Unisa? That that is the next question.

ID DCDT 3

I often ask myself whether we still, because we are known as consultants, education consultants. Whether perhaps that might actually impel us to think twice about our titles, because our roles have dramatically changed. A lot of things have been removed. A lot of things have been added which I think might actually make us to think twice about being named accordingly in order to suit the environment that is ever changing. And I think it makes me feel that there is a bit of a skills gap personally that I have to catch up with. And that my if linked with my IPMS I might actually be found wanting in some areas of technology. Because now I've got to be the forerunner, you know, in front of the academics and the authors and become, you know, more competent in how to design how to manipulate the technological space.

Moleko, Gabaiphiwe

Yeah. Then Question 8 says, do you follow the framework for a team approach in your designs? Please elaborate. I know you have touched on this. Please elaborate on the on your answer to this question.

ID DCDT 3

Yeah. OK. Yeah, mainly that is the first thing that we try and align ourselves with because at the beginning we have our prior, you know, author - instructional design meetings where we actually debrief ourselves about the project, what it entails, what needs to be done. So, I think at that point that's when we have a contracting of some sort. Because then formalities have to be exchanged there. We have to sign the CDD or part A of it and these forms make us to bind ourselves to a commitment of

some sort. To say we are going to walk this path together. So that is the first phase of it and then later on in the FTA, we also have a stage where we run workshops and then we get to know exactly what needs to be done. We learn about it, we inform, we train, we advise. And then development starts. And then because it is done within a team, we also have our deputy directors involved in the process in a way, providing an oversight over what we do. So, we follow some kind of a procedural framework into what we do. And then the other stages will be the development during the development we've got an exchange of ideas, inputs into units or sections that are developed by authors. And then from there we also have to be involved with the other team members just like, you know that I worked in the process, your editors and your critical readers. Which is a very critical element of the process and every stage has got some signing to be done. And this contracting formalizes our relationship. So, I think we follow, I follow that process to the letter because we even have to report on it on a weekly basis to our deputy directors.

Moleko, Gabaiphiwe

Alright, thank you. Then the next question is in your opinion and experience, is the FTA still relevant to the current technological environment?

ID DCDT 3

Uh, yes. I think it is still relevant and we can't do without it because we haven't actually mastered it and followed it, you know, to our satisfaction. But I think because our stakeholders, our clients, the authors and critical readers, they are still grappling with it. Some of them are foreign to it, so we need to ensure that it is followed. It's international practice within the curriculum and learning development arena. So, I think it is a good process and then it solidifies our relationships with our clients. And we all contribute to the quality of the materials by getting involved in some process of this kind. So, I think it's working very well and it shouldn't be abandoned. What could change though could be perhaps the stages, because of the technological infusion we might like to tweak a little bit of the stages and how they happen. Because we have too many role players that are feeding into the system and that

might actually affect some of the workflows and I've seen it in the risk register that some of our role players actually can affect the smooth running of the process itself, so they need to be checked or they need to be engaged further. And so, in a way, perhaps we might need to review the way it happens, yeah.

Moleko, Gabaiphiwe

OK. Alright. Thank you. Then question 10, what is your understanding of the fourth industrial revolution?

ID DCDT 3

Umm. Yeah, this is an interesting one. I've always asked myself what was the first industrial revolution, and the second, and the third. Now we are into the 4th. And I remember at some point in the year 2000, there was this huge brouhaha that the world was going to collapse and people took out their pensions and stuff insurance. And because the computers were said to be outdated and everything was going to crash. And at that time, I don't know what revolution it was, but since that time, then there's a lot of revolutions that have happened in the technological area. And now we are into the 4th, which is your deep application and dependence on technology and machine learning, you know the use of machines to direct our activities. The use of machines to manipulate things and processing of information happens faster. And research is even much more refined. So, I think the fourth industrial revolution is an additional twist to the way we've always used technology. Now we talk about robots. We talk about, you know, big data, Internet of Things and things like that. So, we have moved slightly into a technological language and thinking that we have never seen before. And so that's my understanding of it and how we depend on gadgets to make our work easier and smarter.

Moleko, Gabaiphiwe

Well, you're spot on.

ID DCDT 3

Ohk. OK, so thank you.

Moleko, Gabaiphiwe

How has it or how will it affect your role as an instructional designer, I mean the 4IR?

ID DCDT 3

Umm. Well, I think it's going to make me, I said earlier, it will make me to be on my toes all the time, because when these changes come, they come in quick succession and then we are forced to change as we go. So, we need a lot of training and constant training for that matter. It can be training two times in a year and linked to our IPMS because that's where we have to be experts - in manipulating technology and the platforms and so on. So, for teaching and learning, I think when the time comes for us to say we are now fully online, I would like to see this fourth industrial revolution coming in strongly to make our module be life, you know online or offline, so that students can never access whenever they are either connected or not connected, loadshedding or no loadshedding, but they can still access their materials everywhere and get somebody to respond or a machine to respond to your queries. So that's where I see things going, yeah.

Moleko, Gabaiphiwe

So going back to thank you, thank you for that answer. Going back to the FTA and thinking about it in relation to the 4IR environment, how do you think can it be improved on to ensure that it is relevant to the4 IR environment?

ID DCDT 3

Umm. Yeah. I think the thing of, although we use a lot of forms and things to sign like your CDD's and so on and it's a to and fro process from one role player to another and I often find that if we had a system that is meant mainly for facilitating as a project management tool, facilitating those kinds of formalities online, we would

cut on the downstream problems of having to wait for the CoD and the author to sign or the critical reader to be appointed. If we had a system like in the SMPD where they've got all the modules in front of them and then they can even tell what status the module is at and the system actually summarizes and produces a summary of the module itself and the red flags where things are stalling. Umm. And I think if we can reach that stage then I will say the FTA can work very much smartly for us because everybody will have access to the same system, same information and we can communicate right on the system and remind each other, not through emails or phones, but just on the system. And so that it red flags, it informs, sends a message to an author lecturer about an outstanding issue, or a step in the FTA, and then the person will just respond to that. And maybe I'm just dreaming very broadly here, but I think something like that would help a great deal.

Moleko, Gabaiphiwe

Yeah. Well, that that's covers the body of my questions. Can I ask if you have any other comments maybe that you'd like to make on the interview, on the topic before we close off?

ID DCDT 3

No, I just want to say thank you for the opportunity. And I think I tried to answer all the questions satisfactorily, although maybe not to your satisfaction 100%, but some of them are questions that need a much broader consultation for us to refine our thinking and our responses because some processes are still in process refinement. But the topic is so attractive and because it touches on the very core of what we are doing. I think it will eventually inform some processes when the findings begin to come out and perhaps it will be an interesting study there. And I think for me it made me also think that maybe at forums like the staff meetings and management meetings, whenever we are called to make inputs and even in the risk register of which I'm a member, perhaps some of the things that you asked about might actually be pursued there if they come up. And for example, the role of the role players, how

the stakeholders affect and pose risks to the process itself. So, maybe some of the things here might actually remain on the agenda for some time.

Moleko, Gabaiphiwe

Yeah.

ID DCDT 3

But thank you. Thanks very much and all the best with this study.

Moleko, Gabaiphiwe

Umm, thank you very much. I feel the in research there I never really wrong or right questions. So I appreciate the input that you've made. It is very valuable actually and the more I interview colleagues the more I get very rich data. So, I'm getting excited and Henry told me that I shouldn't get excited because. I might lose focus and he told me that this is the tricky part because as you get information you get excited and you start thinking wildly, so you must not lose focus. So yeah but thank you so much. I appreciate the help and the information that you've given me. It is going to add a lot of value to my study and going forward I'm going to transcribe the responses that you've given me and then I will e-mail that to you, so I'll clean it up first because like I said, the transcription is not very accurate. So, I'll clean it up, try to fix it, and then I'll send it to you so that you can confirm whether it is accurately recorded. And then once the recording is done and we've agreed on it and then I'll proceed with the analysis. And when the analysis is done, I'll also share with you my preliminary findings and for your information, and for your confirmation.

Moleko, Gabaiphiwe

Thank you very much. All the best.

ID DCDT 3

OK. Thank you very much and enjoy your day further. Thank you.

Moleko, Gabaiphiwe

Thank you. Thank you. You too. Bye bye.

APPENDIX G: EXAMPLE OF TRANSCRIPT OF INTERVIEW ELECTRONIC ORIGINATOR

Moleko, Gabaiphiwe

Yeah. So, thank you very much for agreeing to participate in my study. I appreciate your time. And I know that I'm going to get a lot of insight from the interview with you. The title of my study is the responsiveness of instructional design in open distance and e-learning to the 4th Industrial Revolution. So, I thought it was important for me to also get the view of the electronic originators because you play a very important role in the materials design and development process, especially when we get to the technical part where the material goes on to the on to the LMS. So, I will ask you some questions and my questions are in Section 8 and Section B, but in section A did send you the schedule.

EO

Mm-hmm. Yes. Yes, you did. Yeah.

Moleko, Gabaiphiwe

And yes, so we'll use that to just go through the questions quickly. In Section 8, I'm asking how long have you been in electronic originator at UNISA for?

EO

More than 10 years.

Moleko, Gabaiphiwe

Thank you. And do you do you work in specific colleges or in all the colleges?

EO

Umm, you know, it varies. I've worked in all of them. But at times because of the two different campuses like the Florida and the science campus, we get, like agriculture, more from the science campus. I'm actually situated on the science campus. Yes,

so uh, but the work gets distributed equally. OK, it depends, you know which EO is available and all of that. But engineering and technology, human science, education, and agriculture.

Moleko, Gabaiphiwe

OK. No, that's that that is fine then. Thank you. We move on to the interview questions. The first one is how do you describe your role at Unisa? This is now as an electronic originator. What do you do?

EO

Yeah. Umm, we are accountable for the layout and design of courseware and at times non courseware. You know, for example the non-courseware we do brochures, covers. Now I must say that in the beginning we used to do everything like the EO, but now the department has been split with the graphic designers and the EOs. The graphic designers focus more on the covers and brochures and you know stuff like that. And we don't focus so much on non-courseware anymore because in the past we used to receive work from other departments and then we do like the forms, you know, the F-forms and all of those things, and flow charts and brochures for the different colleges. I don't know if it's still being done or did the departments outsource it or is it still done by the graphic designers. And I'm not sure, but currently, the graphic designs, we do the study material, the layout of the printed material and the online. Umm, so we do it in such a way that it's user friendly and easy readable for the students. And understandable by them. And we also create templates and stylesheets and libraries. You know, because at times time management is important. So, when you have these libraries and the templates, then we also send it to the lecturer and then they choose which style they would like to use because also you know for, Umm, designed in such a way that it must come in and go out and also make sure that the quality at the end of the day is also, you know, acceptable. And we also advise the lecturers about the layout and design of the style to help in the final product. We also do artwork; you know we combine the icons with the artwork. And we do redraws. So, we use various programs like just to

name a few like Indesign, Photoshop, illustrator, Adobe Acrobat, MsWord and arbortext. So yeah, and we also do online study material and we liaise with the lecturers and other departments and stuff like that. Yeah.

Moleko, Gabaiphiwe

That is very helpful. So, other than the 10 years that you've been at Unisa, how long have you been performing this role for? So, it means even before you came to Unisa maybe?

EO

Umm, no, I actually came fresh out of school. I was with TSA and with the merger, Unisa. So altogether I'm 28 years.

Moleko, Gabaiphiwe

At Unisa. OK. So, what specific skills does one need to perform this role?

EO

Yes. You need a sound knowledge of the software programs like I mentioned a few. You need to go on formal training and you also find in-house training. So, we use the Indesign suite which includes Indesign, Acrobat, Adobe Acrobat, and illustrator. So, these are the different programs that you need to work. At times we have all three or all four of these programs available because while you're doing your layout, you do the artwork in Illustrator, you do Photoshop for retouching an image for the study material and Indesign is where you develop the content inside and then you need to combine everything in order to have a finished product.

Moleko, Gabaiphiwe

OK. So, are you aware of the framework for a team approach or FTA? Please explain.

EO

Yes, I am. I actually did attend a few of these framework team approach. Must I explain?

Moleko, Gabaiphiwe

If possible.

EO

OK, in my knowledge it is about, you know, it's all the relevant role players meet. They come together from the different departments, which is on the project team, and everybody is held equally accountable for the quality and the success of the project to achieve a shared goal.

EO

And everybody knows exactly what they should be doing, for example there's a project leader, and then there's a secretary that maybe takes notes and then you find there's a EO. There's a quality person. There's a DCDT person. The lecturer is there, the author, the external author. You know everybody like the copyright person is there. So everybody that's gonna play a role in the finishing of the product is there.

Moleko, Gabaiphiwe

OK, so does the FTA affect your role? If so, how?

EO

I can say, OK, I don't understand. This is like a. It's a broad answer. So, I'm just gonna answer the way I understand it the way it's asked. I can say yes, it does affect my role because in some way it adds value. Because as an individual, you are more accountable for the task at hand. There's time frame, that's set to it. You need to work smart. And work in that time frame because you also need to think about your next colleague. You know the next department, so you need to work. And because it goes from this person to the next person, so time is really of the essence, and it

improves communication. You know, whether it's fire like sitting in a meeting and whether it's e-mail communication. And. It broadens your horizons. It embodies trust. And you appreciate the different frames of thinking, and it encourages unity to see that you know what, people can work together. That is, I can say, the benefit. And then you also find the disadvantage of, you know, in everything that you do, there's advantages and disadvantages. That interpersonal conflict also arises, and some people might piggyback on others that is working and not accountable for the task at hand. In time, feedback is delayed because some prefer also to work on their own and some want to work in a group and then that dynamic is also there, whether you like it or not, it's there.

Moleko, Gabaiphiwe

OK. So, in terms of the UNISA 2030 strategy that we are moving to fully online delivery of all modules, the process is already started. How has your role been affected by this change from print to fully online delivery?

EO

Umm. OK. Umm, I must say we are still developing blended modules - study guides because we still develop, even though we are told most of the study material is for online, but we still develop for print. Because you know at the back of your mind you know how Unisa also work like we want it online and then not long after then, the say, Ohh, the students want it in print, so you need to plan for print and online.

Moleko, Gabaiphiwe

OK. It's a very interesting point, actually.

EO

And yes, at times we experience that the lecturer. Umm. OK, I don't know. I'm just gonna say a whole lot of things here.

Moleko, Gabaiphiwe

That's fine.

EO

Yes. You know with the online change, in the beginning it was challenging because we had to attend all the training sessions using Teams, like everyone else. And we didn't have earphones, so to give input it wasn't easy and to ask questions because at times I know the chat is there. But by the time you finish your chat and type in they already on the next agenda point. So, you're scared, and you miss out and all of that. So, you couldn't like really give your input and ask the question that you want. So, then you feel like you are left behind or you're gonna keep other people behind, you know. And also. Umm. Yeah. At times we experience that the lecturer sometimes shift the responsibility to the EO because they also, in the process of learning this new learning management system. So, for us also. And then we're on the same page as them. But there's things that really hampers our work because we all know like, for instance, regarding the assignments. You know we have to learn the multiple-choice questions; you know. We are told we must do it at times. OK at times the lecturer requests us to help but then at times it becomes our responsibility. You know the opening and closing of the assignments and the loading of questions for the assignments. In the past when it was on myUnisa, you know, SAKAI, we just used to populate the site and the content, and it was there. And creating the forums and the frequently asked questions, but then other things like you know, all of those that we feel like it's a lecturers responsibility, it gets transferred to us.

Moleko, Gabaiphiwe

Umm so there's kind of an overlap of responsibilities.

EO

Yes, yes.

Moleko, Gabaiphiwe

OK. OK. That's interesting. So, what is your view regarding the timing of this change changing over from blended or print to online to fully online?

EO 1

I don't really know when the transition took place. And the change but I can see that it had an impact on going forward because it created uncertainty. Umm, you know? It's something new. You know, and you have to do your work at the same time, like I said, and you must do training and then you scared, whether the students are gonna get the study material on time, put out your work, you know. And also like. We also experience like because it was open for a whole lot of, you know, departments that, you know, some people, it's gonna take our jobs from us. Yeah.

Moleko, Gabaiphiwe

But that hasn't happened.

EO

I know it hasn't, but I'm saying it creates a whole lot of uncertainty and unnecessary fear.

Moleko, Gabaiphiwe

So, in terms of how you Unisa is approaching this, would you describe this process as chaotic or orderly?

EO

Yeah. Like I said, I don't know really when this thing the transition took place. As time went by. You could see that this thing is really getting messy in certain areas certain periods. Because, you know, you had to do simultaneously had to do training in the LMS system. And then you also had to work put out the work at the end of the day. And. Yeah, so you know, it was training for the lecturers, for DCDT, for us as EO's, you know, and then also for the students, you know, they were also like. You

know, it was a culture shock for them also to feel, see like, ohh! OK, it's a new system that we have to work now. So they also have to learn how they're gonna receive the study material and it's a new thing. You know. So, they also have to learn in the process of receiving it and communicating with the university on this learning management system where they were used to the old one. So, the translation at a little bit of it still. But as time went by it, it's improving. But yeah, still a lot of hiccups. And then also the network systems were in the beginning more down than up. And you know, I don't know. And then ICT also you feel like at times don't come to the party also. Yeah. Helping us, everybody.

Moleko, Gabaiphiwe

So in your view, what is the likely impact of this change on teaching and learning at Unisa?

EO

OK, it does sound like I'm complaining, but I'm just answering what you are asking.

Moleko, Gabaiphiwe

Yes, yes, yes. No, that's fine. So yeah, in terms of teaching and learning, how do you think this is going to impact on teaching and learning? It could be in a positive way or in a negative way, but how do you think that will be the case?

EO

Uh, yeah, I think it will improve in certain areas because it also teaches one to keep on learning something new and we mustn't be afraid of taking a challenge. And you need to keep abreast u,p to date with the changes. To be more visible and available for the student. And also, the student if they don't understand anything or something or where the study material is concerned, then they can send emails or they can on the site liaise with the lecturer. But I think it's very frustrating especially now with the loadshedding also, you know it's fearful like the students are doing online exams. The system gets interrupted, you don't know. It creates stress in the various areas,

because you don't know whether your assignment got stuck midway, did it go through? Uh, did you submit your examination? You know, the downloading, the time frame. It's unnecessary stress. Also, at the end of the day, with this loadshedding also that has an impact on your online learning.

Moleko, Gabaiphiwe

Umm. And then in terms of the electronic originators, what is the biggest challenge facing yourselves in the process of migrating from? But I think you did mention that you need training and is there anything else you want to add perhaps?

EO

Yes. But our biggest, biggest, biggest challenge is that we struggle to get linked to the sites. You know it can take up to weeks to be linked to the respective site. To populate the site. And we have to develop the content for print and then populate the same job. Also on the learning management so it feels like we're doing one job two times, you understand. And then network problems, like I said and doing the layout and the training at the same time. But it gets better. It's getting better, I must say. Because now that you are comfortable with the with the LMS, you more less now know what is expected.

Moleko, Gabaiphiwe

So, what is your understanding of the fourth industrial revolution?

EO

I never heard of it before, only when you when I read it in your topic.

Moleko, Gabaiphiwe

Really?

EO

Yes. Umm. Maybe it's given a more fancier name, or it's labelled, but maybe it's if you describe what it is about and maybe I will know what it is.

Moleko, Gabaiphiwe

OK. OK, it's the technological environment where we are using artificial intelligence and things like robotics, robots and things like. Yeah, the Internet of Things and learning analytics.

EO

Oh, KOLOK.

Moleko, Gabaiphiwe

Yeah, a whole lot of new things that we would cloud computing.

EO

Umm. OK, so it's so I know of all of those things that you're mentioning, but it was just like grouped under a fancy name, a beautiful name.

Moleko, Gabaiphiwe

So maybe you can answer the next one then. How has it affected your role as an electronic originator? Or how will it affect your role?

EO

How has it affected my role? You don't know whether, like you said in robotics, whether they're still gonna need the human factor. Yes, we always gonna be there. You can't get rid of the humans, but also your job. Am I still gonna have a job at the end of the day? Are they just gonna need certain amount of people to do the work? And also your data and stuff like that. Is the cloud safe? Is it secured, stuff like that. I don't know. I don't know how to answer.

Moleko, Gabaiphiwe

It's alright. And this last question I thought it's not really in your area, but just in case you have an opinion. How can the FTA be revised to make it relevant to the four IR environment?

EO

OK, first of all I must ask. Is the framework for a team approach still happening?

Moleko, Gabaiphiwe

Yes. It is still happening is.

EO

Ohh, OK.

Moleko, Gabaiphiwe

So, what happens is the DCDT is the, I could say, the custodian because they are the project manager. So, they are the ones who see to it that the development of learning material is done according to the FTA. So, they will for instance, include all the stakeholders or role players and they will also monitor their participation in the process. So, the language editors, yourselves, the academics, the critical readers, and the graphic designers. All those people. And so it is the education consultants who make sure that that happens. But I've also been told that the EOs somehow tend to be excluded from the process. I don't know.

EO

Yes, that is why I'm asking you. Is this still taking place because I haven't attended one and I haven't heard my colleagues also attended that framework team approach, so that is why I asked.

Moleko, Gabaiphiwe

Yeah, I think what usually happens is when we have those meetings, we usually call your manager and then he comes on because what we do is we have what we call an FTA meeting with the all the academics who will be working on projects for that particular year. So, we bring them together with all the other representatives from the other units, and then each one tells them what their role will be so that they know what the librarian will be doing for them and who is the librarian, et cetera. So, I think what happens is it doesn't filter down in the departments. For instance, let's say in language services, if the director comes, he doesn't filter down the information to the managers and the language editors in that unit. So, I'm sure in your area also it's probably the case that the manager attends but doesn't filter down the information to the electronic originators. And that is maybe the explanation for your thinking that's the FTA is no longer applicable, yeah.

EO

Umm, yes. Possibly not. Yeah, OK.

Moleko, Gabaiphiwe

Yeah. So maybe then the problem is with the application or the implementation of the FTA.

EO

Yes, yes.

Moleko, Gabaiphiwe

And for me that is a very interesting point, especially in terms of my role in the DCDT, that maybe next time I do the FTA meetings, I should call, I don't know how we can do it so that we don't just call the manager. I called the EOs who will be participating in the process, rather.

EO

Yeah, I don't know how is that gonna be approached. Yeah.

Moleko, Gabaiphiwe

Yeah, because it is a very difficult one because they EOs get allocated to projects only at the time when the project is ready. Isn't it?

EO

Yes, absolutely. Prior to that, you don't sit in the pre planning of the job, yeah.

Moleko, Gabaiphiwe

Yes. And even as the project unfolds like where they still writing and they still doing critical reading and language editing, you are not yet involved in the process. So, you come in at the tail end and. So, then you are not aware that this thing has been happening according to the FTA process. Only because you come in at the end. But yeah, you make a very important point for me to consider also.

EO

Then so we are not in the loop whether this thing is still happening, you see?

Moleko, Gabaiphiwe

Yeah, yeah, that is very interesting.

EO

Yeah.

Moleko, Gabaiphiwe

Well, this is the end of my questions, my last one was whether you have any other comments you'd like to make on the topic.

EO

Umm, no, I don't. I really don't have.

Moleko, Gabaiphiwe

Yeah, I was tempted to ask you actually about the impact of COVID and how things happened at Unisa, how we were quickly forced to change, especially the assessment process, whether it affected you as the EOs as well, that quick change that we had to make.

EO

Yeah. Umm. OK, when we were working from home or when we came back.

Moleko, Gabaiphiwe

Yes. When we worked from home, that year in 2020 when the first semester exams had to happen online, and you remember that whole year when the exam session that had to be moved. I think it was from March to July sometime. And then when they introduced what they called the super semester. All those things that happened in 2020. Did they have an impact on your role at all?

EO

Umm. I don't know. Uh in that regard, but I do know that this thing just happened, and it really had an impact on everybody, and especially for us as EOs. We didn't have laptops and we work with the tower, you know, the desktop PC on our desk. So, we couldn't like to do our work, you know, so. Umm, we had to come to the university to fetch our PCs. And we didn't even have a ICT person to help us to connect everything and stuff like that. So, within our department there's this lady she had to take everything down in order to make sure that we are connected and stuff like that. So, getting connected was a challenge, you know, in order to get access to the server where your study material was and where they made it available for you. So, Umm and also the data problem you know. And like I said, connectivity and all of that. So that was a challenge and also because everything was now sent

online, like the pink docket. More communication and more emails and stuff like that so. Umm, in we have to print the way we used to work is like we had to print the master copy that we receive from language. And you work with it like on our desk and then on the screen. So now we have to work with the master copy on the one screen and the other screen, so you have to work like that. You know it was it was a real transition and a challenge for us, but yeah.

Moleko, Gabaiphiwe

But in a way, it was also a positive change, don't you think?

EO

It was and I must say that in that thing, you know it also, you know, we print less stuff. So most of the things is online, so you have to think before you print.

Moleko, Gabaiphiwe

Umm. Yeah. And then about the students. I think you said something also that made me think about the Unisa students. Do you think they are ready for this? For fully online delivery?

EO

I shame you know what? I don't think they will. Especially if you look at the country in South Africa, you know there are still very underprivileged areas. Not everybody has the opportunity to own a laptop. You know, and with parents not working. It's a data thing. I don't know. Unisa used to give the data, but I don't know. Did I stop or are they still giving the data?

Moleko, Gabaiphiwe

They are still doing it.

EO

They still giving it.

Moleko, Gabaiphiwe

Yes, it does come late in the month, but it still comes.

EO

Oh, OK, that's excellent. But like I said, you know, not everybody has the opportunity to have a laptop and for me personally, even though I have access to the computer at work, as a student, I still prefer printed material. For me, I can highlight something I can print something. If my battery is flat, I can still take my material and I can go sit wherever I want. So, it's a challenge, some say yes they like the online. Others say they like the print, but I don't think printing will ever like come to a stop.

Moleko, Gabaiphiwe

Yeah, no, it looks like we still going to have to print for a long time still. What? Early and thank you so much. I really appreciate the insight that you've given me. You've actually raised some points that I had not thought about before. So, every day I speak to somebody. I get very excited because I come across things that I had not thought of, and I realize that the research is important because you get to hear views that you wouldn't have thought about yourself. So, thank you very much for agreeing to participate.

Moleko, Gabaiphiwe

And I will transcribe the interaction. It takes me a long time to do that, but once I've done that, I will e-mail you the transcription so that you can have a look. And then yes, I actually use this transcription that is on teams, so it helps me, but because teams doesn't hear us properly.

EO

OK. Umm, yes, no, it's a good thing. Then you can just go back and then you can stop in record, yeah.

Moleko, Gabaiphiwe

Yeah. So, I yeah, so I listen to every sentence and then compare it with what is on on the transcription and then correct it. So, if you stop for a while, it puts it a full stop only to find the food. Yeah. You were still in the middle of a sentence, you know, some words I said like this. And then you're 8 year something else. And yeah. So, it takes it takes.

EO

Umm. Ohh OK. Yeah. I thought I spoke clearly.

Moleko, Gabaiphiwe

No, you did. So, it's not going to give me a lot of work to do, but I will send you a draft of the transcription and then you can confirm whether it is accurate or not.

EO

Yeah. OK.OK.OK. Thank you. And can I ask something? So, are you going to see the themes that transpires from your interviews?

Moleko, Gabaiphiwe

Yes, yes. And then later on I will also send you a draft of my analysis for just for you, for your information.

EO

Oh, OK.Oh, OK. And then this is completely anonymous.

Moleko, Gabaiphiwe

This is completely anonymous. When I do the I actually called you EO one, so I will write this **EO 1** and everybody is just a number. So, from now on I won't remember who said what.

EO

Ohh OK.OK. Yes. OK. Alright. Thank you so much GABA.

Moleko, Gabaiphiwe

Thank you very much. I appreciate it. Have a good day, further, and enjoy the weekend.

EO

OK. Thank. Thanks. You too. Have a blessed weekend. OK, bye.

Moleko, Gabaiphiwe

You too. OK, bye bye.

APPENDIX H: EXAMPLE OF TRANSCRIPT OF INTERVIEW WITH ACADEMIC STAFF

Moleko, Gabaiphiwe

Let me start. The first question is what your gender is. So, female.

Moleko, Gabaiphiwe

The second question is, in which age range are you?

CEDU 3

Do I have to tell the truth?

Moleko, Gabaiphiwe

Yes.

CEDU 3

Between 31 and 40.

Moleko, Gabaiphiwe

So how long have you been at an academic at Unisa for?

CEDU 3

That's UNISA for more than six. Six to 10.

Moleko, Gabaiphiwe

And then what is your current position?

CEDU 3

Uh by department senior lecturer. But you know I'm so considered as PQM manager, so I actually wanted to ask you in what capacity do you want me to answer this?

Moleko, Gabaiphiwe

It will be senior lecturer.

CEDU 3

OK.

Moleko, Gabaiphiwe

And how many modules are you responsible for as primary lecturer?

CEDU 3

Well, actually only one in an SLP because I'm seconded, so I don't have any departmental responsibility anymore.

Moleko, Gabaiphiwe

OK, so that takes care of the biographical information. Then the second section, section B. First question, how do you describe your role as an academic at UNISA?

CEDU 3

OK. Well, just from experience, I was at UP before Unisa. And I thought, you know, but it's so much easier when you come across that you don't have students face to face but the distance learning and part of being an academic is extremely overwhelming and taxing. Yeah, your role changes because the availability is different the time periods are different and the way in which you have to support students and the pedagogy that you use is completely unknown. If you're coming from a contact space. So, your role has to kind of adapt to the mode of delivery and the institutional character. And then as an academic you have a lot of varying responsibilities and conflicting responsibilities. You know you have to meet your teaching and learning, which is your primary core work. But then there's also the research on the side and the engaged scholarship and administration and in our space also it takes up a large, large amount of time.

Moleko, Gabaiphiwe

You have been involved in module design and development at UNISA. What was your role in that process?

CEDU3

OK, so I actually started with right from the beginning of the planning of the curriculum for the new qualifications. And when I was in the department, so I was involved in programme design and curriculum planning with the new B Eds and then in the department I took on a bit of a leadership coordinating role for the learning design and the learning developments in terms of coordinating all the modules and the writing processes that were taking place once we had the approval of our qualifications as well as writing my module. So, I had quite a lot to do with all the steps.

Moleko, Gabaiphiwe

OK, So what is your understanding of the framework for a team approach?

CEDU3

My understanding you know, to put it simply, teamwork makes the dream work and from the get-go. And I when I came into Unisa, they'd already done the stakeholder engagements and a lot of that had already been done. The programme design steps and up to now, even in my space as PQM manager, we don't work in isolation. And you know, there's different departments, directorates, persons, stakeholders, students and services that all need to come together to put out at the end of the day a module on the table, our curriculum on the table, and quality offering to our students. So, that includes obviously within the department and departments in a college, we also work with sister colleges. And then you know departments like DCDT who are supporting us in all the steps. But then also AIMS and DPAR, DSAA, DSAR, DISS. And then when the actual writing is taking place, SMPD, language services editing. Yeah. So, there's a whole lot of people involved in the various steps and the various steps are also not in isolation. Those teams shouldn't, can be involved in different steps and it actually gives a better programme at the end of the

day. We find, at least in the space, if you've got a team of people that are all working together for the common direction that you're going in helps.

Moleko, Gabaiphiwe

Thank you. Then how has the change from blended to online delivery at UNISA affected your role as an academic?

CEDU3

For me, it wasn't a shock. I didn't feel like there was change management needed so much for me because I've always been into technology and when I was at my former work at UP, even though we were contact, I used the learning management system a lot. I used a lot of varying technologies when I was teaching my students and my own PhD was in technology. So, I always felt, it was kind of a seamless move for me, and I know it's not the case for everybody else and I think in terms of my role, it's almost become easier if I look at how we were forced into online because of COVID. Even working from home. You know things are easier. Reports are made easier. We have access to so many different platforms and apps and resources that really make things a lot easier if I think of how I used to have to go knock on people's doors for a paper-based response to how everything is now collated in a central place. And so, I think the change has been good and I wouldn't say it's necessarily affected my role that much other than aiding it and making life easier.

Moleko, Gabaiphiwe

And what is your view regarding the timing of this change at Unisa in particular?

CEDU3

I actually think we're a little bit late to the party. I think it could have been done sooner and I'm grateful that COVID forced us into going fully online because, you know, as a distance institution we brought in all different acronyms, ODeL, ODL, now we are CODEL, that we didn't really live up to those, you know, definitions of those acronyms that we were claiming to be. So, I think the timing we were late, but better

late than never because the world is moving that way. And I think it's good that we expose our academics and students to that to prepare them for the world of work and what is to come in the world.

Moleko, Gabaiphiwe

And looking at how we are doing things at Unisa, would you describe this process as chaotic or orderly?

CEDU3

It's difficult and I would like to say it's orderly, but it's not because sometimes you have to do things where the bottom steps haven't been actually built or the foundation hasn't been laid. I'm taking, for example, now we're moving to fully online and it's in our strategic plan by 2030, all modules are fully online. But we were actually already implementing fully online before moving to fully online in various pockets of our modules. So, for example assessments had moved for the online delivery of study content had moved fully online. And now we're doing the pedagogical approach and the actual teaching online. So, it's not, I wouldn't say it's been rolled out in a specific ordered way, but that's also, I think circumstances because of the times we were living in. And I just feel, you know, at Unisa sometimes not everybody is at the same level of either understanding or skills and capabilities to do what needs to be done. There are very varying degrees. Some people are excellent and other people really need a lot of guidance and handholding and training and development to get to that place and where they can offer fully online and teach for the online. So, I wouldn't say it's orderly, but I also don't know what change is ever orderly.

Moleko, Gabaiphiwe

Yeah. That's a good point. So, what is the likely impact of this change on teaching and learning at Unisa?

CEDU3

I think it will have a positive impact once everything gets to the point that it should be. Currently, we still very much in the rocky waters of change and change management and I think that's a big thing as well. There's some people that actually don't want to change. They've done things in a certain way for so long that you first have to almost convince them to change before you can actually change. And I just hope that whatever gets done is of quality because it's almost easier with things online to substitute quality.

Moleko, Gabaiphiwe

So what specific skills does an academic need to manage this transition from blended to online delivery?

CEDU3

I would say resilience and a little bit of motivation and adaptability. You have to be able to and even though we are moving, things are constantly changing and I think it's that mindset of knowing that if you complete a task, it doesn't mean that the final full stop is done and that's it. Your job is over. It's a continuous cycle and process that you're involved in. Technologies are going to change, systems are going to change and they changing fast. So, you kind of have to sink or swim, so you need to have those sort of soft skills. But then also hard skills of training and in various whatever it is technologies or applications or even your role as an as an academic. I don't know how many of our academics actually are trained in teaching and or lecturing for adult pedagogy and now for adult pedagogies through technology. So yeah, I think you need both soft and hard skills and continuous skills development.

Moleko, Gabaiphiwe

So, thinking about that, what is the biggest challenge that is facing academics during this process of migrating from blended to online?

CEDU3

I think one of the things is resistance to the change, and there's also, you know, the conflicting arguments of the current workload while moving and adapting so that's also really difficult. And if academics aren't in the right frame of mind to say, OK, I want to do this and I'm going to do this like I mentioned, they could be giving us very poor quality of what we actually want to be online. And then also, as I said that the skills and abilities vary greatly in all ways, not only if going fully online. Some people can do certain things and others can't. It's not in their skill set yet. And I think yet is the important word because it doesn't mean they can't ever. Just means that they need to be given more guidance and handholding and training and motivation to get them there. But I think the biggest challenge may be that resistance to the change, coupled with the workload that everybody is facing.

Moleko, Gabaiphiwe

Yeah. So, let's then talk about the 4th Industrial Revolution. What is your understanding of the four IR?

CEDU3

Yeah. So, for me it's, you know, it's another period in our history and I think the Internet was the beginning of the 4IR and how the world just opened up at information is accessible and people are accessible, and things are just you know globalization and everything is just changed because of the Internet. But it's not only the Internet, there's also so many technologies that have come into being, that are kind of replacing humans or the jobs that humans do from both positive and negative. And so, because I work in technology a little bit and I research in it, I'm actually reading more now about the 5th Industrial Revolution and looking at it from a sociological perspective of bringing back the human elements to couple with all the smart technologies that we're exposed to.

Moleko, Gabaiphiwe

Yeah, that was interesting. And how do you think does the 4IR impact on your role then as an academic at Unisa?

CEDU3

Well, we have to be on our toes all the time. We have to be able to adapt and evolve and that means changing the way we do things, changing our comfort. So, we can get very comfortable doing something a certain way, but for me it's not necessarily always about the technology and it's actually something that in my own PhD I tried to emphasise that it's all fair and well to have these amazing tools and this whole toolbox of incredible things that are available. But if you don't have the pedagogy and the how to actually teach using those tools for the benefit of the learning outcomes for students, the qualification, then you may as well not have any tools at all. And I think then your role as an academic needs to adapt to the pedagogies that suits the various technologies.

Moleko, Gabaiphiwe

Yeah. Then in the same vein then, I'll ask, how can the 4IR be best harnessed to advance ODeL?

CEDU3

Well, I think in 4IR these so many inventions and things that are coming up and I speak mainly about technology because that's what I know. But there's also you know all the other things of renewable energy and sustainable development and all those other things that we don't necessarily work with or in but just to as Unisa as an open distance learning institution that we can have a much more flexible educational model. And I think that that's something that is being looked at. I know that the academic calendar is being looked at, you know, are we gonna have more openness in our content and materials, our offerings and what exactly does that

mean? So, I think there's a lot of possibility. And again, we have to have the requisite systems for that possibility to actually materialize.

Moleko, Gabaiphiwe

OK. And thinking about the FTA then, do you think it is still relevant to this 4IR environment?

CEDU3

I think so and no man is an island and we're a huge ship, at Unisa so, I don't think you can work out of a team approach in all the different facets from qualification, conceptualization all the way through to the finalisation of your material. So, I think it can definitely work. Perhaps the how it works might change a little bit you know, sort of face-to-face meetings or engagements, we now doing them online and forms that are filled in might be, collated in a different app or whatever the story is reporting might be using smart data. And I do think that the framework is still relevant.

Moleko, Gabaiphiwe

Yes, yes. And then lastly, in your opinion, how can the four IR be harnessed to facilitate instructional design at UNISA?

CEDU3

I think it's kind of the same as the previous answers that we have so many tools now available and so much more information and availability of everything that we come across. So, it would just be smart ways to harness instructional design. And I know we actually spoke about this going fully online that you don't want a paper behind glass approach to do this. So, how 4IR could actually be harnessed to facilitate instructional design is quite a complex question. I think you could do your whole PhD on just that question, but yeah. And I think you know, it's just to look at that whole what is the end outcome of doing all of this when we design a qualification, we want certain attributes of our graduates. We want certain exit level outcomes and if we take that end goal in mind and we design backwards in our instructional design to

achieve that and then bring in all the tools and all the processes of what 4IR holds. And you know that's something that is very complex just saying use this or don't use that.

Moleko, Gabaiphiwe

Well, then that concludes the questions. Is there any other comment that you'd like to make?

CEDU3

No, I don't think so. Not necessarily. I just, I think it's a very interesting topic and I'm I really look forward to reading your findings and seeing and what comes out of this.

Moleko, Gabaiphiwe

Thank you so much. Thank you very much. I really appreciate your time. I appreciate your responses and your insight and I will definitely share with you what I'm going to do is I'm going to clean up the transcript and then I'll e-mail it to you just so you can confirm whether it is accurate or not. Then I'll also share with you the analysis when it's ready. I don't know what year that will be, but yeah.

Moleko, Gabaiphiwe

Yeah. Yeah, actually, yeah, that I you know I am struggling with this part because I've never really done an extensive empirical study like this. So yeah, I might come back to you to say, please help me here or there. Thank you.

CEDU3

That's fine. We can have a follow up interview or whatever needs be if that is what is required.

Moleko, Gabaiphiwe

Yes, thank you so much for being so willingly available, you know I struggled to get other people to participate, but you were readily available. So, thank you for that. I appreciate it.

CEDU3

I will support where I can. I know the long and hard journey of a PhD.
Moleko, Gabaiphiwe

Yes. Yes, thank you so much. And have a good day, further.

CEDU3

You to enjoy your weekend and good luck. Bye bye.

Moleko, Gabaiphiwe
Recording stopped.

APPENDIX I: EXAMPLE OF TRANSCRIPT OF INTERVIEW WITH STUDENT

Moleko, Gabaiphiwe

Thank you very much for agreeing to participate in the interview. I know that it is a holiday and that you set aside time for that on your holiday. But thank you so much for making the time. And I promise you it's not gonna take long. I am conducting research for my PhD study in the instructional design space, but looking at Unisa as an open distance and e-learning institution, and how we design modules and within the broader framework of the technological era that we find ourselves in. I look forward to your responses and do remember that there are no right or wrong answers. What I need is your candid and honest answers and I need to mention that I am fully aware that I need to provide you with confidentiality as a participant. So, I will not mention your name anywhere in the documents. I will use a code name to refer to you as a participant in this study. You'll be like participant number so and so. And again, I need to mention that if you feel at any point that you want to stop and not proceed with the interview, you can indicate that to me, and I will accept that without asking any questions. And then yeah, that is all I need to tell you. And then I have 11 questions to ask you. The first one is Unisa is referred to as an open distance and eLearning institution. What does this mean to you in terms of the delivery of the modules that you are registered for?

CEMS student 3

OK, Unisa being the open distance e-learning institution to me it means that I am able to receive information or education through Unisa by not being physically there in front of a lecturer. I'm able to get information through this distance learning, meaning information can be imparted to me in a number of ways that will ensure that I get information, but without having a lecturer in front of me physically giving information. Through technology that will enable me or like eLearning, meaning technology and also information that will be either sent through the post so that I'm able to get or any other way that is accessible to me to get information without having to meet the lecturer physically.

Moleko, Gabaiphiwe

OK. Thank you for that. Now talking about the different ways in which you can get your material at Unisa, we are busy changing our mode of delivery from print. We changed from print to blended. Now we are going fully online. How is this change affecting your studies?

CEMS student 3

I would say being more in line with technology, it is helping, but I'm talking specifically for myself. I remember previously when one used to panic when it comes to getting the information through in the post, getting it on time, and when there's a strike you also panic that there will be some delays in terms of getting all the study materials in time. But having to learn now using myUnisa, information being given electronically, I think it has helped a lot because one is able to communicate. You can get information in the quickest time rather than to wait for information to be delivered. Even when it comes to you, don't even have to make a phone call because you can just send an e-mail. You can have a conversation electronically, even with the lecturers. So going digitally, I think it's an added bonus or it's helping a lot because I do have access to electronic media. Unlike if it is someone who must get a laptop because they do not have one. Even to have funds to buy one or the issue of data because data in South Africa is very expensive. But I know that Unisa is also helping in that regard especially when it comes to writing exams. They will provide data. But speaking for myself, I think really it has helped a lot. It eliminated that panic and that delay in terms of getting information on time.

Moleko, Gabaiphiwe

In your opinion, do you think this is the right time to make this change at Unisa? Are we on time generally, are we behind? What do you think?

CEMS student 3

In terms of being the right time, I think it is the right time. I wouldn't say we are behind because in any case, South Africa we are not like first in so many things. I suppose the delay because in other countries you will find that probably the decision was made even way back. But I suppose because of the demographics in South Africa you find that Unisa has got students even in rural areas. So, they had to accommodate. I know that even during lockdown, that is when most companies like in the workplace, people had to think about taking advantage of technology. So, I would say yes, it is the right time because you can see now that COVID forced, so many institutions to start looking into digitalizing, so many things, even the education. But as we move into that era of technology, we need to take cognisance of the demographics of South Africa so that we do not leave other people behind. Those who do not have resources to do so, because education in any case, is a right to everyone.

Moleko, Gabaiphiwe

Thank you for that. Now thinking about this change, especially the examinations and the way assessment was handled online over the past two, three years, would you describe the process as chaotic or as orderly?

CEMS student 3

The first time I did the exam online that was in 2021.It was the first time in doing exam online for the very first time. It was not a problem. Even though it was for the very first time and I was going through a lot personally. My mom was sick on that same day. I had to go and fetch her from the hospital, but believe you me, I survived. I was able to go through it without any hassles. Information was there. They made sure that even if it's for the first time a person knows what to do. But this time around I'm not sure what happened. The first one, which was a group thing. That one was not a problem, but I think in terms of the exam, when I was doing the second one, the exam which was online, it was in the morning. I was supposed to start at 8:00 o'clock, but you need to start 15 minutes earlier so that you can read the instructions

and all that. To my surprise, when I tried to access the paper and the site, I couldn't. I couldn't even get the paper. I was panicking. Up until I see that it was already after 8. The only thing I did for me to be able to get the paper I had to send a WhatsApp to one of my group members. I sent the WhatsApp because she was also writing concentrating. I tried to call. Then I sent a WhatsApp message to say please send me the paper because I cannot access it. Luckily, she emailed the paper and this is how I was able to write the exam. Otherwise, my day was already disrupted. I started writing my exam, which was already going to half past. I was panicking, trying to finish on time, which means, even though we going digital when it comes to technical problems and all that, it can also interfere because yes, they gave us information. When you encounter such a problem, what do you need to do. But when you panicking, I'm telling you, even all the steps that you're supposed to follow, the first thing I did was to send an e-mail, but I was using my work e-mail address to send information to say that I cannot access the sites to get the exam paper. And then I realize that probably they won't even look at my e-mail because it's not coming from a myUnisa e-mail address and then I phoned the number that was given. The number was just ringing and then there was this voice, as if I'm on the queue but not accessing the person who can be able to assist me. So, it was taking forever, and I couldn't even get help through the phone. The only way was to contact someone. Luckily, she was able to e-mail me the paper for me to be able to write the exam. So yes, technology is good. It makes life easier. But when it comes to those technical glitches, it can be a problem. Which means I'm not sure where they need to look at ways which can be able to assist when one is having a challenge because that telephone number that was given, it did not help. I realized I need to send an e-mail, but because I had to write, my main focus was to write so that I'm able to finish it in time. I only sent an e-mail afterwards to say I started very late, yeah.

Moleko, Gabaiphiwe

Thank you. And then thinking about the modules that you are taking right now, how well do their design meet your needs and expectations in the current era of technological demands?

CEMS student 3

In terms of the modules, the design and the way the information is imparted, I would say they've made sure that students are able to get the most out of the modules and the instructions as well. The way one is supposed to tackle the studies. It guides you. It also gives you that type of even when you are not too sure about things, because some of the things will find that OK you want to access the myUnisa. The system is down, or there is a strike and all those things. At least they will give that information to say if we encounter this error, you need to e-mail this and like the technical people who can be able to assist you. So, I would say it works best, but when I think about like the first years because I had an encounter of someone who's just registered this year. Maybe it's because it's their first year. It happens. Even if you using like the hard copies where your mind is all over, you don't even know what to do. So, she was panicking because she was not familiar with myUnisa. She was not familiar with so many things. And I think even the modules that she took, she took more than what she was supposed to because she says when she was registering, this is what she was told to take in terms of the number of modules. But for me, I find it because probably I was doing it not for the first time. So, it was sort of easier or it made my life easier so that I know what I'm supposed to do. It was just the onus was on me now to make sure that the time management is on point.

Moleko, Gabaiphiwe

Yeah, yeah. And then thinking about your lecturers, would you say they are technologically competent to teach and support your learning?

CEMS student 3

Yes, I should think so because where it needs more of like technical stuff, there is a support technical e-mail address where you need to send to in regard to challenges. But as far as them, whether we're having a brown bag they need to deliver information or even assist us in terms of how to look for information. I know that we were given even sort of a small lecture in terms of how to use the library but them

being the lecturers now in terms of giving information, I would say they are because I don't even think we were going to be able to access the information and one being able to learn the way one was able to learn in my academic year last year, if it wasn't for the lecturers who were guiding us and sending information as well. Even when one is not clear, you send an e-mail and they were able to respond in regards to whatever that you are sending. The only concern that I had is when we had a lecturer and then she had to go on maternity leave. Someone had to take over. Now it was more of like you comparing with the first one was more in tune, and she knew what she was doing. When you compare that person with the replacement, the replacement was not so…OK, he was knowledgeable in some ways, but it was a bit different. Not that he didn't know what he was supposed to do, but in comparison with the first person. The lecturer made studying easier because I could see that even from all these student when she was still on maternity leave, we ended up sending information to her if we were not clear about something.

Moleko, Gabaiphiwe

Yeah, yeah. OK. So you you've probably heard about the term fourth industrial revolution. What does it mean to you?

CEMS student 3

The fourth industrial Revolution is an era where most things are becoming digitalized and we are moving from this manual way of doing things. In an old era where people. I don't know what it's called. Like the opposite of technology, but it's more about digitalizing the workplace, the way we do things and making people to take advantage of technology.

Moleko, Gabaiphiwe

OK. And what are the characteristics of a module that indicate to you that it is responsive to the 4th Industrial revolution environment? In your view.

CEMS student 3

I would say for instance, the fact that we did not have to depend on the hard copy of the study guides and all those things to be posted to us. We were able to learn fully online. Even the lectures were conducted online. Those brown bags. If we needed more information in terms of the assignments, they were explained to us. Going online on Teams and all those types of platforms for us to get information. Even writing the exam online, which is something that is still new, but you know we are moving towards that era. It is happening even though there are some aspects that needs to be polished so that people can take full advantage and there are no technical glitches, so I would say yes, in terms of the example online a giving information online, I would say the institution is taking advantage of the fourth industrial revolution.

Moleko, Gabaiphiwe

And do you have any suggestions for how we can improve those modules to fit the four IR context fully?

CEMS student 3

Probably it's something that I will have to think hard about. But. Let me see. Can I pass the problem and come back to that one?

Moleko, Gabaiphiwe

It's actually the last question. That is fine. Unless you have any other comments you'd like to make. I always allow for comments.

CEMS student 3

Umm. I'm thinking yeah most of the students at Unisa it's people who are already working full time jobs. You will find students who were unable to get spaces in your normal institutions, then they will go to Unisa. But mostly it's people who are working. So, when they do these, especially the brown bags or even the workshops and all those things, if they can try to accommodate people who are working full time

because it's either you use your lunch hour or you sometimes you'll even put in a day's leave so that you are able to attend those online workshops or meetings. So, if they can be able to accommodate those who are working, I think it will help as well because I know we had to prove that you've attended those brown bags and sometimes other people couldn't even attend even one. So, it becomes a problem. And then in terms of the modules, I did not see any challenges that will make me to say, I was unable to study well because these parts were not organized very well. But I remember one of the group members was doing a different study units where they did not have a lecturer for almost the whole duration of the academic year. And they were just doing assignments, not getting feedback to see whether they were doing well or not. So even though you do not see like a lecturer you need that communication to happen so that because you cannot like at least when it's physical you are able to even see your lecturer maybe by the corridors and you can ask questions. But when it comes to this, you rely only on technology to send emails and there must be something coming back. Feedback coming from your lecturer so that you can proceed with confidence as well. So, if there's a lack of communication on both sides, it becomes a problem, especially for a student, because you're relying on that information from your lecturer to say yes, you are doing great or you ask a question or you need a feedback in terms of the assignment. But if there's none of that happening then it becomes a problem because now you realize that if only I was able to see this person physically then I wasn't going to have this encounter of not knowing whether I'm on the right track or not. But for me, especially the subject that I was doing now, I think it was organized to such an extent that it made life easier for me to be able to proceed with my studies with ease.

Moleko, Gabaiphiwe

OK. OK. Well then thank you so much. That brings us to the end of the interview.

CEMS student 3

OK.

Moleko, Gabaiphiwe

I really appreciate all your responses and you've given me a lot to work on. I really appreciate your time as well. So, thank you very much and all the best with your yeah.

CEMS student 3

All right, this is I'm clear that I was able, so I'm glad I was able to help.

Moleko, Gabaiphiwe

All the best with your studies and, have a good day further.

Moleko, Gabaiphiwe stopped transcription.

APPENDIX J: ETHICAL CLEARANCE CERTIFICATE

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UNISA COLLEGE OF EDUCATION ETHICS REVIEW COMMITTEE

Date: 2021/10/13

Dear Ms WG Moleko

Decision: Ethics Approval from
2021/10/13 to 2026/10/13

Ref: **2021/10/13/7393555/18/AM**
Name: Ms WG Moleko
Student No.:7393555

Researcher(s): Name: Ms WG Moleko
E-mail address: molekwng@unisa.ac.za
Telephone: 0822005431

Supervisor(s): Name: Prof MT Gumbo
E-mail address: gumbomt@unisa.ac.za
Telephone: 012 429 3339

Title of research:

The Responsiveness of Instructional Design in Open Distance and e-Learning to the 4th Industrial Revolution

Qualification: PhD Open Distance and e-Learning

Thank you for the application for research ethics clearance by the UNISA College of Education Ethics Review Committee for the above mentioned research. Ethics approval is granted for the period 2021/10/13 to 2026/10/13.

The **low risk** application was reviewed by the Ethics Review Committee on 2021/10/13 in compliance with the UNISA Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment.

The proposed research may now commence with the provisions that:

1. The researcher will ensure that the research project adheres to the relevant guidelines set out in the Unisa Covid-19 position statement on research ethics attached.
2. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.

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3. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study should be communicated in writing to the UNISA College of Education Ethics Review Committee.

4. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.

5. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the confidentiality of the data, should be reported to the Committee in writing.

6. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study. Adherence to the following South African legislation is important, if applicable: Protection of Personal Information Act, no 4 of 2013; Children's act no 38 of 2005 and the National Health Act, no 61 of 2003.

7. Only de-identified research data may be used for secondary research purposes in future on condition that the research objectives are similar to those of the original research. Secondary use of identifiable human research data requires additional ethics clearance.

8. No field work activities may continue after the expiry date **2026/10/13**. Submission of a completed research ethics progress report will constitute an application for renewal of Ethics Research Committee approval.

Note:

The reference number **2021/10/13/7393555/18/AM** *should be clearly indicated on all forms of communication with the intended research participants, as well as with the Committee.*

Kind regards,

Prof AT Motlhabane
CHAIRPERSON: CEDU RERC
motlhat@unisa.ac.za

Prof PM Sebate
EXECUTIVE DEAN
Sebatpm@unisa.ac.za

Approved - decision template – updated 16 Feb 2017

APPENDIX K: PERMISSION TO CONDUCT RESEARCH AMONG UNISA STAFF AND STUDENTS

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RESEARCH PERMISSION SUB-COMMITTEE (RPSC) OF THE SENATE RESEARCH, INNOVATION, POSTGRADUATE DEGREES AND COMMERCIALISATION COMMITTEE (SRIPCC)

24 November 2021

Decision: Permission approval 24 November 2021 to 23 November 2022

Ref #: 2021_RPSC_098

Ms Wilheminah Gabaiphiwe Moleko

Student #:

Employee #: 07393555

Principal Investigator:

Ms Wilheminah Gabaiphiwe Moleko

Department of Curriculum and Instructional Studies

School of Teacher Education

College of Education

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Supervisor: Prof MT Gumbo; gumbomt@unisa.ac.za; 0823258353

The responsiveness of instructional design in open distance and e-learning to the 4th industrial revolution

Your application regarding permission to involve Unisa staff, students and data in respect of the above study has been received and was considered by the Research Permission Subcommittee (RPSC) of the UNISA Senate, Research, Innovation, Postgraduate Degrees and Commercialisation Committee (SRIPCC) on 12 November 2021.

It is my pleasure to inform you that permission has been granted for the study. You may invite the following Unisa employees to online interviews through the gatekeeping assistance of your supervisor:

a) Instructional designers/Education consultants (6 persons)

b) Electronic originators (6 persons)

Prof Lessing Labuschagne – Chairperson

Email: llabus@unisa.ac.za, Tel: (012) 429-6368

APPENDIX L: TURNITIN REPORT AND SIMILARITY INDEX

turnitin

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File size:	3.06M
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THE RESPONSIVENESS OF INSTRUCTIONAL DESIGN IN OPEN DISTANCE
AND E-LEARNING TO THE 4TH INDUSTRIAL REVOLUTION

by

Wilheminah Gabaiphiwe Moleko

submitted in accordance with the requirements
for the degree of

DOCTOR OF PHILOSOPHY IN EDUCATION

in the subject of

Curriculum Studies

at the

University of South Africa

Supervisor: Prof MT Gumbo

June 2023

Wgn Moleko

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APPENDIX M: LANGUAGE EDITING CERTIFICATE

EDITING AND PROOFREADING CERTIFICATE

7542 Galangal Street

Lotus Gardens

Pretoria

0008

01 June 2023

TO WHOM IT MAY CONCERN

This certificate serves to confirm that I have language edited WG Moleko's thesis entitled, **"THE RESPONSIVENESS OF INSTRUCTIONAL DESIGN IN OPEN DISTANCE AND E-LEARNING TO THE 4TH INDUSTRIAL REVOLUTION."**

I found the work easy and intriguing to read. Much of my editing basically dealt with obstructionist technical aspects of language, which could have otherwise compromised smooth reading as well as the sense of the information being conveyed. I hope that the work will be found to be of an acceptable standard. I am a member of Professional Editors' Guild.

Hereunder are my contact details:

Jack Chokwe (PhD)

Contact numbers: 072 214 5489

jackchokwe@gmail.com

Professional EDITORS Guild