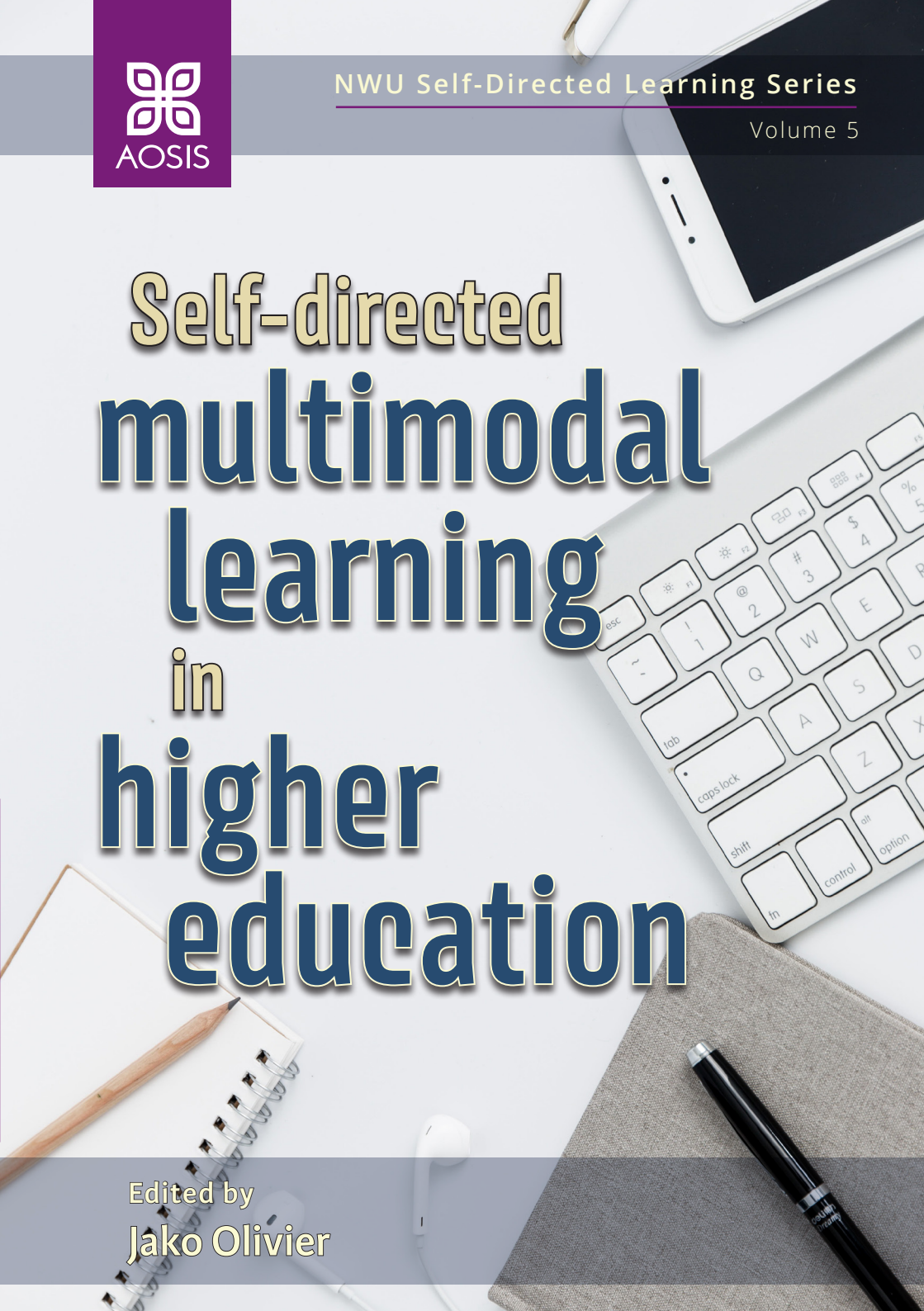
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Volume 5
Self-directed
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Edited by
Jako Olivier

NWU Self-Directed Learning Series
Volume 5

Self-directed multimodal learning in higher education

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Self-directed multimodal learning in higher education

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Peer review declaration

The publisher (AOSIS) endorses the South African 'National Scholarly Book Publishers Forum Best Practice for Peer Review of Scholarly Books'. The manuscript was subjected to a rigorous two-step peer review process prior to publication, with the identities of the reviewers not revealed to the author(s). The reviewers were independent of the publisher and/or authors in question. The reviewers commented positively on the scholarly merits of the manuscript and recommended that the manuscript should be published. Where the reviewers recommended revision and/or improvements to the manuscript, the authors responded adequately to such recommendations.

Research Justification

This book aims to provide an overview of theoretical and practical considerations in terms of self-directed multimodal learning within the university context. Multimodal learning is approached in terms of the levels of multimodality and specifically blended learning, also the mixing of modes of delivery (contact and distance education). As such, this book will provide a unique snapshot of multimodal practices within higher education through a self-directed learning epistemological lens. The book covers issues such as what self-directed multimodal learning entails, mapping of specific publications regarding blended learning, blended learning in mathematics, geography, natural science and computer literacy, comparative experiences in distance education, as well as situated and culturally appropriate learning in multimodal contexts.

Various research methodologies were employed in this book. This covers critical literature studies, systematic literature reviews, design-based research, qualitative research conducted auto-ethnographically and by means of interviews and questionnaires, as well as mixed-method studies where data from quantitative instruments were combined with qualitative data.

This book provides a unique focus on multimodality in terms of learning and delivery within the context of self-directed learning. Therefore, this book would not only advance the scholarship of blended and open distance learning in South Africa, but also contribute to enrich the discourse regarding self-direction. It will help readers to have an idea of the latest trends in the literature regarding multimodal self-directed learning in South Africa, as well as unique empirical work being conducted in this regard.

The target audience of this book comprises researchers and academics working in the field of multimodal learning, and more specifically blended learning, as well as open and distance learning. This book will provide not only a theoretical framework for those who aim to work within the combined context of multimodality and self-directed learning; the empirically research practices shared in the book could also inform future research.

I hereby declare, on behalf of the chapter authors, that the content presented in this book is based on original research and that no part of the book has been plagiarised from another publication or published elsewhere.

Jako Olivier, Research Unit Self-Directed Learning, Faculty of Education, North-West University, Potchefstroom, South Africa

Contents

Abbreviations, Boxes, Figures and Tables Appearing in the Text

List of Abbreviations

ADDIE	Analyse, Design, Develop, Implement and Evaluate
AEH	Adaptive Educational Hypermedia
AI	Artificial Intelligence
BL	Blended Learning
BOCODOL	Botswana College of Distance and Open Learning
BOU	Botswana Open University
CAI	Computer-assisted Instruction
CAQDAS	Computer-assisted Qualitative Data Analysis Software
CD	Compact Disc
CL	Cooperative Learning
CLP	Cooperative Learning Preference
CoI	Community of Inquiry
CSCL	Computer Supported Collaborative Learning
DBR	Design-based Research
DL PDP	Distance Learning Professional Development Programme
EBSCO	Elton Bryson Stephens Company
HE	Higher Education
HEI	Higher Education Institution
HEMIS	Higher Education Management Information System
HEQSF	Higher Education Qualifications Sub-Framework
ICT	Information and Communications Technology

IWB	Interactive Whiteboard
LMS	Learning Management System
LOs	Learning Objects
MC	Multimodal Composing
MEdEL	Master's in Educational Leadership
MOOC	Massive Open Online Course
NRF	National Research Foundation
NWU	North-West University
OCLI	Oddi Continuing Learning Inventory
ODE	Open and Distance Education
ODL	Open Distance Learning
OEP	Open Educational Practice
OER	Open Educational Resource
PBL	Problem-based Learning
PI	Positive Interdependence
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
SAMR	Model Substitution, Augmentation, Modification, Redefinition Model
SDL	Self-directed Learning
SDLI	Self-directed Learning Instrument
SDLPS	Self-directed Learning Perception Scale
SDLRS	Self-directed Learning Readiness Scale
SM	Self-monitoring
SOLMS	Student-oriented Learning Management System
SoTL	Scholarship of Teaching and Learning
SRL	Self-regulated Learning
SRSSDL	Self-rating Scale of Self-directed Learning
TED	Technology, Entertainment and Design
TPACK	Technological Pedagogical Content Knowledge
UNESCO	United Nations Educational, Scientific and Cultural Organization

UODL	Unit for Open Distance Learning
WIL	Work-integrated Learning
ZPD	Zone of Proximal Development
ZPTD	Zone of Proximal Teacher Development

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Foreword

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Learning has many ways, and we just need to find ours. Out of the official academic programmes, from primary and secondary school, to higher education (HE), and alongside lifelong or vocational ones, the process of learning is owned by every person. Many people prefer a coach – a mentor to guide the steps and reduce the burden of decision. Others prefer a pre-established, by-the-book approach where all the phases are depicted, activities are described, assessment metrics are well settled and where there is little room for interpretation. There is nothing to object to about any of these ways, or any other in the past, or any developing in the future.

I must confess, nonetheless, in my experience, to master something – to really master a topic or a competence or a skill, or even a sense (like taste or orientation) – one must deal with oneself. Usually, the learner becomes the stopper because of several reasons, including fear, respect, pride, gloating, ignorance, schedule and so on. One must face those fears and potential boundaries so as to control and overcome them, and only then the learner can achieve another milestone in his or her process. Indeed, there is no better way to really excel in something than to embrace it seamlessly.

In this context, self-directed learning (SDL) is a powerful approach to make a master out of the learner. Students will get lost, sad, lonely, outraged and, hopefully, released and empowered. And, suddenly, they will reach that very threshold that looked so

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far, just around the corner, some time ago. In doing so, the learner goes from being a potential self-stopper to becoming a self-triggered, self-determined, self-directed active subject.

This book presents a series of reflections about multimodal learning and SDL, combined. Some of them lean on open education, whilst others lean on blended learning (BL), adaptive learning, cooperative learning (CL) and online learning. Sometimes, all these buzzwords on education (adaptive, lifelong, blended, cooperative, open, etc.) are mixed up in an attempt to make sense out of the current educational scenario. Nowadays, the combination of two or more of these words in a lesson plan or an academic programme looks logical and sensible. The recurrent question regards how it seems impossible and unfruitful to leave outside the official syllabus what happens in the classroom; how to use social networks in a lesson; how to engage students in the academic flow with an active role in their portfolio; and, to some extent, how to make every learner the actual driver of his or her learning itinerary.

Self-directed multimodal learning is a key to this approach. It transforms regular students into powerful agents of change – their change. In exploring a number of ways to channel learning, to achieve certain capabilities, to develop skills and even to memorise information, learners become the actual conductors of their own orchestra – the real masters of their awareness of the learning path. And this book is a significant guidance to that awareness.

Preface

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Within the context of the Fourth Industrial Revolution and the increasing need for equitable access to and student success in learning within higher education (HE), the notion of self-directed multimodal learning has become increasingly important. In this book, multimodal learning is understood to be at the level of individual, interactional, instructional or institutional multimodality. However, the focus is placed mainly on instructional and, to a lesser extent, on institutional multimodality. This publication aims to contribute to the academic scholarship around self-directed learning (SDL) and multimodality whilst drawing on the literature of blended learning (BL) and distance education, as it presents evidence-based commentary.

This book is volume 5 in a series of publications, titled by the North-West University (NWU) Self-Directed Learning Series, as initiated by the NWU's Research Unit for Self-Directed Learning. This series addresses different aspects of research being conducted within the wider field of SDL and specifically within the mentioned research unit. In addition, this specific publication relates to multimodal learning, which as a field of research is supported by the NWU's United Nations Educational, Scientific and Cultural Organization (UNESCO) Chair on Multimodal Learning and Open Educational Resources.

This book comprises 10 chapters. Chapter 1 provides an overview of the concept of self-directed multimodal learning by discussing the different levels of multimodality in terms of individual, interaction, instruction and institutions. In this book,

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the concepts of BL and distance learning are prominent and, consequently, in this chapter they are contextualised within the wider scholarship around multimodality. In addition, the chapter explores affordances of self-directed multimodal learning within the context of transformative open education.

Chapter 2 deals with a systematic literature review of the trends from academic articles and postgraduate studies related to BL, SDL and the Community of Inquiry (CoI) framework, published between 2009 and 2019 in the South African context. The chapter provides thematic gaps and methodological opportunities in the literature that would prove useful for any future research in this field. Furthermore, trends regarding BL, SDL and the CoI framework are also identified.

In Chapter 3, the attributes of adaptive learning technology are considered in terms of the assumptions and principles of SDL, by proposing a conceptual model to guide future research and implementation. The chapter also shows that by means of background assessment, adaptive learning technology can potentially enable the 21st-century multimodal classroom to transform into a dynamic, engaging and participative experience that may enhance SDL.

Chapter 4 presents another in-depth systematic literature review by focusing on the design guidelines for a self-directed BL environment. It also provides facilitators within a multimodal context with comprehensive guidelines for designing effective BL environments. Through this process the aspects necessary to promote SDL are also emphasised.

Chapter 5 provides a comparative autoethnographical overview of the diffractive pathways in self-directed multimodal learning, as derived from experiences of Botswana and South Africa. The lived experiences are presented in an institutional multimodality context, with a long history of distance education, as well as in a context where this approach was only recently implemented, in addition to face-to-face instruction.

Consequently, the chapter reports on diffractive pathways about how both distance and contact modes can influence each other in blended spaces.

Chapter 6 is focused on creating social presences without neglecting the importance of teaching and cognitive presences in designing multimodal online learning environments. In order to reach this goal, students in the research had to engage in an online problem-based learning (PBL) activity in geography education through Google Docs, as managed within the university's learning management system (LMS). This research determined that the use of Google Docs, combined with the elements of cooperative learning (CL) within a PBL task, contributes to a higher social presence online.

Chapter 7 explores the situated and culturally appropriate nature of current multimodal learning practices in terms of SDL amongst distance education students and lecturers at a selected South African university. From this qualitative study, it was evident that despite some acknowledgement of diversity in the multimodal environment, lecturers do not know how to include culturally appropriate content in their lessons, and some lecturers and even students do not believe that students should have choices with regard to content. In addition, lecturers sometimes have a limited choice in selecting content, because of alignment, outcomes and prescribed resources. Finally, it was found that language and multilingualism in education are associated with culturally appropriate learning and that more support is necessary for situated and culturally appropriate learning.

Chapter 8 involves a design-based study that explored the scaffolding of teachers' critical reflection in a South African distance learning programme. To this end, a reflective journal was included as part of a work-integrated learning (WIL) portfolio in the Diploma in Grade R Teaching. In this chapter, the need, as well as the value is determined of a more detailed reflective format towards scaffolding critical reflection for student teachers in this specific teacher education programme.

Chapter 9 presents research related to third-year geography student teachers' perceptions and feedback over 4 years to help improve the design of online PBL managed in a LMS. From this research the quantitative and qualitative results indicated that students held positive views about these designs and that changing the Wiki of the LMS to Google Docs in order to create an interactive collaborative working space through which all group members could work, simultaneously optimised not only the teaching presence but also the social presence.

Chapter 10 investigates how blended and CL in a computer literacy class could develop SDL skills. This research should be regarded within the context of increasing demands for digital literacy. The quasi-experimental design showed that a computer literacy module presented in this manner has the potential to enhance pre-service teachers' SDL skills and equip them with more than just computer literacy.

In this book, *self-directed multimodal* learning is defined as an approach to education where individual modal preferences, communication through different modalities, as well as the blending of learning, teaching and delivery by means of different modes are employed with the aim of fostering self-directedness among students.

Acknowledgements

The authors would like to thank the North-West University (NWU) Faculty of Education, its executive dean, Prof. Lloyd Conley, and the faculty's Deputy Dean: Research and Innovation, Prof. Washington Dudu, for providing funding and support to make this publication possible.

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Additional funding towards technical and language editing was provided by the NWU United Nations Educational, Scientific and Cultural Organization (UNESCO) Chair on Multimodal Learning and Open Educational Resources. Some of the chapters were also funded wholly, or in part, through funding provided by the South African National Research Foundation (NRF) – acknowledgements in this regard are provided at the end of the relevant chapters.

Furthermore, the authors thank Dr Jackie de Vos for her significant contribution as a language editor and Dr Amit Dhakulkar for helping with the technical editing.

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Finally, all the authors are thanked for their contributions in order to make this publication possible.

Chapter 1

Self-directed multimodal learning within a context of transformative open education

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Abstract

This chapter, as a critical literature review, examines the concept of multimodal learning with respect to its roots in the scholarship of multimodality and blended learning (BL). The levels of multimodality– that is, individual, interactional, instructional and institutional iterations – are explored within the context of self-directed learning (SDL) and related theoretical constructs.

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Finally, the affordances of self-directed multimodal learning are considered within the context of transformative open education.

Keywords: Multimodal learning; Self-directed learning; Multimodality; Blended learning; Distance education; Open education; Open educational resources; Self-directed multimodal learning.

Introduction

This book combines educational research from different disciplines and contexts with the common feature that all of them share aspects of multimodality and specifically self-directed multimodal learning. In this chapter and in the book, multimodality is approached from three inter-related levels as proposed by Olivier (2018:7) – multimodal communication, multimodal learning/teaching and multimodal delivery – with the addition of individual multimodality (cf. Olivier 2020). The relevant theoretical frameworks and literature that inform the related scholarly discourse are reviewed in this chapter to explore these concepts further. A further objective of this chapter is to determine the affordances of self-directed multimodal learning with regard to transformation in higher education (HE) within the context of open education. This chapter involves conceptual research to reach the aforementioned elucidatory and functional objectives.

It is important, however, to consider that the term 'multimodal learning' is not consistently used in academic literature. Consequently, in this chapter, the use of multimodal learning is limited to the four levels mentioned in the previous paragraph and as built upon the scholarships proposed by Carey Jewitt (2013), Gunther Kress (2010), Gunther Kress and Theo van Leeuwen (2001) and Jeff Bezemer and Gunther Kress (2008, 2016), amongst others. The use of multimodality has been extended from functional linguistics and social semiotics to various other fields (Di Mitri et al. 2018:338; Jewitt, Bezemer & O'Halloran 2016:1; Smith & Kennett 2017:88, 89). Furthermore, the idea of employing multimodality in education is not new, as

graphical and even multimedia artefacts have been used in education for a long time. However, in the past, the main focus was on printed text as the key and central pedagogical artefact (Smith & Kennett 2017:88).

The term 'multimodal learning' is used in various fields, ranging from totally diverging meanings to more related polysemic instances (cf. Jewitt et al. 2016:2). Conversely, the focus of multimodal learning in this context does not relate to multimodal deep learning (cf. Ngiam et al. 2011); sequenced multimodal learning (Magana, Serrano & Rebello 2019); multimodal learning analytics (Di Mitri et al. 2018); multimodal input by users in multimodal learning interfaces, or systems (Jaimes & Sebe 2007; Vo 1998); multimodal user interfaces (Odeh & Qaraeen 2009); or to the narrower approach of multimodality being confined to students using various sense modalities (Farías, Obilinovic & Orrego 2007:178). Furthermore, Picciano (2017) has conceptualised a Multimodal Model for Online Education, but despite some theoretical links with aspects of multimodal learning, the use of multimodal learning in this chapter cannot be equated to this particular model. However, this chapter is in alignment with the way multimodal learning is approached by Grobler (2020) and Olivier (2018, 2020).

A further use of the word 'multimodal' pertains to teaching, and *multimodal teaching* is, according to Shridhar, Pandey and Karmani (2019:305–306), a combination of 'group discussions, demonstration, role play, videos, webinars, podcasts, [and] assessment with individual feedback'. Therefore, for them, the meaning of multimodality lies in the integration of different classroom activities and content, provided through different technologies. According to Anastopoulou (2004:37), on the other hand, multimodality relates to the 'employment of multiple modalities, interaction styles, and sometimes even interactive devices'. In the context of Anastopoulou's (2004:38) research, how modality is conceptualised, is also important, and modality can be categorised into input or output, by either humans or computers. Despite the fact that the issue of multimodal input

(cf. Vo 1998) is disregarded in this chapter, it should be noted that, in a learning context, communication is not supposed to be the only way, and especially in the context of multimodality, this should also be considered. Consequently, the need for interaction from lecturers and students should be multimodal in both ways.

The concept of multimodality is not only used for communicative and educational settings, but also has been extended to research methodology (Jewitt et al. 2016:130–153) where it can be considered as a 'methodological framework' (Norris 2004), or 'research lens' (Jewitt 2013:6). Despite the advantages and promise of such a multimodal analysis, it has also been criticised (Du Toit 2014:16–18). It is, therefore, clear that the adjective *multimodal* can be and is used in any instance where a number of modes are involved, applied or investigated. In this chapter, however, the focus is on the four levels of multimodality that make up multimodal learning, and specifically is the emphasis on self-directed multimodal learning.

Self-directed multimodal learning is informed by social semiotic theory as the foundational framework. The relationship between social semiotics and multimodal learning is clear (Du Toit 2014:7). Kress (2010:178) states that '[o]ne cannot have a theory of learning without a theory of meaning, however implicit that may be; a theory of learning always entails a theory of meaning'. Thus, multimodal learning is about making meaning. Similarly, Nouri (2019) observes that:

> [*F*]rom a multimodal perspective, the emergence of digital technologies and new media has created new conditions for learning, as new semiotic resources have been made available for consuming and producing knowledge representations. (p. 686)

As semiotic resources are used in the learning context, so would the field of semiotics also inform the understanding of multimodal learning.

Semiotics is often regarded as the study of signs, and Crystal (2008:431) defines it as '[t]he scientific study of the properties of signalling systems, whether natural or artificial'. Crystal (2008:431)

observes that it has been 'applied to the analysis of patterned human communication in all its sensory modes, i.e. hearing, sight, taste, touch and smell'. Meaning relates to semiotics and, therefore, Kress (2010:178) also observes that 'semiotics is inevitably and centrally implicated in any theory of learning' and that '*sign-making is meaning-making* and *learning* is the result of these processes' and that it even relates to assessment (Kress 2010:182–183; [*emphasis in the original*]). Moreover, Kress (2010) provides the following definition of 'learning':

> Learning is the result of the transformative engagement with an aspect of the world which is the focus of attention by an individual, on the basis of the principles brought by her or him to that engagement; leading to a transformation of the individuals' semiotic/conceptual resources. (p. 182)

Therefore, within the context of multimodal learning, a transformative interrogation and negotiation of lecturer and student semiotic resources take place. This process takes place through language, and hence learning as both communication and meaning-making is explored.

Learning as communication and making meaning

A central foundational aspect of this chapter's approach to multimodality is the fact that learning can be regarded as communication. Related to this facet is the following statement by Jewitt (2003:32), that '[l]earning, especially school learning, is usually understood as a linguistic accomplishment. Language (speech and writing) is seen as central to communication in general and learning in particular'. Similarly, Canale (2019:53; [*emphasis in original*]) states that 'learning cannot be just understood *in communication*, but rather *as communication*'. In a broader sense, learning could also be regarded, as Abrams (2015: 13) describes it, as 'an idiosyncratic and highly contextualized phenomenon that is complicated by the diverse, textured, and semiotic features of meaning making experiences'. The focus on

language also extends further than communication or means of representation and thinking. Therefore, 'everything that can be thought can be thought in language, and everything that can be represented, can be represented in language' (Jewitt 2003:32).

This focus on language and meaning prompts the need to draw from the theoretical background of social semiotics (Jewitt et al. 2016:58–85) and systemic functional linguistics (Jewitt et al. 2016:30–57). According to Kress (2010:54), '[s]ocial-semiotic theory is interested in meaning, in all its forms'. As stated before, the focus of semiotics is on signs (Hodge & Kress 1988:1), and Kress (2010:54) notes that '[s]igns exist in all modes, so that all modes need to be considered for their contribution to the meaning of a sign-complex'. The roots of social semiotic theory are in linguistics. Wong (2019; cf. Halliday 1978) makes the following observation:

> Social semiotics is a social theory of meaning and communication modelled on Michael Halliday's theories of language as social semiotic and Systemic Functional Grammar with a particular focus on the agency of social actors and social context. (p. 1)

In social semiotics, the resources available for meaning-making are central. Wong (2019) observes that:

> [*S*]ocial semiotics has been a social theory of meaning and communication in which semiotic resources with varying affordances are used as tools by sign-makers for serving particular social needs required in a given social context. (p. 2)

It is evident that an important aspect of social semiotics is the phenomenon of a sign. Bezemer and Kress (2016) make the following statement:

> Social semiotics takes the notion of the sign as its starting point. Signs are elements in which the signified (a meaning) and the signifier (a material form) have been brought together. (p. 20)

For them (Bezemer & Kress 2016), these signs have three characteristics:

1. 'the relation of form and meaning is motivated; that is, the relation between the two is not an arbitrary one'

2. 'the sign is always shaped by the environment in which it is made, and its place in that environment' and '[*t*]o make their signs, sign-makers choose from a range of modes that are available in their environment'
3. 'each mode offers certain potentials for making meaning: each has specific affordances' (p. 20).

Wong (2019) lists four theoretical assumptions underpinning the theory of social semiotics:

- [*M*]eaning-making is always multimodal, drawing on a multiplicity of modes such as image, gesture, posture, gaze, action, music, colour, 3D objects, alongside speech and writing.
- [*S*]emiotic resources are used by people in a given social context.
- [*T*]he motivated sign which implies that the connection between form (i.e. signifier) and meaning (i.e. signified) within the social semiotic multimodal analysis is, therefore, not arbitrary but motivated and transparent.
- [*S*]ocial semiotics is built on the assumption that it is the sign maker's interest that guides his or her selection of semiotic resources. (pp. 2–3).

Within the context of multimodality, 'common semiotic principles operate in and across different modes' (Kress & Van Leeuwen 2001:2). With regard to communication, it is essential to note that communicational environments can be considered as being complex and multimodal (Kress 2010:32, Wong 2019:4), communication takes place because of a specific prompt (Kress 2010:32; Wong 2019:4) and communication actually only occurs through interpretation (Kress 2010:35; Wong 2019:4). It is also clear that the concept of a text (Farías et al. 2007:182) and communication (Nouri 2019:684) has been changed considerably because of the influence of technology.

Canale (2019) also notes:

> [*S*]igns and meaning-making processes are constitutive of situated social practices in which participants make sense of the world,

> represent experience, communicate with others and establish social relations, and as such they are situated and context-bound. (n.p.)

Jewitt (2003:60) agrees with this statement because, according to her, '[e]ach mode has different potentials for expression making the choice of mode a crucial part of the production and the shaping of knowledge' and that it 'is important for learning as school curricular subjects draw on the semiotic resources of modes in different ways'. Hence, any multimodal approach to learning could potentially be different depending on the discipline and content. In brief, multimodal learning should be contextualised and situated, and this implies in-depth knowledge of the students and their world.

Any meaning-making is context- and situation bound. In this regard, Canale (2019:41) makes the observation that 'meaning-making is by definition situated, that is to say, bound to time/space scales'. This aspect relates to the nature of social semiotics as (Canale 2019):

> [*S*]ocial semiotics underscores the situatedness of meaning-making processes and the various ways in which humans make meanings by drawing on several modal resources and media in particular situations and for particular purposes. (p. 42)

However, the specific learning environment also plays a role. According to Canale (2019:19), 'environments in which sign-makers make, transform and interpret meanings are made up of time/space frames that interact with, affect and implicate one another'. In this regard, Canale (2019:20) uses the concept of *scales*, which can be considered as 'the instrument through which sign-makers organize and arrange the semiotic world around them' (cf. Blommaert 2019; Blommaert, Westinen & Leppänen 2015).

Drawing on the concept of social semiotics and by implication on the theory of language as social semiotic by Michael Halliday (cf. Halliday 1978; Jewitt et al. 2016:58–85; Kress 2010:54), certain implications are also relevant for multimodal learning. Halliday distinguishes between three metafunctions, namely, ideational,

interpersonal and textual metafunctions (Hodge & Kress 1988:124; Jewitt et al. 2016:34; Kress 2010:87; Wong 2019:18). In multimodal environments, the ideational metafunction relates to the way in which textual and graphical elements make meaning through an experiential function and how semantic relationships are constructed through the logical function. The interpersonal metafunction pertains to the social interaction between a writer (lecturer) and a reader (student), and the function could even be extended to interaction between readers (students). Finally, the textual metafunction focuses on the creation of a text – hence, here, coherence and the structure and organisation of elements are of importance.

Jewitt (2003) interprets these metafunctions in the context of multimodality and new technologies. She (Jewitt 2003) concludes that new technologies mediate learning differently from printed materials and that:

> [*T*]he 'non-linguistic' modes go well beyond the function that they are most often associated with of [*sic*] directing and maintaining student attention. These modes as they appear on the computer screen contribute to the construction of curriculum entities (ideational meaning), as well as positioning the student users in relation to knowledge (interpersonal meaning) and realising the coherence of a text (textual meaning). (p. 280)

Therefore, the medium – in this case, screen-based technology – determines the way in which meaning is interpreted.

Learning is language and it is communication; however, it can also be multimodal and, ideally, it should foster self-direction amongst students in order to nurture lifelong learners who can function in ever-changing technological contexts.

Defining self-directed multimodal learning

In this chapter, self-directed learning (SDL) is regarded as both a process and a learning aim, and multimodality is the vehicle and environment. However, it is essential to delineate these concepts

clearly, as with many academic jargons the semantic implications often vary in breadth and can even be specific to an academic tradition or author.

According to Şentürk and Zeybek (2019:151–171), SDL is considered as a requirement for multimodal learning. The concept of SDL can be described, using the classical definition of SDL by Knowles (1975), as:

> [*A*] process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies and evaluating learning outcomes. (p. 18)

This definition qualifies how multimodality – according to this publication – can be approached in terms of individual preference, interactional acts, instructional action and institutional delivery. Self-directed learning can be considered as part of a movement towards learner-centred learning, and its origin can be traced back to the works of Carl Rogers, Allan Tough and Malcolm Knowles (De Waard 2016:18, 20, 32–33), amongst others. Different models of SDL have been identified in the literature (Şentürk & Zeybek 2019:153–157) and SDL strategies have also been determined (Şentürk & Zeybek 2019:157–161).

Importantly, Brockett and Hiemstra (2019:55–56) consider SDL as both a process and a learner preference. For Pilling-Cormick and Garrison (2007:14), SDL relates to 'students taking primary responsibility and control of their learning process, including setting goals, finding resources, determining strategies, and evaluating outcomes'. According to Jewitt (2003:32–33), the use of technology has an effect on the way people think and it leads to more independence for students. Significantly, SDL implies a sense of agency for students and therefore (Abrams 2015):

> [*S*]tudents should be encouraged to search for, discuss, and experiment with apps, software programs, and devices that are helpful to them – including resources that teachers may be unfamiliar with and/or may not have planned on using in class. (p. 111)

In addition, Latchem (2019) states that SDL:

> [*A*]llows individuals to focus effort on useful information they do not yet possess, expose information that is inaccessible via passive observation, and through active engagement may enhance the encoding and retention of the new material. (p. 17)

The importance of SDL is also evident as Ehlers (2013:116, 117) states that '[t]he concept of SDL comes to be of enormous importance to social learning – from an educational-theoretical point of view' as 'learners can determine and be responsible for their learning processes'. In addition, Brockett and Hiemstra (2019:66) emphasise the importance of the social context in self-direction. Hence, SDL does not necessarily imply learning as an independent and solitary act but rather a communal endeavour.

Despite the prominence of SDL in the literature, there has also been some criticism towards this phenomenon. Hase and Kenyon (2007:112) are of the opinion that curricula where SDL has been considered in the design 'were still very much teacher-centric with little opportunity for any real involvement at a micro or even macro level by the learner'. Consequently, they propose an alternative concept of heutagogy (cf. Blaschke 2019). Hase and Kenyon (2007:112) note that *heutagogy* (also called *self-determined learning*) is 'learner-centred learning that sees the learner as the major agent in their own learning, which occurs as a result of personal experiences'. Blaschke (2019:78) regards heutagogy as being on a continuum at the end of a progression from pedagogy and andragogy (strongly associated with SDL). However, in this book, the focus is limited to SDL.

The use of technology, as in the case of multimodal learning, has certain effects or implications for SDL. In an empirical investigation on the interrelations between technology use, SDL, student engagement and academic performance, Rashid and Asghar (2016) found a positive relationship between technology use and SDL. Candy (2004:52–59) observed how there seems to be a form of reciprocity between SDL and technology as they influence each other.

To understand the concept of multimodality, the term 'mode' needs to be explored. The term 'mode' is used and approached differently in various contexts. Generically, the term refers to different manners or ways of some phenomenon. Etymologically speaking, the word can be traced back to the Latin word *modus*, which, in turn, apart from 'a measure', also refers to a 'manner' or 'way of doing something or of behaving' (Partridge 2006:2020). Bezemer and Kress (2008:171) define *mode* as 'a socially and culturally shaped resource for making meaning', and different modes have different modal resources (cf. Bezemer & Kress 2016:18; Kress 2010:79; Redman 2018:79). Jewitt (2003:32) describes a mode as 'any regularized organized set of semiotic resources for articulating meaning'.

Modes and included content are also dynamic in nature and hence the concepts of transformation and transduction are used. According to Bezemer and Kress (2008:169), *transformation* relates to 'changes within a mode'; and with *transduction*, the 'semiotic material is moved across modes, from one mode (or set of modes) to another mode (or set of modes)' (cf. Kress 2010: 125, 129).

Modes are contextual and they present potential for meaning making. Kress (2010:11) states that '[m]odes are the result of a social and historical shaping of materials chosen by a society for representation'. Importantly, Bezemer and Kress (2016:21) observe that '[a]s modes offer different potentials for making meaning, this entails that signs – and their effects – made in one mode differ from signs made in other modes'. According to Moreno and Mayer (2007:310), mode refers to a '[c]ode used to represent information' and modality refers to '[s]ense receptors used to receive information'. In this context, Canale (2019) states the following:

> Multimodality leads us to analyze how complex meanings are created in the articulation of both modal resources – or modes – and media. Modal resources are semiotic resources that can be selected to make meanings, depending on the particular context and interest of the sign maker. (p. 45)

Just like resources, modes can be selected in order to support a specific meaning being conveyed.

The choice of mode is important as, according to Jewitt (2013:32), 'how knowledge is represented and experienced – the choice of communicational modes and technologies – is crucial to understanding knowledge construction'. Farías, Obilinovic and Orrego (2011:137) state that 'multimedia learning is conceived as knowledge construction', according to Mayer's multimedia learning model (Moreno & Mayer 2007). This knowledge construction also has clear pedagogical implications. Nouri (2019:685) also contends that '*modes*, such as gestures, audio, video and images are semiotic resources that have different affordances and potentials for making meaning'. Employing different modes in the classroom could be advantageous as Thompson (2008) states:

> The multimodal learning taking place allows students to critically examine how different texts convey meaning, how the modes convey meaning differently, and how texts evoke different responses from the reader, writer, listener, and viewer. (p. 145)

Already the influence of nontraditional modes is evident in education. Bezemer and Kress (2008:167) state that 'modes of representation other than image and writing – moving image and speech for instance – have found their way into learning resources, with significant effect'. However, in an educational context, both mode and medium can be distinguished.

According to Jewitt (2003:81), a distinction between mode and medium is necessary. With reference to technology, *mode* relates to 'technologies of representation' (Jewitt 2003:81), whilst the *medium* 'is the substance in and through which meaning is instantiated or realised and through which meaning becomes available to others' (Bezemer & Kress 2008:172), 'the carriers used to transfer information, ranging from the human perceptual organs to coaxial cable and radio waves' (Anastopoulou 2004:40), or basically, the 'technologies of dissemination' (Jewitt 2003:81). A further relevant term is *media*, which refers to the

'the means for the distribution of messages' (Bezemer & Kress 2008:169).

From the literature, the learning environment can also be described as being multimodal (Ioannou, Vasiliou & Zaphiris 2016; Sankey, Birch & Gardiner 2010). In this regard, Ioannou et al. (2016) distinguish between two aspects of a multimodal learning environment:

> First, the learning environment used both physical and digital tools, it was connected to the outside world, and it was interactive. Second, the environment afforded the presentation and use of information in multiple formats such as text, pictures, diagrams, and audio. (p. 1028)

From this description, the distinction between the use of physical and digital tools versus the actual mode of presentation is evident. Digital environments are described by Cope and Kalantzis (2017:1) as 'eLearning ecologies' as they are similar to 'an ecosystem, consisting of the complex interaction of human, textual, discursive, and spatial dynamics'. The ecological metaphor is useful to describing a multimodal context where dynamic and organic interactions are envisaged.

Frames can be used to highlight or separate. Kress and Van Leeuwen (2001) refer to the concept of *framing* as:

> [*T*]he way elements of a visual composition may be disconnected, marked off from each other, for instance by framelines, pictorial framing devices (boundaries formed by the edge of a building, a tree, etc.), empty space between elements, discontinuities of colour, and so on. (p. 2)

However, they note that framing may also imply (Kress & Van Leeuwen 2001):

> [*T*]he ways in which elements of a composition may be connected to each other, through the absence of disconnection devices, through vectors, and through continuities and similarities of colour, visual shape and so on. (p. 2)

In this chapter, I would even like to extend the metaphor of framing as a disconnecting and connecting device. In this regard, specific frames are suggested around the different levels of

multimodality. Firstly, the concept of multimodality is extended beyond its main focus of communication. Furthermore, by framing these levels where necessary, one can distinguish between them but, essentially, there could be connections between them because of overlapping continuities and shared characteristics. The frames or levels of multimodal learning (cf. Olivier 2020) are presented in Figure 1.1.

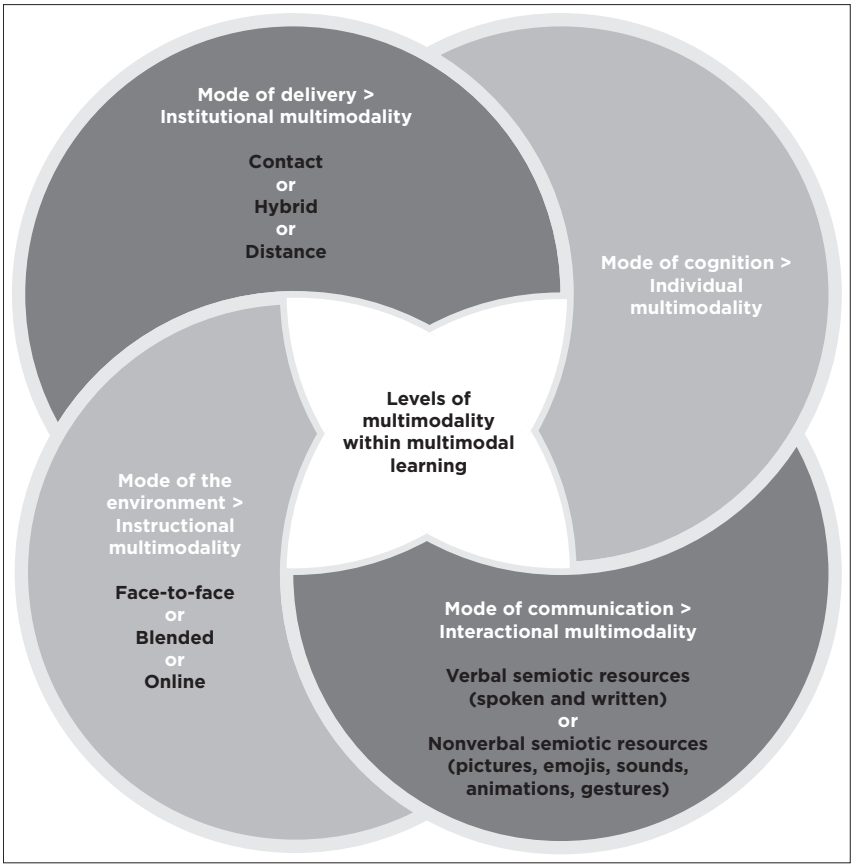

FIGURE 1.1: Levels of multimodality within multimodal learning.

Each of these levels holds unique but also shared characteristics, yet they can be framed by the purpose of the type of mode involved. Moreover, each level has certain common principles – derived from different disciplines and practices – which could be interpreted as the grammar (Kress & Van Leeuwen 2001:3) of the specific level. In this chapter, the four levels are briefly unpacked; however, in this book the focus is mainly on instructional multimodality with occasional crossing over of the different framelines.

Individual multimodality

At the individual level of multimodality, the focus is on how the individual approaches different modes and which preferences a person would have. Redman (2018:1) emphasises the importance of self-knowledge and claims that '[p]eople must know the Self to address the turbulent circumstances and variety of content with which today's technology bombards our global village'. This implies students having a concept of their modal preference as drawn from reflective practice and experience. The accommodation of such practices would be necessary in any interactional and instructional, multimodal learning contexts. Furthermore, learning implies changes in the brain. In this regard, Lin, Parsons and Cockerham (2019:8) note that '[a] human's perceptions and understanding of the world are built on patterns' and that '[s]ensory input is registered as patterns of perceptions, and may be preserved either as unisensory or as multisensory perceptions', whilst, interestingly, '[i]n multisensory patterns, each sense will be preserved independently'.

When multimodality is considered as 'using tools to communicate among the user and interface' (Algahtani 2015:19), the focus is on sensory modalities utilised by users. Such interfaces should accommodate a range of preferences. From the literature, it is evident that electronic interfaces could be limiting in their use of modalities or could be overextending through data

overload (Algahtani 2015:19). Consequently, the modal content should not be too monomodal or too multimodal.

A further very interesting phenomenon is multimodal assessment through which students 'draw on a variety of skills that are consistent with their literacy practices' (Du Toit 2014:108), whilst considering the different modes other than writing that can be employed by students and also multilingualism. Apart from the mentioned student dispositions, Sankey et al. (2010:853) also highlight the importance of student learning style (cf. Alseid 2009:21) preferences in multimodal learning environments and how neuroscience has proven the advantages of utilising multiple modes in learning environments. Lin et al. (2019:10) also note that different skills are required for students to be successful within a technology context.

McGovern et al. (2016:R20) even found that the 'transfer of learning between sensory modalities' is possible and that their research 'suggest[s] a unidirectional transfer of perceptual learning from dominant to non-dominant sensory modalities and place[s] important constraints on models of multisensory processing and plasticity'. McGovern et al. (2016:R21) also stated that their research 'predicts that training on a task with the non-dominant sense would lead to modality-specific learning effects'.

An important aspect of individual multimodality is the student's capacity to generate multimodal content. Teacher-centredness can be quite problematic in fostering individual multimodality. Redman (2018:4) believes that 'the learner's estrangement from their learning projects begins from being fed by someone else's idea of what the learner should know about the world they inhabit'. It is problematic for an education system if, within it, the student 'becomes more interested in generating an impressive numerical "account" rather than being the producer of personally authentic practical knowledge' (Redman 2018:3). Consequently, the student as the self-directed producer of knowledge is essential. The advances in technology and increased access and use thereof have democratised the knowledge-

generating nucleus. According to Redman (2018:4), the digital revolution 'has caused a shift in the agency of knowledge-production processes, spreading it evenly between the three main actor-groups: society, teachers and learners' (cf. 'Affordances of self-directed multimodal learning in an open context').

Jewitt (2003) explains multimodal learning as follows:

> [*S*]tudents' signs are never (more or less competent) repetitions, reproductions, copies, of the teacher's sign: the students' signs are always transformations of the resources that were available to them, made in the light of their interest at the point of making the sign. (p. 59)

Importantly, Jewitt (2003:59) also notes that '[t]he sign as arbitrary means that learning is essentially about acquiring an abstract system of resources that is outside of the learner' and that '[t]he role of the student is to learn the rules and codes of the system'.

To foster individual multimodality, concepts such as digital literacy (cf. ch. 10) and even the more dynamic metaliteracy are key for education. The need for a focus on metaliteracy is because 'students need to develop critical media literacy skills, which include an expansive understanding of literacy and the critical examination of media in relation to dominant, suppressed, and silenced ideologies' (Abrams 2015:28). Mackey and Jacobson (2011:76) reframe information literacy as metaliteracy and explain the difference between these two concepts, stating that '[w]hile information literacy prepares individuals to access, evaluate, and analyze information, metaliteracy prepares individuals to actively produce and share content through social media and online communities'. So, by building on the critical skills required for handling resources within information literacy metaliteracy proposes a student-centred aspect where students also act as producers. This aspect of students as producers also relates to what Olivier (2020) calls 'demiurgic access'. Furthermore, Lin et al. (2019:11) also emphasise critical thinking skills as being important as, within a digital context, a student's 'learning goal will not primarily be to acquire knowledge, but rather to

problem-solve and respond creatively to the challenges and needs of a dynamic world'.

The aspects of individual multimodality can further be extended as such individuals act in social contexts where communication is bidirectional. Consequently, the level of interactional multimodality is also pertinent to any discussion on multimodal learning.

Interactional multimodality

In the scholarship on multimodal learning, interactional multimodality has long been the focus of scientific discourse. In this regard, multimodality refers to communication by means of different modes (Smith & Kennett 2017:88). However, in this chapter, multimodal communication is also approached in relation to learning and teaching. Bezemer and Kress (2016:13) state that 'teaching is an instance of multimodal communication' and that 'a range of different communicative resources [can be used] to design a multimodal learning environment'. They further say that 'communication and learning are interlinked, mutually constituting and defining of [*sic*] each other in a closely integrated domain of *meaning-making*' (Bezemer & Kress 2016:14, 15; [*emphasis in original*]), and that there is little difference between learning and socialisation. Furthermore, interaction can also be approached from an online education perspective (Picciano 2019:116–119), which makes this aspect of multimodality relevant for instructional multimodality as well.

Interaction implies multimodality and is not limited to language. Jewitt (2013:1) acknowledges that communication does not only take place by means of language, and in support of this notion, Norris (2004:1) also states that '[a]ll interactions are multimodal'. In the light of these two sentiments, the concept of multimodality 'attends systematically to the social interpretation of a range of forms of making meaning' (Jewitt 2013:2), and it 'provides a framework for the systematic description of modes

and their semiotic resources' (Jewitt 2013:3). Farías et al. (2007:183) note that although texts were in the past considered as being 'linear, closed and finished', the opposite is true in a multimodal context. Thompson (2008:144) emphasises the importance of multimodal literacy and the fact that different subjects and disciplines employ different 'modes of meaning-making'.

The importance of speech and writing historically is not necessarily perpetuated through screen-based interaction. According to Bezemer and Kress (2016:14), 'the use of semiotic resources provides inroads into learning', but they also admit that 'the claim, now profoundly challenged, that language, as speech and writing, provides the most developed and entirely comprehensive resource for all meaning-making' (Bezemer & Kress 2016:17). Hence, blurring of the interactional and instructional levels or frames is evident. Semiotic effects are discernible in different contexts, or as Kress (2010) observes:

> [*A*]t the level of media and the *dissemination* of messages – most markedly in the shift from the book and the page to the screen; at the level of *semiotic production* in the shift from the older technologies of print to digital, electronic means; and, in *representation*, in the shift from the dominance of the mode of *writing* to the mode of *image*. (p. 6; [*emphasis in original*])

Importantly, there seems to be a dynamic relationship between technology and the communication and meaning-making that takes place through such mediums. In this regard, Jewitt (2003:23) states that '[m]ultimodal communication is central to the design and use of the majority of new technologies'. Furthermore, Jewitt (2013:14) observes that 'the features of technologies ("old" and "new" technologies) provide different kinds of constraints and possibilities for meaning making – technologies, like other tools, shape what we do'. Burke and Rowsell (2007:331) state that '[t]echnology has pushed multimodality up a notch by offering more modalities, simultaneously within text content and design' and that this

implies a return to 'textual elements that can be visual or have sound or movement that give texts meaning'. Consequently, the importance of 'multimodal content' and 'multimodal texts' (Thompson 2008:148, 151) in learning contexts is evident. According to Canale (2019:46), '[n]ew technology gives way to new configurations and reconfigurations of texts, new ensembles and orchestration of modal resources and media'.

Multimodal communication also involves meaning-making and this involves signs. In the discussion on semiotics earlier, the issue of signs was mentioned, and interactional multimodality also depends on signs and semiotic resources. Bezemer and Kress (2008:170) describe *signs* as 'elements in which meaning and form have been brought together in a relation motivated by the interest of the sign maker'. This process requires appropriate semiotic resources. Furthermore, Kress (2010:79) asserts that '[d]ifferent modes offer different potentials for making meaning' and that '[t]hese differing potentials have a fundamental effect on the choice(s) of mode in specific instances of communication'. According to Jewitt (2003:29), different modes are employed on screens when using technology and that '[t]he meaning of a message is distributed across all of these modes, and not necessarily evenly' whilst 'different aspects of meaning are carried in different ways by each mode'. Hence, the modes themselves carry semiotic value.

Interaction also implies negotiated meaning. Kress and Van Leeuwen (2001) distinguish between four domains or strata through which meaning is made:

1. *discourse*, which relates to 'socially constructed knowledges of (some aspect of) reality'
2. *design*, which is 'the conceptual side of expression, and the expression side of conception', and is a 'means to realise discourses in the context of a given communication situation'

3. *production,* which implies 'the organisation of the expression, to the actual material articulation of the semiotic event or the actual material production of the semiotic artefact'
4. *distribution*, which pertains to 'the technical "re-coding" of semiotic products and events, for purposes of recording (e.g. tape recording, digital recording) and/or distribution (e.g. radio and television transmission, telephony'. (pp. 4, 5, 6, 21)

Multimodal communication relates to the environment, as well as what Yelland (2018) calls 'multimodal experiences' and 'multimodal texts'. In this context, different multimodal contexts come into play, namely, 'oral, aural, linguistic, visual and kinaesthetic' (Yelland 2018:849). An important conclusion drawn by Yelland (2018:856) – who researched the use of tablets among children aged between four and eight years in Australia – is that '[b]eing able to select the most effective modalities to represent your idea or communicate your findings is an essential component of being multiliterate in contemporary times'. However, this ability is relevant for learners regardless of their age.

In the multimodal context within educational environments, even assessments need to be adapted (Burke & Rowsell 2007). Algahtani (2015:18) concurs with this view and says that multimodal assessment could include 'the use of auditory and visual metaphors to represent the information to be used in the online assessment methods'. On another level, the digital environment and the ubiquitous learning context possibly allow for a move away from limited standardised assessments to 'a ubiquitous learning model where information is constantly being engaged and numerous knowledge artifacts are being produced is a better way to get this essential collection of assessment resources' (Cope & Kalantzis 2017:56).

Certain elements of interactional multimodality also relate to the instructional level. Research conducted by Ioannou et al. (2016:1032) has shown that the use of one or more modes of presentation in the communication process was 'well perceived' in a problem-based learning (PBL) intervention done in a

multimodal learning environment. Sankey et al. (2010:861) noted that despite improvement in student performance in their empirical study related to the use of multimodal learning environments, 'multimodal learning may be of greater benefit to lower-achieving students, whilst higher achieving students perform well, regardless of how the content is presented'.

In this chapter, I acknowledge the central role that multimodal communication or interaction, as it is phrased here, plays ontologically in multimodal learning, and also the fact that the emphasis in scholarship is on this level. However, there is a clear blurring of the frames between interactional and instructional multimodality – as stated earlier, learning is in fact communicating. However, in this chapter, and specifically elsewhere in this publication, the level of instructional multimodality is prominent.

Instructional multimodality

Instructional multimodality pertains to different modes of instruction, such as face-to-face, online or a blend of both. Alseid (2009:34) defines multimodal eLearning as a 'learning process that involves more than one modality in the representation of the learning material'. Yet, with instructional multimodality, the focus is extended to not only representation but also to other aspects of instruction. Consequently, the term 'blended learning' (BL) is closely associated with this level or within this frame. The term 'blended learning' can be defined as a combination of online learning and face-to-face learning (Abrams 2015:3; Bosch 2017:57; Harasim 2017:30; Olivier 2011:85; Picciano 2017:187; Sriarunrasmee, Techataweewan & Mebusaya 2015:1565; Tucker, Wycoff & Green 2017:6) and it is relevant for many parts of this publication (cf. ch. 2, ch. 3, ch. 4, ch. 6, ch. 8, ch. 9 & ch. 10). The concept of online learning is also related to eLearning, which, in turn, refers to the utilisation of specific information communication technologies for the purposes of learning (Alseid 2009:14; Faneer 2015:10–11). However, in the literature, there are many and conflicting definitions of 'blended learning', and many iterations

of this concept are applied at different levels of education (Bosch 2017:55; Olivier 2011:85; Picciano 2019:21; Tucker et al. 2017:6). Yet Picciano (2019:21) notes that the qualifier *blended* has been used to 'designate courses where some percentage of seat time (less than 80%) was conducted online'. Nonetheless, not all sources adhere strictly to the notion of contact percentages to describe learning as being blended. Grobler (2020) also makes a clear link between multimodal learning and BL.

Regardless of the distinction between face-to-face and online learning, these barriers or frames are also becoming difficult to distinguish. The reason for this is that technology is increasingly being infused into classrooms and that, in online learning circumstances, especially historically, the aim would be to 'reproduce forms of teaching of the classroom mode' (Ehlers 2013:9). In addition, with regard to technology, Canale (2019) remarks that:

> [*W*]hile the new artifact may be socially regarded as an innovative element in education, it may co-exist with or even reproduce traditional practices due to teaching style, preference, lack of policy support, motivation, among other reasons. (p. 48)

Even though the word 'instructional' might imply a teacher-centredness, in multimodal learning, a student-centred approach is central to the process. In addition, the focus of instruction in the context of this chapter would be more on the origin of the word relating to building or construction and, in this case, constructing knowledge in a collaborative and ultimately self-directed manner. Haniya and Rusch (2017:52) emphasise the need for a change in the 'teacher–student power relationship' in order for learning to become more student-centred within a context of ubiquitous learning. Consequently, new forms of relationships are needed where '[w]ith the assistance of digital media tools, these forms of relationships are built on mutual collaboration and active learning' (Haniya & Rusch 2017:53). Active learning is also highly relevant for any successful implementation of self-directed multimodal learning. Amina (2017:66) describes *active learning* as 'any instructional method

that engages students in the learning process, requiring them to do meaningful learning activities and think reflexively about what their knowledge processes' would be and this implies a 'student-focused learning paradigm'.

The role of students in instructional multimodality cannot be ignored. Anastopoulou (2004:30) describes multimodal learning as an approach 'that incorporates learners' multiple modalities and the available instruments of the environment including the multiple representations provided by books or multimedia software'. Therefore, the multimodal nature of a learning experience does not only pertain to the instruction or environment, but also to what the students bring into the context. In the South African context, Du Toit (2014:99) showed how South African students were able to utilise different modes – in this instance, within multimodal assessments.

Learning generally takes place in a multimodal manner. In this regard, Canale (2019:42) noted that 'communication and learning are not monomodally achieved, and therefore they should not be conceived as solely linguistic work, but instead as multimodal work comprising several modes and media'. Furthermore, there are many advantages for instructional artefacts to be multimodal. In support of this statement, Gellevij et al. (2002:238) found that 'multimodal instruction leads to better outcomes than unimodal instruction' and that, in such a context, '[t]raining time is shortened, learning is improved, and cognitive load is not altered'. Similarly, multimodal input on the part of the student also shows advantages (Faneer 2015:16). However, as Bates (2019:100) observed, 'there is relatively little research-based literature on how to choose appropriate media or technologies for teaching'.

As BL draws on the theoretical basis of both more generic learning theories and online learning theories (cf. Picciano 2017:173–176), so can multimodal learning. As such, when instructional multimodality is approached from a theoretical basis, it can also build upon aspects of general learning theories within behaviourism, cognitivism and constructivism

(Amina 2017:69–72; Bosch 2017:24–25; De Waard 2016:47–48; Harasim 2017:11–23, 32–79; Lin et al. 2019:5–6; Olivier 2011:137–149; Picciano 2017:167–170, 2019:44–47; Şentürk & Zeybek 2019:143–150). In addition, with regard to online learning, Community of Inquiry (CoI) (Picciano 2017:173, 2019:50–51) (cf. ch. 2, ch. 6 & ch. 9), connectivism (Amina 2017:72–74; Harasim 2017: 3–14, 80–104; Lin et al. 2019:6; Picciano 2017:174–175, 2019:51–52) and collaborativism or online collaborative learning (Harasim 2017:105–183; Picciano 2017:175, 2019:53–54), amongst others, could be regarded as relevant. Furthermore, conceptual frameworks like the technological pedagogical content knowledge (TPACK) model (Abrams 2015:43; Bosch 2017:63–65) and the multimodal model for online education (Picciano 2017, 2019:57–63), the Substitution, Augmentation, Modification, Redefinition (SAMR) model (Bosch 2017:69–71), Bath and Bourke's BL design process (Bosch 2017:72–77), Bosch's (2017) combined BL design model, or even instructional design models, such as analyse, design, develop, implement and evaluate (ADDIE) models (Picciano 2019:106–115) can also be utilised in a multimodal learning context. Furthermore, the concept of multimodal design also needs to be considered as it 'is related to the presentation of material according to available and shifting resources' (Abrams 2015:13). Blended learning can also be classified according to its implementation. To this end, Bosch (2017:58–62) gives an overview of how different variations of BL fit on a continuum and which models are discernible.

The multimodal environment is highly pertinent to instructional multimodality. Moreno and Mayer (2007:310) define multimodal learning environments as those environments where both verbal and non-verbal content are presented. They also extend this concept to the point where 'interactive multimodal learning environment is one in which what happens depends on the actions of the learner' (Moreno & Mayer 2007:310). This interactivity happens on a continuum and covers numerous actions by the learner or instructor (Moreno & Mayer 2007:311). Hence, elements relating to the interactive level of multimodality

also relate to instructional aspects – showing further evidence of blurring between the frames proposed in this chapter. Because of the use of technology, and specifically the Internet, there has been a 'rise of new multimodal genres where text, image, sound, and data are inseparable: the social media feed, the website, the app, the infographic, the data visualization' (Cope & Kalantzis 2017:25), which is also related to the concept of multiliteracies. From the literature, it is clear that multimodal learning environments contribute positively towards the comfort and performance of students (Nouri 2019:684). Farías et al. (2011:137) also noted that 'multimedia presentations have the potential to result in deeper learning and understanding than do presentations that are presented solely in one format'. Recent developments in multimedia learning have even explored touch modalities by means of haptic technologies (Magana et al. 2019:516–518).

Interactive multimodal learning environments may be problematic in terms of *cognitive overload* as according to Moreno and Mayer (2007:314) a 'potential challenge when learning from interactive multimodal environments is that the processing demands may exceed the processing capacity of the cognitive system', which could be addressed through careful instructional design.

An essential aspect of technology integration within an educational setting is the fact that the use of technology should be planned and supported. Regarding a PBL intervention, Ioannou et al. (2016) made the following remark:

> [*A*]lthough technology has motivational benefits and therefore was well perceived by the learners in this study, we would argue that technology without supporting and scaffolding PBL interactions and process (i.e., recognition, researching, reporting, and reflection) would not have had the desired impact on cognitive engagement. (p. 1037)

Hence, apart from PBL contexts (cf. ch. 6 & ch. 9), support and scaffolding should be regarded as essential components of any multimodal learning process. However, the motivational

affordances of multimodal learning should not be ignored. Jiang and Luk (2016:8) found in their study that the use of digitally mediated multimodal composing (MC) 'was considered as motivating because it enhanced the level of intellectual challenge in students' English learning'. Smith (2017) also explored the MC process and revealed information about students' cross-modal movements and modal preferences. Therefore, the perceptions and reactions of students towards any multimodal classroom intervention (regardless of level) should be considered.

Multimodality is not only relevant on the part of the lecturer but also on the part of the student. In this regard, Jiang and Luk (2016) proposed the use of digitally mediated MC. This concept is used here in the context of language teaching; however, it is proposed that this approach should be used in other disciplines and contexts as well. Jiang and Luk (2016:1) noted that MC involves the use of different modes in order to compose texts. This approach is used 'to prepare students for the changing nature of representation, the increasing linguistic and cultural diversity, and the plurality of textual practices associated with digital technologies' (Jiang & Luk 2016:2). Importantly, Jiang and Luk (2016:9) determined that '[w]hen learning with digitally-mediated MC [multimodal composing] is carefully designed, it is possible to construct a more collaborative and personalized experience' (cf. ch. 3).

Individuals with multimodal preferences interact multimodally and learn through multimodal instructional contexts; however, all of this happens with some or other institutional configurations. Hence, institutional multimodality is also of concern. However, in this chapter, the focus is limited to more formal education as the publication specifically looks at HE.

Institutional multimodality

In this chapter, institutional multimodality relates to the modes of delivery, utilised within educational institutions. In this context,

delivery takes place either through contact, distance, or a combination of both. Despite some overlap with instructional multimodality, the focus here is on how an institution categorises the learning taking place. As such, the modes relevant to this level pertain more to administrative choices and the physical classroom space. In the context of distance education, Redelinghuys (2017:59) supported the use of the concept of 'multimodal delivery'. According to Redelinghuys (2017):

> [*A*] multi-modal model of learning makes use of an array of approaches to meet the needs of students and enable them to experience teaching and learning in a way that is comfortable to them. (p. 59)

Hence, the use of the term 'multimodality' when referring to the institutional delivery of learning is not unique in this chapter.

Contact learning involves students attending classes in person, with possible additional online supplementary teaching or support, whereas distance education (cf. ch. 5, ch. 7 & ch. 8) relates to students not attending any classes on a campus but accessing learning through other means, such as online technologies. A hybrid (Prinsloo 2019:72) approach would involve aspects of both modes of delivery. Such a hybrid approach is also sometimes called 'dual mode programme delivery' or 'mixed mode programme delivery' (Redelinghuys 2017:58). It is, however, important to note that, in many cases, it is difficult to clearly distinguish between any of these three modes and that they would rather exist on a continuum.

Distance education has a long history and extended body of scholarship. Picciano (2019:30–31) notes the long history of distance education and also highlights the origin of correspondence courses and later associations with established universities (cf. Simonson & Schlosser 2010:6–12). As the need for access to HE has increased, so has the need for distance education, which implies easier, open and flexible access and structures. Michael Simonson defines distance education as 'institution-based, formal education where the learning group is

separated and where interactive telecommunications systems are used to connect learners, resources, and instructors' (Simonson & Schlosser 2010:1). From this definition, the emphasis on the learning taking place at an institution and the separation between lecturers and students are clear. Furthermore, a number of other definitions have been proposed for this phenomenon (Simonson & Schlosser 2010:3–6), but for the sake of this chapter, the above-mentioned definitions are sufficient.

A further extension of the concept of distance learning is open distance learning (ODL). According to Redelinghuys (2017:55), ODL relates to a combination of distance education and open learning. Furthermore, Latchem (2019) observed that:

> [*O*]pen and distance learning is essentially a social interactive, constructive, self-regulated and reflective process and the importance of developing autonomy, responsibility and self-efficacy in the learners and a sense of connection and engagement with their tutors and peers. (p. 16)

Insung Jung (2019:1) used open and distance education (ODE) in this context and described it as being 'complex in nature and scope as it involves a wide range of nontraditional ways of teaching and learning that are mediated by various media and technologies'.

At a scholarly level, it is important to also take note that distance education builds on specific theory. In this regard, the following (non-exhaustive) list provides an overview with the theory of independent study by Charles Wedemeyer (Simonson & Schlosser 2010:14–16), theory of independent study and the theory of transactional distance by Michael Moore (Simonson & Schlosser 2010:16–17), theory of industrialisation of teaching by Otto Peters (Simonson & Schlosser 2010:17–20), theory of interaction and communication by Börje Holmberg (Simonson & Schlosser 2010:20–23), Malcolm Knowles' andragogy theory (Knowles 1975; Simonson & Schlosser 2010:23–24), Hilary Peraton's synthesis of existing theories (Simonson & Schlosser 2010:24–25), equivalency theory (Simonson & Schlosser 2010:25–27) and

Desmond Keegan's theoretical framework for distance education (Simonson & Schlosser 2010:27–29).

In addition, Jung (2019:4–6) identifies theories pertaining to ODE.

Distance learning in South Africa has a complex history. Prinsloo (2019) provides a good overview of the broader context of distance learning in this country. According to Prinsloo (2019:67), the idea of 'online distance education is a fairly recent and emerging phenomenon'. Yet, it is clear that numerous South African institutions now have some form of distance education (Prinsloo 2019:75–77).

Self-directed multimodal learning in open education and transformation in higher education

Self-directed multimodal learning has a specific role to play within a context of open education and openness in general, as well as transformation of the HE space. Cronin (2017:16) states that '[e]ducation is about sharing knowledge; thus, openness is inherent in education'. Hence, openness should not be considered as a new approach to education but rather an aspect inherently part of education. Even for formalised learning, open education is relevant, and Hegarty (2015) notes:

> [*L*]earning might be formalized and embedded in qualifications, but more often than not it is comprised of informal learning, where participants choose and create the environment and resources most optimal for them. (p. 3)

The differences between the concepts approached in this chapter can in future also be investigated in both formal and informal contexts, although the blurring of boundaries between such constructs is evident. With regard to self-direction, in addition to being able to select appropriate human and material resources, it has now become important for students to be able to also select

their preferred modal resources. According to Nouri (2019:696), 'learning is more effective and meaningful during self-study when students can choose modes of knowledge representation and construction'.

Open education

Open education, in the context of this chapter, relates to a greater move towards openness in education (Cronin 2017:15; Haniya & Rusch 2017:51; Picciano 2019:150). As such, this openness can be associated with the so-called open movement (Cox 2016:14) or can be described as an 'avalanche' (Ehlers 2013:1) where '[m]ore and more higher education institutions (HEIs) are opening up, in their business models, in their leaning designs, and in their access regulations'.

The concept of education, learning or resources being *open* is retained in this chapter, despite criticism against such an adjectival modifier (Bezemer & Kress 2016:19), as the link with openness ties this chapter to a specific scholarship and a movement in education. This openness can be grouped into three categories, namely, development, infrastructure and content, according to Cox (2016:14–15). According to Deimann (2019:40), openness is 'a complex sociopolitical term which is deeply interwoven with technology' and it is 'associated with the notion of sharing along with the removal of barriers such as access to educational institutions and opportunities'. Clearly, the benefits of open education are to democratise education, especially with regard to access.

Within the open context, a number of related terms have been created or associated with the movement. Hence, *open development* relates to 'aspects of Open that include actual processes through which primary materials are shared' (Cox 2016:3), whilst *open infrastructure* refers to the technical environment, which could include repositories, and *open content*

refers to free content that is shared (Cox 2016:16–17). Furthermore, an often-used concept is *open educational resources* (OERs).

In this chapter, open education also relates to the use of OER within an educational setting. Since the United Nations Educational, Scientific and Cultural Organization (UNESCO) definition of OER in 2002 (Cox 2016:1, 19; Cronin 2017:17; Ehlers 2013:84), a new definition was proposed by UNESCO member states' representatives and the International Council for Open and Distance Education (ICDE 2019) OER Advocacy Committee on 27 May 2019, which defined OER:

> [*L*]earning, teaching and research material in any format and medium that resides in the Public Domain or are under the copyright that has been released under an open license that permits no-cost access, reuse, repurpose, adaptation and redistribution by others'. (n.p.)

According to Picciano (2019:150), OERs 'include a wide array of materials such as textbooks, reading material (e.g., case studies), simulations, games, tests, quizzes, assessment tools, presentations (e.g., PowerPoint), and multimedia'. A distinguishing aspect of OER is that certain licensing – for example, Creative Commons (cf. Ehlers 2013:88), or GNU General Public Licence – is associated with the resources.

The nature of open education is related to ubiquitous learning that has been made possible with the spread of technology and Internet access. Haniya and Rusch (2017:48) regard 'ubiquitous learning as a form of learning on-demand' as the '[d]igital technologies afford the opportunity to engage in learning anytime, any place, and in almost any way'. Hence, the affordances of such learning are evident within a self-directed multimodal learning context where students can take charge and make use of this on-demand learning. However, Haniya and Rusch (2017:48) acknowledge that '[l]iving in a world of ubiquitous computing means that those who don't have a device with an Internet connection are disadvantaged'.

It is essential to note that openness can mean different things and that it can cover different attributes of openness.

Hodgkinson-Williams and Gray (2009) distinguished between four degrees of openness:

1. *social openness* that relates to 'the willingness to make materials available beyond the confines of the classroom by lecturers, students and university management'
2. *technological openness* that involves 'making OER shareable, fundamental issues are the presence and use of interoperability standards and functionality'
3. *legal openness* that pertains to intellectual property rights and licences such as Creative Commons
4. *financial openness* that touches on 'the cost of OER to the user. (pp. 105, 108, 109, 110)

Internationally, and in South Africa, initiatives around OER have increased. Cox (2016:51–54) provides a detailed overview of some of the empirical studies conducted on OER in South Africa and the Global South. However, despite significant effort regarding advocacy and promotion for OER in HE, it has had limited impact (Cox 2016:2). Yet the advantages of using OER are clear as 'faculty and instructional designers no longer need to develop all aspects of a course, but can instead search for appropriate course content and integrate it as needed' (Picciano 2019:151).

The use of OER in practice relates to the concept of open pedagogy. According to Hodgkinson-Williams and Gray (2009:104), *open pedagogy* refers to the 'opening up of educational processes'. Wiley and Hilton (2018:134) observed that open pedagogy is 'closely associated with the creation, use, and sharing of open educational resources (OER)'. The lack of pedagogy linked to OER has also been regarded as criticism against the resources (Cox 2016:3). David Wiley (2013) defines *open pedagogy* as a 'set of teaching and learning practices only possible in the context of the free access and 4R permissions characteristic of open educational resources'. The 4R permissions noted here have since been extended to 5R's, and these activities

are described by Wiley (2019) as follows (cf. Cronin 2017:17; Wiley & Hilton 2018:134–135):

1. Retain – the right to make, own, and control copies of the content (e.g., download, duplicate, store, and manage).
2. Reuse – the right to use the content in a wide range of ways (e.g., in a class, in a study group, on a website, in a video).
3. Revise – the right to adapt, adjust, modify, or alter the content itself (e.g., translate the content into another language).
4. Remix – the right to combine the original or revised content with other material to create something new (e.g., incorporate the content into a mashup).
5. Redistribute – the right to share copies of the original content, your revisions, or your remixes with others (e.g., give a copy of the content to a friend).

The origin of the concept of open pedagogy can, however, be traced back to the early 1970s, to Paquette's (1979) reference to *pédagogie ouverte* (cf. Morgan 2016). In this regard, Morgan (2016:n.p.) observed that 'Paquette outlines 3 sets of foundational values of open pedagogy, namely, autonomy and interdependence; freedom and responsibility; democracy and participation'. The links to SDL in this context are also apparent as SDL implies autonomy, as well as interdependence and a sense of responsibility regarding the learning process on the part of the student.

According to Hegarty (2015), open pedagogy is grounded in open educational practice (OEP). In this regard, the UDE (2010:19) defines OEP as a 'range of practices around the creation, use and management of open educational resources with the intent to improve quality and innovate education'. Similarly, Cronin (2017) defines OEP:

> [*C*]ollaborative practices that include the creation, use, and reuse of OER, as well as pedagogical practices employing participatory technologies and social networks for interaction, peer learning, knowledge creation, and empowerment of learners. (p. 18)

Yet Wiley and Hilton (2018:134) indicate that 'some people treat the term "open educational practices" as being synonymous with "open pedagogy," whilst others hold them to be distinct from each other'. Consequently, Wiley and Hilton (2018:135) employed the term 'OER-enabled pedagogy', which relates to 'the set of teaching and learning practices that are only possible or practical in the context of the 5R permissions which are characteristic of OER'.

An important aspect of open pedagogy is its student-centredness – once again emphasising a similarity to SDL. According to Wiley and Hilton (2018:134), this association 'has been strengthened in recent years concurrent with the development of new technologies' and hence self-directed multimodal learning comes into play. In this context, DeRosa and Robison (2017) contend:

> [*B*]y replacing a static textbook – or other stable learning material – with one that is openly licensed, faculty have the opportunity to create a new relationship between learners and the information they access in the course. (p. 117)

Hegarty (2015:5) identified eight attributes of open pedagogy, which can be summarised:

- Participatory technologies: use for interacting via web 2.0, social networks and mobile apps.
- People, openness, trust: develop trust, confidence and openness for working with others.
- Innovation and creativity: encourage spontaneous innovation and creativity.
- Sharing ideas and resources: share ideas and resources freely to disseminate knowledge.
- Connected community: participate in a connected community of professionals.
- Learner generated: facilitate learners' contributions to OER.
- Reflective practice: engage in opportunities for reflective practice.
- Peer review: contribute to open critique of others' scholarship.

Taking the aforementioned attributes into consideration, some changes in HE and the approach to learning and resources could be possible.

Transformation

In this chapter, learning is regarded as transformation. Similarly, Canale (2019:53) states that 'a multimodal socio-semiotic approach to learning moves forward and posits a quite different metaphor: learning as transformation'. Canale refers to language learning as a transformative process of developing a repertoire of semiotic resources. However, in this chapter, it is proposed that such a repertoire could extend further and can even be considered as an appropriate metaphor for any learning. In addition, Canale (2019) describes learning:

> [*A*]n expansion in that it is the process through which semiotic resources that were not available to sign-makers now become available, at the same time that they can make new meanings with them. (p. 53)

Consequently, transformation does not relate to the more political and institutional cultural aspects of this concept (cf. Suransky & Van der Merwe 2016), even though such transformational aspects would influence all aspects of education.

The concepts of power and difference, as associated with multimodality, can also be relevant to the discourse on transformation. In this regard, Jewitt (2013:7) observes, on power, that '[a] multimodal approach is sensitive to exploring power relations, and how these are materially instantiated through the different kinds of access that people have to communicational modes'. The concept of difference, however, relates to multimodality that 'enables the investigation of how modes are taken up differently within specific environments and by different actors' (Jewitt 2013:9).

It is evident from the literature that OER has the potential to increase access to HE and resources linked to this context

(Cox 2016:27). Furthermore, OER has the potential to extend collaboration and the establishment of communities of practice through which resources can be shared (Cox 2016: 33, 34). In SDL, resources and the nature of access to them are of importance. In this regard, Brockett and Hiemstra (2019:199) observed that 'resources frequently need to be made accessible during an entire learning experience because of varied learner needs, pacing requirements, and plans'. The lecturer's role in the resource selection process is clear as stated by Brockett and Hiemstra (2019:199), '[i]n most learning experiences, however, the facilitator still needs to play some sort of role in evaluating, locating, providing, and even creating learning resources'. Consequently, opening up access to resources on a formal (having access to technologies), epistemological (being able to access and understand the content) and demiurgic (being able to contribute content) level is essential to any form of open transformation.

In an educational context, certain elements are required for transformation. To this end, Canale (2019:55) states that transformation 'brings into the picture the signmaker, the interpreter, the environment and the resources available for sign-making'. This process also leads to the presence of signs of learning and engagement. According to Canale (2019:55), the signs of engagement relate to 'the socially and interactively meaningful ways in which sign-makers respond to and in the environment, and in which they demonstrate their attention or interest at a particular moment'. Importantly, Rashid and Asghar (2016:604) question the mere transformational power of digital technology, despite acknowledging that 'digital technology has infiltrated in the ecosystem of the higher education'. According to Candy (2004:136), the transformative aspect of technology would be its capacity to establish collaboration through networking. Therefore, it is not only about access to content but also about access to others, whether peers or instructors.

Open education transformation relates to the way in which the environment has changed with regard to technology. As there has been a greater move towards greater democratisation and collaboration, online education, in this context, is also influenced. In this regard, Ehlers (2013) makes the following observation:

> With the emergence of modern technologies and the Web 2.0 revolution, content creation, participative information sharing, and, most notably, collaboration among users has [*sic*] revolutionized Web-based communities and created cutting-edge concepts, coining and promoting the terms Technology-enhanced learning 2.0, peer production, and informal learning. (pp. 4–5)

It is widely recognised that this so-called move to Web 2.0 would imply something closer to the original conceptualisation of the Internet, or as 'returning to Tim Berners-Lee's original idea of the Web as a read and write medium and the simultaneous addition of new, social, participatory, and technologically advanced elements' (Ehlers 2013:10). This manifestation of the Internet would emphasise phenomena such as (Ehlers 2013):

- blogs
- wikis
- tagging and social bookmarking
- media sharing, including YouTube
- podcasting
- social networking, such as Facebook
- collaborative editing tools, such as Google Docs
- syndication technologies
- virtual worlds. (pp. 13–20)

The impact of Web 2.0 has also led to the recognition of the so-called eLearning 2.0 as ascribed to Stephen Downs (Ehlers 2013:30) where elements of Web 2.0 infuse the eLearning approach. Apart from further extensions of this approach with the use of Web 3.0 as synonym for the semantic web, the idea of

Web 2.0 and eLearning 2.0 is still relevant as they emphasise the social nature and potential of the Internet.

Transformationally, it is clear that opening access to content and people is central to the context of this chapter. In the next section, the praxis of self-directed multimodal learning in an open context is explored, focusing on specific affordances evident from the literature.

Affordances of self-directed multimodal learning in an open context

In this chapter, it is essential to also establish a link between SDL and open education. Morgan (2016) describes a clear relationship between open pedagogy and SDL. The importance of SDL for distance learning is also clear from the literature (Latchem 2019:15). In support of a positive relationship between SDL and multimodal learning, Sriarunrasmee et al. (2015) found that employing BL in an information literacy classroom enhanced the SDL skills of students. Hegarty (2015:11) observed that '[a] high degree of openness relies on learner-driven practices that are self-regulated'. De Waard (2016:36–38) also highlighted the importance of SDL in Massive Open Online Courses (MOOCs). In addition, Ehlers (2013) made the following statement from which many key aspects of SDL can be identified:

> It is generally perceived that open learning cultures and technology and social media for learning are a demanding shift from a teacher and expert-oriented, asynchronous, top-down, micromanaged, and time-staged paradigm and culture of educating learners to a new paradigm: more learner-oriented, synchronous, bottom-up, and self-organized, self-paced learning – predominantly based on skill and competence development. (p. 4)

From the above quote, learner-centredness and an emphasis on self-organisation are evident. Hence, the ideals of open education correspond with what can be associated with SDL. In this chapter, however, the focus is on self-directed multimodal learning where the different relevant modes involved in the learning process,

come into play. Another essential self-directed multimodal learning example would be personal learning environments, which imply that 'the learning environment no longer consists of single applications but is made up of different individually compiled and cooperative tools' (Ehlers 2013:28).

Real-life and situated learning is relevant within the context of SDL. In this regard, Farías et al. (2007:177) observe that, from the viewpoint of multimodality, 'the value of visual texts in the life of students outside the school, as opposed to the prominence of written texts in the school curriculum' is evident. Du Toit (2014:1) also concurs with this viewpoint by stating that HEIs still favour written texts rather than other modes. This prominence of writing also relates to the way in which literacy has been approached (Du Toit 2014:31–33).

The concept of genre is appropriate in multimodal learning contexts as any resources, whether open or not, should adhere to certain genre elements in order to support learning. According to Kress (2010:113), 'genre addresses the semiotic "emergence" of social organization, practices and interactions' and, furthermore, 'it names and "realizes" knowledge of the world as social action and interaction'. Certain signs can be employed to denote instructional, collaborative, demonstrational, interactional, reflective or assessment aspects of a learning environment. Hence, genre orients the readers within a learning environment towards specific actions and/or processes with regard to both temporal and spatial locations.

The selection of available technologies is paramount. Ioannou et al. (2016:1036) emphasise the importance of 'creative use of affordable technologies available in the university classroom' in multimodal learning environments. For student teachers, the importance of them becoming the creators of online multimodal texts themselves is also important. In this regard, Thompson (2008) suggests that she would:

> [*E*]ncourage my pre- and in-service teachers to become more familiar with these multimodal texts for reading and writing by assigning

> a project that has them design their own blog site to interact with popular culture that connects to their content area. (p. 145)

However, according to Nouri (2019:685), there has been little research on 'university students' unforced enactment of multimodal learning practices during self-studies' as the focus (in research) has been largely on instructors or the environments.

To support self-directed multimodal learning, conducive circumstances must be created. In this regard, Redman (2018:5) refers to reconnected learning and accentuates having the relevant means, as well as tools so that 'the learner can invent his/her own multidisciplinary, multimodal and uniquely personal systems of knowing and sharing knowledge'. The success of the use of OER depends on institutional support. In this regard, Cox (2016) noted that:

> [*T*]he culture of the institution will influence how Open initiatives are formed, the structures that govern not only those initiatives but all work done in the institution and how those structures are enforced. (p. 226)

She also adds that 'if institutions showed strong support for contribution of teaching materials to create an Open culture, then there may be a more obvious relationship between Open culture and contribution' (Cox 2016:226). Cronin (2017) notes the:

> [*N*]eed for institutions to work broadly and collaboratively to build and support academic staff capacity in three key areas: developing digital literacies and digital capabilities; supporting individuals in navigating tensions between privacy and openness; and, critically, reflecting on the role of higher education and our roles as educators and researchers in an increasingly open and networked society. (p. 28)

A very pragmatic example related to the open context is the concept of *disposable assignments*. In this regard, David Wiley (2013) criticises assessments that are disposable and that 'add no value to the world'. As a counter-measure against disposable assignments, Wiley (2013; cf. Wiley & Hilton 2018:136–137)

proposes an open pedagogy process through which some assignment content can be used as OER and hence such an:

> [*A*]ssignment clearly leverages the reuse, revise, remix, redistribute permissions of open educational resources in order to enable students to extend and improve the official instructional materials required for the course. (n.p.)

Importantly, assessments will have to be multimodal in nature as Algahtani (2015:119) determined in an experimental study that participants did 'enjoy (and attain satisfaction from) the multimodal assisted e-assessment experience'. However, Wiley and Hilton (2018:144) caution that '[s]tudents are the authors and copyright holders of the homework and other artefacts they create as part of their education' and, therefore, '[t]here is no morally or ethically appropriate scenario in which faculty can require students to openly license their homework or other creations as part of an assignment'.

Instructional design should also be an important feature in self-directed multimodal learning in an open context. As such, on the part of the lecturer and the student, the principles of modality, verbal redundancy, personalisation, temporal contiguity, spatial contiguity, coherence, redundancy, guided activity, reflection, feedback, pacing and pretraining (Moreno & Mayer 2007:315–320) should also be considered. Whilst approaching any instructional design, the different levels of multimodality also provide definite affordances. In this regard, the functional specialisation (Jewitt 2003:42) should be considered as certain modes are more relevant in certain circumstances because of the way society uses those modes generally. Conversely, functional load (Jewitt 2003:43) relates to the actual usage of a specific mode in 'a particular occasion of communication'. Furthermore, through careful planning, the creator of a multimodal learning artefact chooses relevant modes for specific content as (Kress & Van Leeuwen 2001) states:

> [*I*]n the age of digitisation, the different modes have technically become the same at some level of representation, and they can be

> operated by one multi-skilled person, using one interface, one mode of physical manipulation. (p. 2)

Integrating OER in multimodal environments can also provide affordances such as greater access to resources. In this context, Brockett and Hiemstra (2019) observe:

> [*S*]elf-directed learners may, in fact, benefit the most from access to increased information and improved retrieval systems, assuming that they have access to the systems and know how to use them. (p. 272)

They further observe that '[t]he notion of being able to retrieve lots of information by oneself has implications for SDL approaches and resources' (Brockett & Hiemstra 2019:273). Importantly, it is evident that users of OER must be empowered to effectively use such resources.

Self-directed multimodal learning in an open context also implies the importance of students being the creators of resources. This concept can be linked with Papert's idea of constructionism or learning-by-making (Wiley & Hilton 2018:135–136). DeRosa and Robison (2017:117) agree with this by stating that '[i]nstead of thinking of knowledge as something students need to download into their brains, we start thinking of knowledge as something continuously created and revised' and that 'students are expected to critique and contribute to the body of knowledge from which they are learning'. Nouri (2019:686) notes that, within a multimodal approach, 'learners are more active producers of knowledge that design their learning by selecting among and by utilizing multiple semiotic resources' (cf. Smith & Kennett 2017:98).

As knowledge producers, students would 'search and analyze multiple sources with differing and contradictory perspectives and develop their own observations and conclusions' (Amina 2017:67). In this context, students can be considered as (Nouri 2019):

> [*A*]ctive designers of knowledge and that acknowledge that learning and meaning making – in the current technological media landscape –

> can and many times are taking place trough [*sic*] the use of different modes and in a multimodal way. (p. 686)

This aspect has clear theoretical roots within the social constructivist approach to learning. Yet, in the literature, different terms are used to describe students being co-creators of knowledge. In this regard, Bruns refers to 'producers' (or 'users' + 'producers') (Ehlers 2013:33) who create content. Nouri (2018:695) found in research conducted with university students that 'students' construction and consumption of learning material is to [a] large extent taking place in a multimodal way'. According to Lin et al. (2019:10–11), '[d]igital learners build knowledge as they observe and interact with virtual and real-time phenomena, build social networks, and make connections between new ideas and prior understandings'. Hence, the creation of knowledge is part of a wider strategy employed by students in a multimodal context.

In agreement with the aforementioned sentiments, Cope and Kalantzis (2017) state:

> [*T*]here is a shift in the balance of agency between an instructor and a learner, where *the learner has considerable scope and responsibility for epistemic action*, albeit within the frame of reference of an activity sequence that has been scaffolded by the instructor. (p. 10; [*emphasis in original*])

Despite the unfortunate focus on sequence – which not all learning might follow – the emphasis on the student and the supportive and scaffolding role of the lecturer are evident. In this regard, Smith and Kennett (2017:90) observed that '[m]ultimodal reading pathways are not fixed in online spaces, as readers follow their own textual pathways across sites, modes, media, and evolving genres and forms'. Importantly, student creators would not act in isolation. Amina (2017:81) states that '[s]tudents can use their own identities to influence the digital ecology classroom through shared experiences and knowledge exchange whilst contributing to the knowledge that is being collaboratively produced'. This critical and active collaborative production is key

towards reaching self-directed multimodal learning within an open context.

Whilst creating content for self-directed multimodal learning in open contexts, care should be taken and planning should be carefully done to select the appropriate modes. This is essential as '[d]ue to the different affordances of modes each mode used in the computer applications contributes to the construction of knowledge in specific ways' (Jewitt 2003:280). Furthermore, the 'meaning potentials of modes need to be considered in relation to the multi modal [*sic*] ensemble that they are always only ever one part of' (Jewitt 2003:280–281). In essence, a rethinking of what knowledge involves might be necessary and then 'knowledge is less a product that has distinct beginning and end points and is instead a process in which students can engage, ideally beyond the bounds of the course', and this can be done by means of OER (DeRosa & Robison 2017:117). According to Cope and Kalantzis (2017), knowledge should not be 'a matter of what I know as an individual' but rather:

> [*M*]y capacity to navigate the wide epistemic world at my fingertips; it is my ability to discern critically what is salient and what is not; it is commitment to acknowledge the social provenance of my knowledge by means such as citations and links; it is my ability to work with others to create collaborative knowledge where the sum of the knowable is greater than the individual contributions of colleagues in-the-knowing; it is my capacity for synthesis; and it is my ability to extend creatively socially acquired knowledge. (p. 11)

A requirement towards effective self-directed multimodal learning in open contexts would be the support of relevant literacies. In this regard, Nouri (2019:697) notes that HE should adapt by 'supporting the development of students' multimodal literacy and learning skills, and by exchanging its current monomodal view of assessment with multimodal assessment practices'. Furthermore, as Jewitt (2003:34) observes, 'there is a need to conceptualise literacy more broadly as a matter of multimodal design'. Apart from the needs posed by multimodal environments, the drive towards SDL also implies additional

literacies that should be considered. According to Abrams (2015:15), a layered literacies approach is appropriate as it provides 'a framework to talk about what students are doing, acknowledging the multimodal literacies, experiences, values, and coinciding abilities that are inherent aspects of such meaning making'. In addition, the layered literacies framework promoted by Abrams (2015:111) 'requires educators to help students move between the online and offline worlds, using the knowledge gleaned in each to understand and to participate in socially ensconced spaces'.

Conclusion

This chapter explored self-directed multimodal learning within a context of transformative open education. In this regard, the chapter proposes that multimodality can be approached as a tetradic – individual, interactional, instructional and institutional multimodality – to distinguish the type of modes used within an educational context.

Central to a multimodal approach would be communication, and hence this chapter provided a brief introduction to how learning can be regarded as communication and meaning making. In this context, the affordances of social semiotics and related theoretical concepts are evident. Furthermore, this chapter specifically related to self-directed multimodal learning, and hence SDL and its role in multimodality were discussed in detail. These aspects provide a clear framework for future research with the lens of self-directed multimodal learning.

The multimodality levels were then unpacked. Individual multimodality relates to the modal preferences of a person and this also relates to neurological and sensory aspects. Interactional multimodality, on the other hand, links up with most of the literature on multimodality as it pertains to communication, regardless of the medium or whether it is verbal or non-verbal. Instructional multimodality focuses on modes of instruction, and

the concept of BL is prominent in this regard. This level of multimodality is also the main focus of most of the contributions to this publication. Finally, institutional multimodality is also distinguished, at an administrative level, as learning that can be delivered through contact learning, distance learning or hybrid learning. It is evident that further research is required at all of the identified levels of multimodality.

In conclusion, this chapter provided an overview of self-directed multimodal learning, specifically focusing on open education and transformation in HE. To this end, the various important aspects of openness within education and the implications of some educational transformation were explored. Clearly, access to content and people are essential ingredients for this transformation. Certain affordances of self-directed multimodal learning in an open context were also identified as SDL and open education are mutually beneficial. Furthermore, learning should be situated in a real-life context, be sensitive of genre requirements and be supported by appropriate technologies. Any attempt towards successful self-directed multimodal learning implies appropriate circumstances, effective environments and institutional support. Working against the prevalence of disposable assignments also supports the creator's role of students within an open context. All of these activities also imply specific literacies that need to be developed.

A number of aspects relating to multimodal learning can still be explored, specifically in the South African context. For example, the effects and advantages of multimodal interaction with regard to communicative aspects not related to language (Norris 2004) in educational contexts, whether through contact or distance learning, can be explored. Norris (2004:153) states that '[i]n education we may want to think about the multiple ways of communicating meaning', and he asks which of the modes might be more appropriate in different contexts when 'focused interactional attention in order to learn' might be needed (Norris 2004:154).

It is important to note that lecturers function within dynamic disconnected and sometimes connected frames of the different levels of multimodality within self-directed multimodal learning in open contexts. However, most significant should not be the differences of modes internally within the levels or even between levels, but focusing on the affordances of the symbiosis that can exist through actively blending different modes.

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Chapter 2

The affordances of the Community of Inquiry framework for self-directed blended learning in South African research

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Abstract

This chapter provides an overview of trends from academic articles and postgraduate studies related to BL, SDL and the CoI framework from 2009 to 2019 in South Africa. By means of a systematic critical review of identified articles – as located in major electronic databases – the main methodologies, contexts and findings were determined. This research was conducted to provide a snapshot of the current research regarding the position of the CoI framework in terms of self-directed BL. The research found that clear thematic gaps and methodological opportunities in the literature are evident.

Keywords: Community of Inquiry (CoI) framework; Self-directed learning; Blended learning; Instructional multimodality; Cognitive presence; Social presence; Teaching presence; Systematic literature review.

Introduction

Blended learning – conceptualised as multimodal learning or functioning at the level of instructional multimodality in this book (cf. ch. 1) – pertains to different blends of modalities within an educational context. The term BL has varied meanings. According to Friesen (2012:1), who reviewed a number of definitions of BL, it entails 'the range of possibilities presented by combining Internet and digital media with established classroom forms that require the physical co-presence of teacher and students'. In this chapter, BL, therefore, refers to a combination of face-to-face and online modalities.

Furthermore, the CoI framework (cf. ch. 6 & ch. 9) has been extensively used for BL, especially with regard to a social, cognitive and teaching presence (Kineshanko 2016). The CoI framework (cf. Garrison 2015, 2016; Swan 2019; Vaughan, Cleveland-Innes & Garrison 2013) can be traced back to the seminal work of Garrison, Anderson and Archer (1999:88), in which, according to them, 'worthwhile educational experience is

embedded within a Community of Inquiry that is composed of educators and students – the key participants in the educational process'. In a thematic metasynthesis of 329 research artefacts on CoI, Kineshanko (2016) found that, with regard to CoI:

> [*T*]he terms, concepts, processes, and tools described in the seminal publication are still germane to distance, blended, and online researchers and educators to define terminology, measure factors, introduce CoI-based concepts to positively influence learning conditions and experiences, and to validate or extend the framework itself. (p. iv)

Consequently, it is to be expected that the framework is still valid and used in publications.

A third aspect relevant to this research is the concept of SDL, which is described by Knowles (1975) as:

> [*A*] process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies and evaluating learning outcomes. (p. 18)

Therefore, the searches conducted for this research entailed BL, SDL and CoI as the phenomena.

The aim of the research was to determine, through a systematic literature review of research published in the South African context between 2009 and 2019, what the affordances of the CoI framework would be for self-directed BL. Thus, this chapter follows a systematic review as it has 'a narrowly defined scope and focus on a specific question'. Also '[s]ystematic reviews typically make explicit the methodologies and criteria they have used in selecting the studies for inclusion' (Cohen, Manion & Morrison 2018:404). Therefore, the following research questions were posed for this research:

- What common research methodologies are used in terms of CoI for blended SDL?
- What does the corpus of documents reveal about the research context?

- What is revealed about the concepts of BL, CoI and SDL in the corpus of documents?
- What recommendations for future research were identified in the corpus of documents?

To answer these questions, the main concepts related to this triadic exploration of BL, CoI and SDL are clarified before the overview and analysis of the corpus itself is presented.

Concept clarification

The key concepts relevant to the corpus used in this study are briefly described in this section with regard to the pertinent scholarship.

Blended learning

In a 21st-century educational context, BL is not an unfamiliar concept. Blended learning encapsulates the best of the online world with face-to-face teaching (Bosch & Laubscher 2019; Moskal, Dziuban & Hartman 2013), and is much more than just the addition of technology in the classroom (O'Byrne & Pytash 2015). To effectively implement BL, teachers and lecturers fundamentally need to reconsider their teaching styles and approaches to optimise teaching and the learning experience (Eutsler 2018). This also implies a redefinition of the role of the lecturer to emphasise their role as 'facilitator' rather than that of 'teacher' (Kai 2019).

In the South African context, there is a need for affordable and sustainable education (Moja, Luescher & Schreiber 2015), which poses numerous challenges when implementing BL. As the affordances of BL are vast – such as offering students flexible learning environments (Van der Merwe et al. 2015), collaboration with others to master the content (Protsiv et al. 2016), individualised guidance from the facilitator and many more – so too are the challenges of implementing BL in a non-developed

country (Fisher, Bushko & White 2017). Therefore, we examine some of the current trends in implementing BL in a South African context, with a specific focus on the CoI framework.

The Community of Inquiry framework

As the demand for online and technology-enhanced learning started growing at the beginning of the century, so did the need for models and frameworks to help educators in the integration and planning of such learning environments. The CoI framework was first published in 1999 (Garrison, Anderson & Archer 1999) to investigate the use of online computer conferences as an educational platform. Garrison et al. (1999) were of the opinion that, in such an online environment, learning occurs in a community where there is a relationship and interaction between three core elements, namely, (1) cognitive presence, (2) social presence and (3) teaching presence.

Cognitive presence

Cognitive presence is concerned with the way in which meaning is constructed through interaction and communication (Law, Geng & Li 2019). This construction of meaning also has an impact on critical thinking, which is a necessity in the HE context (Garrison et al. 1999). The practical inquiry model outlines the four phases to operationalise the cognitive presence (Pool 2014). The first phase, *the triggering event* – which refers to a challenging question, problem or dilemma – can assist in engaging the learners in discourse and make the curious to participate in the learning event (Qiao, Tang & Hew 2018). During the second phase, *exploration*, students need to both search through group discussions and brainstorm (Qiao et al. 2018). The third phase, *integration*, expects students to construct meaning and organise their thoughts and ideas. This phase calls for an ongoing critical discourse and reflection. The final phase, *resolution*, is when the question, problem or dilemma is contextualised and findings are

presented in an orderly manner. This phase may lead to further questions and problems that would encourage the discourse even further (Qiao et al. 2018). The cognitive presence helps to foster a sense of belonging and encourage freedom of expression (Law et al. 2019).

☐ Social presence

Social presence focuses on the establishment of interpersonal relationships, the ability to communicate and work in a group. According to Garrison et al. (1999:94), 'the primary importance of this element is its function as a support for cognitive presence, indirectly facilitating the process of critical thinking carried on by the community of learners'. The online environment should be an open and inviting safe space in which learners could feel connected to other students. They should be encouraged to share ideas and collaborate without being judged (Law et al. 2019). Therefore, according to the CoI framework, educators should intentionally plan for a learning community where instructional conversations, which enhance critical thinking, can occur (Garner & Rouse 2016).

☐ Teaching presence

The main purpose of teaching presence is to balance the social and cognitive presence to reach the intended outcomes of the learning experience (Garrison, Anderson & Archer 2010). In a traditional educational environment, the educator is expected to fulfil a number of core tasks, which include mediation, communication and facilitating learning (Pool 2014). This is also the case in an online environment. Anderson et al. (2001:5) explain that the teaching presence relates to the 'design, facilitation and direction of cognitive and social processes for the purpose of realising personally meaningful and educationally worthwhile learning outcomes'. However, in an online environment, with no or limited face-to-face contact with the educator, these responsibilities should be shared. Both educator and students

have a responsibility to contribute to the learning process (Taite 2012). According to Redstone, Stefaniak and Luo (2018), peer-led discussions, peer review and peer assessments are the ways in which the teaching presence can be improved.

In addition to BL and CoI, the studies in the researched corpus also related to SDL; therefore, the latter concept is also briefly described.

Self-directed learning

According to Knowles (1975), and as stated in the introduction, SDL is described as a process through which students take charge of their learning through planning, resource selection and implementation. According to Van der Walt (2016), SDL has its roots in the self-determination theory and the history of the concept has been clearly recorded in the literature (cf. Brockett & Hiemstra 2019:29–34; Candy 2004:47–50). Furthermore, Brockett and Hiemstra (2019:55–56) identified two dimensions to the concept of SDL, as it relates to 'a process in which a learner assumes primary responsibility for planning, implementing, and evaluating the learning process', as well as the so-called learner self-direction, which 'centers on a learner's desire or preference for assuming responsibility for learning'.

The link between SDL and self-regulated learning (SRL) is evident in the literature. In this regard, Jossberger et al. (2010) acknowledge the link between the two concepts, and also regard them at different levels:

> SDL is situated at the macro level and basically refers to the planning of the learning trajectory, whilst SRL concerns the micro level that deals with the execution of a task. (pp. 417–418)

Pilling-Cormick and Garrison (2007) also have shown theoretical links between SDL and SRL. It is also clear that both relate to 'internal or covert (person) and external or overt (behaviour and environment) elements of the educational experience' (Pilling-Cormick & Garrison 2007:29).

With regard to teaching praxis, there are certain skills that could be conducive to the SDL process. In this regard, Kicken et al. (2009:453) highlight '[a]ssessing the quality of own performance, formulating learning needs and selecting future learning tasks' as three basic SDL skills.

To explore the above-mentioned three main concepts, this chapter involves a systematic literature review. The research method is explained in the next section.

Research method

For the purpose of this chapter, a systematic literature review was performed. Three researchers worked together on this project. We made use of various G Suite apps to manage the project. In addition to the institution's access to the databases, Google Scholar was also used in the search process. We created a shared folder in Google Drive with all the relevant documentation necessary to conduct the review. Various electronic databases were searched, which included EBSCOhost, Science Direct, JSTOR (Journal Storage), Scopus, Sabinet and Google Scholar. The main themes in the study were CoI, BL and SDL, which also served as the search terms for the review. Searches were performed on each database using combinations of these terms. Each search was recorded in a search document, in which were recorded the date of the search, search number, the database, specific keywords and the number of hits. For each search, the documents with their abstracts were saved.

The document selection was done in a systematic manner. The selection criteria were strictly adhered to in order to select relevant documents (Jahan et al. 2016). Figure 2.1 presents the process of selecting the relevant documents. Documents were included in the review if they met the following criteria:

- they were published in scholarly journals or books between 2009 and 2019
- they had to be in English

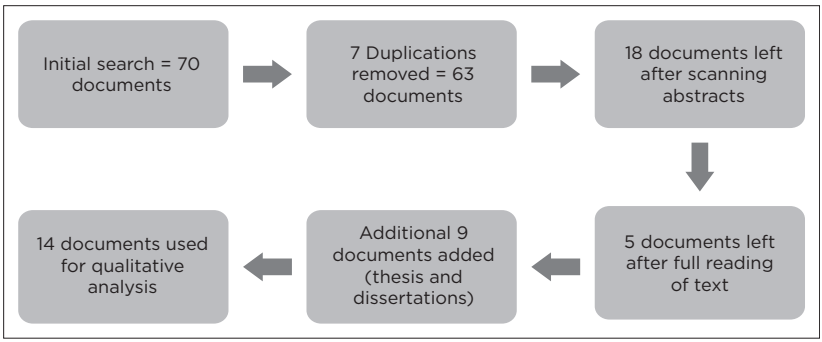

FIGURE 2.1: The search process used in the literature review of selecting the relevant documents.

- the research had to be conducted in the South African context
- all three themes (CoI, BL and SDL) had to be evident in the document.

Initially, after scanning the title, abstracts and reading the full text, only five documents met the eligibility criteria. We, therefore, decided to include postgraduate theses or dissertations, which were revealed in the searches. They met all the criteria above, except for being published in a scholarly book or journal. The final documents (14 in total) that met the set eligibility criteria as described above were downloaded to a folder in the shared Google Drive.

We used ATLAS.ti™, computer-assisted qualitative data analysis software (CAQDAS), to code, sort and categorise the data. The three researchers worked simultaneously to code two of the documents together to ensure consistency and trustworthiness. In the process, we created a shared codebook in Google Sheets, which presented the various codes, a definition of each, as well as a typical example (DeCuir-Gunby, Marshall & McCulloch 2011). The codebook was constantly updated whilst the researchers coded the rest of the documents.

The discussion of the analysis of the systematic literature review, which aims to answer the research questions posed at the beginning of the chapter, is presented in the following section.

Results

This section explores the results that emerged from the qualitative analysis of the corpus of documents. The systematic literature review scrutinised the documents and revealed the following dominant themes in line with the research questions:

- common methodologies
- the context in which the studies took place
- the role of BL in each study
- the manner in which the CoI framework underpinned each study
- the way in which SDL featured in the studies.

Overview of common methodologies

The first aim of this chapter was to determine which common research methodologies are used in terms of CoI for blended SDL. Through the review of the corpus of studies, the research methodologies employed in different studies were identified, and some trends are presented in this section. This analysis covered the research paradigm, methodology, research design and measuring instruments where noted in the research.

Research paradigm

The research paradigm was the first aspect considered in this part of the analysis. According to Cohen et al. (2018:60), a paradigm is 'a way of looking at or researching phenomena, a world view, a view of what counts as accepted or correct scientific knowledge or way of working'. Despite some cursory references to paradigms in some of the studies, no further in-depth information was provided on the relevant ontologies or epistemologies in any of the research, except for Hlatshwayo (2018). Some studies did not even state a specific paradigm choice. In Bosch and Pool (2019:62), no overarching research paradigm was stated, despite the fact that they referred to a 'qualitative research paradigm'; this was also true for Modise

(2016). Gambiza (2009:43) erroneously made the following statement regarding the master's thesis, '[t]he study falls largely within the quantitative research paradigm'. This could be identified as being positioned within a positivist paradigm. Pool, Reitsma and Van den Berg (2017) also did not indicate their research paradigm, yet they indicated that the research reported on in the article was qualitative by nature. In the systematic literature review by Roberts (2019), no paradigm was identified either. These five studies can be described as being conducted within an interpretivist paradigm. Protsiv et al. (2016) also did not indicate a paradigm and as a mixed-methods study could potentially have followed a mixed-methods paradigm.

Some studies were clearly identified as being situated within an interpretivist paradigm. In this regard, Cruywagen (2015:83) stated in his thesis 'focuses on an interpretive/social constructivist perspective'. Similarly, Gani (2018) and Hlatshwayo (2018) noted that the research for their PhDs was guided by a constructivist paradigm. Mixed-methods studies mainly involve paradigms accommodating both qualitative and quantitative methods. In this regard, Golightly and Van der Westhuizen (2018:137) described their study as being 'within the post-positivist paradigm', whilst Le Roux and Nagel (2018:14) indicated that they had followed '[a] pragmatic approach, relying primarily on qualitative methods'. The theses by Massyn (2009) and Pool (2014) also resorted under pragmatism. Rajkoomar (2015:70) indicated that, for her PhD, the choice was 'pragmatism and interpretivism as epistemological lenses'. In conclusion, from the analysed studies, it is apparent that the most common paradigms are interpretivism and pragmatism and that no study could be described as being positivist or transformative. These trends can also be ascribed to the types of methodologies used in the studies.

☐ Research methodology and design

In the analysis of these studies, the research methodologies (i.e. qualitative, quantitative or mixed methods) and the research

designs were considered. To summarise, the following research methodologies (cf. Cohen et al. 2018:106–125) were utilised in the analysed studies (see Table 2.1).

The following research designs were evident from the analysis of the identified sources (see Table 2.2).

It is essential to note, however, in some cases that the description of the relevant methodology could be regarded as being misleading. For example, in Gambiza (2009:43), it is stated

TABLE 2.1: Overview of research methodologies used in the corpus of documents.

Methodology	Sources
Qualitative research methodology	Bosch and Pool (2019), Cruywagen (2015), Gani (2018), Hlatshwayo (2018), Modise (2016), Pool et al. (2017), Roberts (2019)
Quantitative research methodology	Gambiza (2009)
Mixed-methods research methodology	Golightly and Van der Westhuizen (2018), Le Roux and Nagel (2018), Massyn (2009), Pool (2014), Protsiv et al. (2016), Rajkoomar (2015)

TABLE 2.2: Overview of research designs used in the corpus of documents.

Research designs	Sources
Basic qualitative research (Merriam & Tisdell 2015:23–25)	Bosch and Pool (2019)*
Case study (Cohen et al. 2018:792)	Golightly and Van der Westhuizen (2018), Le Roux and Nagel (2018), Cruywagen (2015), Gambiza (2009), Gani (2018), Hlatshwayo (2018)
Design-based research (Cohen et al. 2018:867)	Pool et al. (2017), Pool (2014)
Survey research (Cohen et al. 2018:706)	Protsiv et al. (2016), Modise (2016)
Systematic literature review (Cohen et al. 2018:404)	Roberts (2019)
Triangulation mixed-methods design	Massyn (2009)
Fully mixed sequential dominant status design	Rajkoomar (2015)

Note: Where no research design was overtly mentioned, an asterisk (*) was used to indicate this.

that '[t]he study falls largely within the quantitative research paradigm'; however, qualitative data were also obtained.

From the brief analysis above, it is evident that most of the studies in the corpus followed a qualitative research methodology followed by mixed-methods research. Therefore, the need for quantitative studies in this chapter is evident. With regard to research designs, a variety of designs were followed. However, the case study research design seemed to be the most common approach. The lack of experimental and action research in the corpus was particularly interesting. In addition, specific instruments or strategies are also relevant.

☐ Measuring instruments and strategies

A further aspect explored in this analysis is the different measuring instruments or strategies employed by the researchers. Different measuring instruments for investigating CoI and SDL are evident in the literature (cf. Brockett & Hiemstra 2019:99–142). The questionnaire developed by Arbaugh et al. (2008) is a common instrument used for measuring CoI. Regarding SDL, the Self-Directed Learning Readiness Scale (SDLRS) by Lucy Guglielmino (1978) is described as one of the first efforts to measure SDL readiness (Brockett & Hiemstra 2019:100). However, qualitative methods are also common in SDL research (Brockett & Hiemstra 2019:146).

Apart from one study (Roberts 2019), which involved a systematic literature review, all the other studies in the corpus involved some sort of research instrument, or, more commonly, a combination of a number of instruments.

Most of the instruments noted in the corpus were used to obtain qualitative data. In this regard, the following types could be identified:

- Document analysis:
  - student-written feedback (Bosch & Pool 2019; Protsiv et al. 2016)

    - Facebook threads (Pool 2014; Pool et al. 2017)
    - emails (Pool 2014)
    - content from the learning management system (LMS) (Cruywagen 2015; Gani 2018)
    - online assignments (Cruywagen 2015)
    - online content from discussion boards, wikis or journals (Cruywagen 2015; Modise 2016; Pool 2014)
    - institutional policies (Gani 2018)
    - module form, tutorial letter, study guide and portfolios (Hlatshwayo 2018)
- Semi-structured interviews:
    - individual interviews (Bosch & Pool 2019; Cruywagen 2015; Gani 2018; Modise 2016; Pool 2014; Pool et al. 2017; Protsiv et al. 2016; Rajkoomar 2015)
    - focus group interviews (Bosch & Pool 2019; Pool 2014; Pool et al. 2017; Rajkoomar 2015)
    - notes from a group discussion (Protsiv et al. 2016)
- Participant observation (Cruywagen 2015; Hlatshwayo 2018; Protsiv et al. 2016).

It was interesting that, with regard to qualitative research, the instruments were not included in all studies. This was observed in the studies of Bosch and Pool (2019), Pool (2014) and Pool et al. (2017), for example. However, for most of the postgraduate studies (Cruywagen 2015; Gani 2018; Hlatshwayo 2018; Modise 2016; Rajkoomar 2015), the different interview or observation schedules that were used, were included.

Concerning quantitative instruments, the following types were identified in the corpus:

- CoI instrument by Arbaugh et al. (2008), (Pool 2014)
- modified CoI instrument by Arbaugh et al. (Golightly & Van der Westhuizen 2018:138)
- 'adapted online PBL questionnaire of Golightly and Muniz' (Golightly & Van der Westhuizen 2018:137)

- trace data derived from the Blackboard Learn™ (Bb) course management system and YouTube (Le Roux & Nagel 2018)
- Vermunt's Inventory of Learning Styles (Gambiza 2009).

In some cases, the instruments were used to obtain both quantitative and qualitative data:

- Questionnaires:
    - open-ended questions added to a quantitative instrument (Golightly & Van der Westhuizen 2018; Massyn 2009; Modise 2016)
    - questionnaire with open-ended questions and some closed-ended questions (Gani 2018; Hlatshwayo 2018)
    - paper-based questionnaire that 'contained scaled items and open-ended feedback to supplement the items', as well as a modified web-based version of the initial questionnaire (Le Roux & Nagel 2018:14)
    - Likert scale questions and questions related to student experiences (Protsiv et al. 2016)
    - self-developed Online Experience Questionnaire with open-ended and closed-ended questions (Gambiza 2009)
    - self-developed questionnaire for Library and Information Science educators (Rajkoomar 2015).

In case of Gambiza (2009), the instrument used in the research was also included in the study. Although not a specific instrument in this study, student marks were also included in the statistical analysis.

From the above overview the prominence of qualitative data is evident, with a strong emphasis on online artefacts used for document analysis and interviews with different stakeholders. With regard to quantitative data, some existing instruments were used but, in some cases, researchers developed their own questionnaires. For Arbaugh et al. (2008), the importance of CoI is clear. However, it is significant that no SDL instruments were used in any of these studies.

Context

To understand the research presented here, as analysed from the corpus, it is essential to also consider the context in which the research was conducted. To this end, the research context was explored in terms of discipline, level of education and the type of population. A summary of the analysed context is presented in Table 2.3.

From the summary above, the wide variety of fields covered in the corpus is evident. However, most of the studies were conducted within the field of education. Furthermore, the empirical studies in the corpus were conducted in university contexts. A summary of the level of education and the type of relevant populations is provided in Table 2.4.

TABLE 2.3: Summary of disciplines covered in the corpus of documents.

Discipline	Sub-discipline	Sources
Education	Assessment module	Bosch and Pool (2019)
	Geography module	Golightly and Van der Westhuizen (2018)
	Methodology module	Pool et al. (2017)
	Technology education module	Pool (2014)
	Certificate in Technology in Distance Learning and eLearning	Modise (2016)
Economic and Management Sciences	Bachelor's in Management Leadership	Massyn (2009)
	Bachelor of Commerce – Enterprise Education	Le Roux and Nagel (2018)
Medicine	Doctoral programme in Medical Sciences	Protsiv et al. (2016)
Theology		Roberts (2019)
Humanities	Bachelor of Arts – Music	Cruywagen (2015)
	English for Economics course	Hlatshwayo (2018)
Environmental Science		Gambiza (2009)
Library and Information Science		Rajkoomar (2015)
No specific discipline		Gani (2018)

TABLE 2.4: Summary of the level of education and the type of research population used in the corpus of documents.

Level of education	Type of population	Sources
First year	Students	Cruywagen (2015)
Second year	Students	Cruywagen (2015)
Third year	Students	Golightly and Van der Westhuizen (2018)
	Students	Le Roux and Nagel (2018)
	Students	Gambiza (2009)
Fourth year	Students	Bosch and Pool (2019)
	Students	Cruywagen (2015)
	Students	Pool (2014)
	Students	Pool et al. (2017)
Honours degree	None	None
Master's degree	None	None
PhD	Doctoral students	Protsiv et al. (2016)
No degree/staff training	Lecturers	Gani (2018), Modise (2016)
No specific level	Lecturers and students	Hlatshwayo (2018)
	Lecturers and students	Massyn (2009)
	Lecturers and students	Rajkoomar (2015)
Level not relevant*	Type not relevant*	Roberts (2019)

*, systematic literature review

From Table 2.4, it is evident that the majority of studies focused mainly on students and not necessarily on lecturers, or other individuals that may form part of the educational context. Furthermore, despite some studies covering all year levels, most of the studies clustered around the end of undergraduate degrees. A clear gap is research at honours and master's degree level. In addition, more research can be carried out on the lower-year levels of undergraduate degrees. The lack of research in the school, and especially non-formal educational sectors, is also evident.

Blended learning

The main motivation for integrating technology into the educational arena should be to improve teaching and learning (Gani 2018). In

order to achieve this, the technology integration should be applicable and purposeful (Gani 2018). It is important for curriculum designers and lecturers to be critical regarding the designing of BL environments. The selection of appropriate technology, the type of blend and activities that are chosen, need to be carefully evaluated. This needs to be done in the light of the evolving nature of teaching and learning and technology (Modise 2016).

Blended learning affordances

This section focuses on the affordances of BL. Most documents in the corpus revealed various perspectives on the uses of BL in the South African contexts. Various authors agreed that BL allows for flexibility and convenience for students to work, which emphasises the principle of 'any time, any place' associated with BL (Bosch & Pool 2019; Gani 2018; Golightly & Van der Westhuizen 2018; Le Roux & Nagel 2018; Massyn 2009; Protsiv et al. 2016). This flexibility – which overcomes barriers such as travel, time and expenses – is particularly beneficial in the context of adult learning (Protsiv et al. 2016). In addition, BL provides the opportunity for key professionals, people with disabilities and women to take part in formal learning (Protsiv et al. 2016).

Some of the studies were grounded in social constructivism and used collaborative strategies in the BL environment. They reported that this environment could assist students to reach their group goals (Bosch & Pool 2019), encourage more effective collaboration (Golightly & Van der Westhuizen 2018) and promote an interactive environment (Cruywagen 2015). Gani (2018) stated that the use of these collaborative strategies gives students a sense of belonging. By establishing both a teaching and a social presence, the online platform can provide both academic and emotional support to students (Gani 2018).

Blended learning provides opportunities to change the teaching–learning environment by including interactive teaching and learning methods, which are underpinned by various learning

theories (Pool 2014; Rajkoomar 2015). In addition, BL allows for the use of varied resources, which accommodates students' different learning styles (Le Roux & Nagel 2018; Rajkoomar 2015). Also, more relevant and updated information can be made available to students in BL, in contrast to outdated resources that are often used in face-to-face settings (Le Roux & Nagel 2018). These authors also point out that independent self-paced learning, a characteristic of SDL, assists with the motivation of students.

The integration of technology in BL courses has the potential to encourage personalised learning experiences (Protsiv et al. 2016). The BL environment allows for more timely feedback. According to Modise (2016), detailed and comprehensive feedback has proved to encourage and motivate students. Gani (2018) is of the opinion that online platforms can be used to address areas of the course content that students find problematic. The face-to-face component of a BL course allows student–lecturer interaction where misunderstandings, problems and questions can be addressed (Rajkoomar 2015). Certain approaches and activities in BL were also identifiable.

Approaches and activities used in blended learning

The literature is not clear about the distinction between BL strategies, BL approaches and BL activities. In this chapter, we conceptualise approaches used in BL as teaching–learning approaches that can be used in BL environments – for example, the flipped-classroom approach, cooperative learning (CL) and PBL. Blended learning activities, on the other hand, refer to teaching–learning activities that are used in the BL environment to support the approach used. Some examples are online quizzes, discussion forums and reflective journals.

The following teaching–learning approaches were identified in the documents:

- CL (Bosch & Pool 2019; Cruywagen 2015; Gambiza 2009)
- PBL (Gambiza 2009; Golightly & Van der Westhuizen 2018; Massyn 2009)
- flipped classroom (Le Roux & Nagel 2018).

Bosch and Pool (2019) used the combined BL model to design a CL–BL environment. In this environment, students were expected to work in cooperative groups on an authentic task. This was done to assist these students to prepare for their teaching careers in a practical manner. *Notion*, a project management software package, was used to administer the online activities. The activities included online discussions, sharing of resources with group members, online quizzes and the planning of presentations. Both Cruywagen (2015) and Gambiza (2009) did not discuss their use of the CL approach in detail but referred to it. They both made use of the LMS to present the course material. Cruywagen (2015) included teaching–learning activities such as discussion boards, wikis, online tutorials and assignments relating to the content.

Problem-based learning was used in the study by Golightly and Van der Westhuizen (2018). This study investigated the experiences of students in the online PBL task in a Geography Education module. The PBL task was executed by means of a collaborative online activity that used Google Docs as a platform for collaboration. Gambiza (2009) used an LMS where PBL was used as a teaching–learning approach. He made extensive use of discussion forums to guide the PBL tasks. In the study by Massyn (2009), PBL was used as the main teaching–learning approach, supported by cooperative and collaborative activities. She used an online PBL assignment, asynchronous discussion forums and synchronous chat sessions.

The flipped-classroom approach was used by Le Roux and Nagel (2018) to redesign a face-to-face module to include an online component. Their aim was to prepare students enrolled at the Faculty of Economics to enhance their entrepreneurial skills. Seminars were used to underpin the theory of the module, whilst

online technology was used to foster independent SDL skills. Following the viewing of educational videos and slides, seminar activities in the face-to-face environment were conducted to assist in the application of theory. The seminar consisted of three components, namely, individual reading of provided case studies and answering related questions; discussion of possible answers to the above-mentioned questions in groups; and, lastly, reflecting with the lecturer on concept clarification and misconceptions. The third component was a collaborative group project in which students created artefacts for assessment (Le Roux & Nagel 2018).

A few of the studies did not identify a specific teaching–learning approach but had used various teaching–learning activities in the BL environment. Pool et al. (2017) reported on group activities that were presented on an LMS where students communicated with each other on the LMS and on Facebook. Protsiv et al. (2016) used interactive synchronous online sessions in which practical activities, online discussions and demonstrations were presented. Roberts (2019) presented a systematic review on formational teaching in theology; however, neither specific teaching–learning approaches, nor activities were evident in the text.

The study by Gani (2018) examined the practices in BL courses at a distance learning university. No specific teaching–learning approach was highlighted in that study; however, she presented a table that summarised the teaching–learning activities used in the online component of eight different modules. Some examples of these activities included online discussions and forums, participation in polls and completing online questionnaires. Modise (2016) did not report a specific teaching–learning approach. Some of the activities that students were expected to do in the BL course included lecture streaming, online discussions, and synchronous and asynchronous teaching–learning activities.

Rajkoomar (2015) explored the ideas and views of lecturers from various universities on their experiences of implementing a BL course. No specific approach was highlighted in that study. The study highlighted some of the teaching–learning activities

used by the lecturers, mostly done in an LMS. These included group activities, student seminars and online quizzes. Also, Hlatshwayo (2018) did not report about a specific teaching–learning approach. The study reported on teaching–learning activities such as sharing resources, online tutoring, discussion forums and sharing information on WhatsApp groups. Pool (2014) stated that various online activities formed part of the course design in her study, where students worked collaboratively to complete these activities. Other activities included group discussion boards and face-to-face group meetings.

Blended learning technologies

Various technologies that were used to realise the above-mentioned activities were identified in the corpus of documents. Table 2.5 presents a summary of the types of technology, as well as examples of activities that are typically used in the BL environment.

As shown in the table above, all of the studies used an LMS as their main online platform, where the basic functionalities were used for teaching–learning activities. The other types of technology were used to provide a platform for collaboration or sharing of resources. The only exception is GoAnimate, which was used to create digital storyboards and animations.

The type of blend

The type of blend refers to the way in which the module is structured in terms of the blend between online and face-to-face learning. In some cases, we have sketched the context of the study to provide clarity regarding the blend (see Table 2.6).

Most of the studies included in the corpus illustrate the redesign of a traditionally face-to-face course to include an online component. In cases where BL was already in use, the study concentrated on improving the effectiveness of the online component.

TABLE 2.5: Summary of the types of technologies with examples of activities used in the corpus of documents.

Types of technology	Examples of activities	Sources
LMS functionalities	Quizzes, discussion forum, online resources, polls, video recordings of lectures	All
WhatsApp	Group chat and collaboration, sharing information	Bosch and Pool (2019), Hlatshwayo (2018)
Google Docs	Collaboration for PBL task	Golightly and Van der Westhuizen (2018)
Facebook	Group discussions, sharing of resources	Pool et al. (2017)
Wiki	Group tasks	Cruywagen (2015)
PowerPoint slides	Group presentations	Bosch and Pool (2019), Protsiv et al. (2016)
Online resources (e.g. e-books)	Class and task preparation	Gani (2018)
YouTube videos	Flipped-classroom activities, multimedia activities	Gani (2018), Le Roux and Nagel (2018)
Notion	Group collaboration, planning, content presentations, group administration, sharing of resources	Bosch and Pool (2019)
Podcasts	Used as add-ons to wikis	Cruywagen (2015), Gani (2018)
Zoom	Question and answer sessions with students	Gani (2018)
GoAnimate	Digital storyboards (animations)	Gani (2018)

LMS, learning management system; PBL, problem-based learning.

Blended learning challenges

Blended learning has much to offer to the educational arena and is intended to enhance the teaching–learning environment. However, in a developing country such as South Africa, the implementation of BL does not come without challenges. The corpus of documents was scrutinised with regard to challenges that have arisen because of the implementation of BL.

Student challenges

The following challenges relating to students were identified in the documents. For traditionally face-to-face students, the integration of BL is a challenging experience (Bosch & Pool 2019;

TABLE 2.6: Different types of blending found in the corpus of documents.

Source	Type of blend
Bosch and Pool (2019)	An original face-to-face course was transformed into a BL environment. The online component was presented as a CL task.
Golightly and Van der Westhuizen (2018)	A face-to-face course was converted into a BL course. The online component consisted of a collaborative PBL task.
Le Roux and Nagel (2018)	Traditional face-to-face lectures at a traditionally contact university were replaced with a flipped-classroom approach. In addition to limited face-to-face sessions, online material was provided on the LMS to support students.
Pool et al. (2017)	A fully face-to-face course was redesigned as a blended learning course.
Protsiv et al. (2016)	The BL course consisted of a combination of interactive, synchronous online sessions and learning activities and combined online and face-to-face interaction.
Roberts (2019)	Traditionally, in Theology, courses were presented face-to-face. This study presents a systematic review on the integration of technology in the teaching of the 'softer skills'.
Cruywagen (2015)	The context of the study was in Music Education that was presented in a traditional face-to-face manner. The research was concerned with the redesign of a Music Education course to include both face-to-face and online technologies.
Gambiza (2009)	The research focused on a course that consisted of formal face-to-face lectures that were accompanied by an online learning component. In the online component, they made use of online teaching–learning strategies, such as discussion forums and reflective journals.
Gani (2018)	The experiences of both academic and support staff regarding the integration of online learning in a distance learning institution were examined.
Massyn (2009)	The course was initially a fully online mode, or a fully face-to-face mode. An online component in the face-to-face mode and face-to-face sessions in the online mode were incorporated.
Modise (2016)	The study took place in a traditional distance learning university where face-to-face classes were offered in conjunction with the distance component. A blended approach was used in the intervention where both online and face-to-face tutoring were implemented.
Rajkoomar (2015)	A blended approach was used where the face-to-face component focused on human interaction and the online learning component utilised computer-based technologies.
Hlatshwayo (2018)	In a traditional distance learning institution, the study focused on the effective use of online learning that used various online technologies.
Pool (2014)	A face-to-face course was converted into a BL environment. The online component consisted largely of a CL task.

BL, blended learning; CL, cooperative learning; PBL, problem-based learning; LMS, learning management system.

Cruywagen 2015). The students missed the personal interaction with the lecturer (Cruywagen 2015; Massyn 2009; Pool et al. 2017; Protsiv et al. 2016). Students reported that their fellow students were not always self-disciplined in working in both the online and face-to-face environments (Gambiza 2009; Pool et al. 2017). Students also felt the need for discussions to be more synchronised, which would allow for better student participation in the online environment (Gani 2018). Massyn (2009) reported that there was not always good social cohesion between students in the online environment.

Lecturer challenges

Challenges experienced by lecturers are explored further in this section. Blended learning proved to be an unfamiliar terrain for many lecturers who endeavoured to work in the field of BL (Gani 2018; Protsiv et al. 2016; Rajkoomar 2015). A few authors reported that staff members experienced a higher workload when moving to BL (Protsiv et al. 2016). Regular feedback is certainly one aspect that is time-consuming for lecturers; however, it has to be prioritised (Massyn 2009). The study by Gani (2018), which focused on staff (lecturer and support staff) experiences in BL, found that the design was content-focused rather than student-focused. When social networking tools were incorporated in BL environments, students often preferred not to merge their social and academic lives, which created more challenges for the lecturer (Rajkoomar 2015).

Institutional challenges

Although many lecturers gradually have started implementing BL in their courses, not all institutions have formally adopted BL as a mode of delivery (Protsiv et al. 2016). Some researchers call for more formal policies to be set by their institutions regarding the implementation of BL (Gani 2018). Consequently, different lecturers resort to their own individual approaches within one institution. There was also a need for most extensive technology support at an institutional level (Gani 2018). Institutions sometimes

select technologies that do not address the needs of the primary users of the technology (Modise 2016). An additional challenge for institutions is the cost implications of implementing quality educational technologies (Le Roux & Nagel 2018).

Technology challenges

One of the common challenges highlighted by a number of studies on technology was the issue of unreliable Internet connections and insufficient information and communications technology (ICT) infrastructures (Gani 2018; Protsiv et al. 2016), as well as problems relating to accessibility (Le Roux & Nagel 2018). Both lecturers' and students' lack of technological skills is a challenging aspect that needs to be taken into account in the planning and implementation of the BL environment (Gani 2018; Rajkoomar 2015), which can be addressed by means of training and development (Massyn 2009; Modise 2016; Rajkoomar 2015).

Community of Inquiry

The CoI framework is a well-researched model that is used to design and refine BL courses. Traditionally, the CoI framework consists of three critical elements, namely, social, cognitive and teaching elements (Garrison et al. 2010). The dynamic relationship between the three elements should be carefully planned when designing the online component of a BL environment. In the corpus of documents (more recent research), two additional elements were identified and explored. These are an emotional presence (Le Roux & Nagel 2018) and a learning presence (Bosch & Pool 2019; Pool 2014; Pool et al. 2017). In the next section, how each of these elements featured in the documents is discussed in more detail.

Social presence

An established social presence in online environments needs to be carefully planned, as the nature of online communication is

different from that of face-to-face communication (Pool 2014). In the studies by Bosch and Pool (2019), Cruywagen (2015) and Gambiza (2009), the element of a social presence was largely addressed by implementing a CL approach. Group members were expected to fulfil a particular role and responsibility in the group. The task, as described by Bosch and Pool (2019), promoted social responsibility in students to communicate, resolve conflict and support their fellow group members. This not only promoted individual accountability (an element of CL) but also encouraged group cohesion and a social presence (Bosch & Pool 2019). On the other hand, Gambiza (2009) reported that students found the CL environment difficult to adapt to, which resulted in the minimal promotion of social presence.

The studies by Golightly and Van der Westhuizen (2018) and Pool (2014) also highlight the benefits of group work, in which each member was allocated a particular role. In their PBL approach, it manifested in the form of a collaborative task. They reported that a higher level of difficulty in the task increases group members' involvement, which, in turn, promotes social presence. Golightly and Van der Westhuizen (2018) also stated that the PBL task encouraged social responsibility – for example, group members showed respect and tolerance for fellow group members' views and ideas. Various researchers have pointed out that a sense of belonging to a group or community can stimulate a social presence (Gani 2018; Modise 2016; Pool 2014; Rajkoomar 2015).

Le Roux and Nagel (2018) aimed at fostering the social presence through seminars and mediated interaction by peers. This was to some extent successful because of the interaction amongst students in the seminar. However, the nature of the online component of the flipped-classroom approach limited the group interaction and therefore the social presence did not reach its full potential.

The lecturer also has a responsibility to establish a social presence. Gani (2018) mentioned the importance of quality and

timely feedback to students, supporting students academically and emotionally and monitoring their progress. The importance of dialogue and interaction between students and lecturers, and among students themselves is also important in establishing a social presence (Gani 2018; Hlatshwayo 2018; Rajkoomar 2015). Furthermore, the opportunity for students to get to know each other better should be created in the online environment, as this assists them in promoting a social presence (Massyn 2009).

☐ Cognitive presence

Cognitive presence refers to the embracing of a 'deep approach to learning' (Massyn 2009:275). Some researchers have recognised the interdependence between different presences. For example, studies by Golightly and Van der Westhuizen (2018), and Le Roux and Nagel (2018) reported that a higher social presence in the online environment affects an increase in cognitive presence. Le Roux and Nagel (2018) further stated that the existence of social presence, as well as the cognitive presence within a collaborative space can result in some higher-order learning. On the other hand, Pool et al. (2017) highlighted the relationship between cognitive and teaching presences. They are of the opinion that, if the course is structured in such a way that higher-order thinking is stimulated, the cognitive presence will increase. Gani (2018:50) elaborated on this and pointed out that 'a metacognitive awareness of critical thinking can harvest cognitive presence'. Rajkoomar (2015) confirmed this and stated that this metacognitive awareness can be fostered by reflective thinking.

Massyn (2009) provides various guidelines as to how a cognitive presence can be established. These include making use of active learning, promoting higher-order thinking, integrating suitable assessment and feedback, and establishing reflective practices. Pool (2014) also suggests various guidelines that could assist in ensuring a cognitive presence. She encourages group discussions relating to academic matters, the structuring of

activities and assignments in such a way that students can elaborate on and critique other group members' work, identifying and remediating misconceptions, and assisting students in making connections.

Teaching presence

A common assumption amongst researchers is that the lecturer is the most prominent role-player in establishing a teaching presence by mentoring, monitoring and communicating with students (Cruywagen 2015; Massyn 2009; Pool 2014; Rajkoomar 2015). However, as previously discussed, the teaching presence does not necessarily have to be established by the lecturer. Gani (2018) and Hlatshwayo (2018) affirm this idea and suggest that online tutors have the potential to promote a teaching presence. Regular communication and collaboration with students do promote a teaching presence and can lead to higher-order thinking (Gani 2018). In addition, scaffolding is also an important strategy that can be used by online tutors to support in solving problems (Golightly & Van der Westhuizen 2018). Although online tutors, who are not the lecturers, are often used in BL environments, Pool et al. (2017) reported in their study that students preferred the presence of the lecturer. They ascribed this to the fact that BL was an unfamiliar terrain to the participants, and so they had low levels of self-regulation. They further reported that as the students' self-regulation increased, the importance of a teaching presence decreased.

Le Roux and Nagel (2018) are of the opinion that the use of videos and seminars in the flipped–classroom approach contribute to create a teaching presence. In addition, Hlatshwayo (2018) asserts that active online participation, collaboration and feedback that is provided timely can assist in promoting successful online teaching. Pool (2014) makes a number of suggestions as to how a teaching presence can be established, namely, diagnosing misconceptions, summarising discussions and introducing online consultation hours for immediate feedback.

Other presences

In addition to the three above-discussed critical elements identified in the CoI framework, four of the documents discussed other presences in the CoI framework, namely, a learning presence, an agency presence and an emotional presence.

Learning presence

All four documents that reported on additional elements referred to the learning presence. In all cases, they justified the existence of a learning presence based on the idea as conceptualised by Shea and Bidjerano (2010). Since this foundational work, the learning presence has been explored in various studies (Hayes, Smith & Shea 2015; Jimoyiannis & Tsiotakis 2017; Lee & Han 2018).

Online learning requires students to be more self-regulated; however, none of the other three original CoI elements emphasise the importance of students' self-regulation (Shea & Bidjerano 2010). Hence, Shea and Bidjerano (2010) introduced the concept of the learning presence. Shea and Bidjerano (2010) further stated:

> [/]t seems imperative that we examine learner self- and co-regulation in online environments especially as they relate to desired outcomes such as higher levels of cognitive presence as described in the CoI framework. (p. 1723)

Bosch and Pool (2019) identified self-regulation as an essential skill of SDL. They implemented the combined BL design model based on a CL approach, with the main purpose of enhancing SDL skills. They reported that the implementation of this model assisted in promoting a learning presence. Le Roux and Nagel (2018) also acknowledged the existence of self-regulation in the CoI framework. They pointed out that an agency presence – which was conceptualised by Anderson (2019) – combines a learner presence and an emotional presence.

Emotional presence

Emotional presence was recognised by Le Roux and Nagel (2018); however, it was initially identified by Cleveland-Innes and Campbell (2012). Because of the role that emotional aspects play in motivation, self-regulation and academic achievement, the need for another presence was established. An emotional presence entails individuals' emotion, affect and feelings, as well as the interaction of these aspects among individuals. These interactions take place between students and instructors, learning technology and course content (Le Roux & Nagel 2018). According to these authors, emotional presence is associated with both the social and the teaching presences.

Self-directed learning

In the analysis of the corpus of studies, SDL was also considered, and in this regard, the focus was on the specific SDL skills identified in the studies, the SDL strategies employed or observed, the affordances of SDL, as well as the challenges encountered in fostering SDL.

Self-directed learning skills

In the broader SDL literature, a number of SDL skills are identified (cf. Kicken et al. 2009). Not all the studies in the corpus overtly stated which SDL skills were relevant for the specific research. However, specific skills could be derived from the corpus. In each instance, the relevant sources referring to the skills were also indicated. However, it should be noted that there might be discrepancies between the sources as to whether all these aspects could be considered as being SDL skills. The specific skills derived from the corpus are as follows:

- communication (Massyn 2009)
- critical thinking (Gani 2018; Massyn 2009; Rajkoomar 2015)
- discipline (Bosch & Pool 2019)

- dividing tasks (Pool 2014)
- evaluating own performance (Bosch & Pool 2019; Pool 2014)
- goal-setting (Bosch & Pool 2019; Pool 2014)
- metacognitive awareness (Pool 2014)
- organisation (Bosch & Pool 2019)
- planning (Bosch & Pool 2019)
- problem-solving (Bosch & Pool 2019; Gani 2018; Golightly & Van der Westhuizen 2018)
- reflection (Gani 2018; Rajkoomar 2015)
- responsibility for own learning (Bosch & Pool 2019; Gani 2018; Hlatshwayo 2018; Massyn 2009)
- self-control (Bosch & Pool 2019)
- social skills (Massyn 2009)
- time management (Bosch & Pool 2019; Pool 2014).

It is striking that not all the studies identified specific SDL skills. In addition, in some of the sources, there was reference to generic SDL skills without further qualification. Furthermore, the above-mentioned skills can be supported by specific strategies. These strategies are explored in the next section.

Self-directed learning strategies

This research also reports on the strategies the researchers from the corpus employed to support and foster SDL. In the literature, a number of SDL strategies are also evident (Şentürk & Zeybek 2019:157–161). Various strategies could be identified from the different studies (see Table 2.7).

It is evident from Table 2.7 that, in the studies in the corpus, a wide range of SDL strategies were followed. Despite the value of having such a list to inform teaching practice, it should be noted that the concept of strategy is not used consistently and that there might be a conceptual overlap between the identified strategies.

TABLE 2.7: Self-directed learning strategies found in the corpus of documents.

SDL Strategy	Source
Active learning strategies	Massyn (2009)
Application of theory into practice	Le Roux and Nagel (2018)
Authentic workplace experience and real-life scenarios or problems	Bosch and Pool (2019), Gambiza (2009), Massyn (2009)
Being aware of metacognitive processes	Pool (2014)
Collaboration	Gani (2018), Golightly and Van der Westhuizen (2018), Le Roux and Nagel (2018) Rajkoomar (2015)
Evaluating own learning	Hlatshwayo (2018)
Experiential learning	Massyn (2009)
Freedom to explore and construct meaning	Pool (2014)
Inquiry-based learning	Cruywagen (2015)
Interactivity	Le Roux and Nagel (2018), Pool (2014)
Interdependence	Bosch and Pool (2019)
Internal control and mediation by students	Gambiza (2009)
Lecturer acting as facilitator	Gani (2018)
Lecturer guides and monitors	Gani (2018)
Lecturer moving from authoritative to consultative role	Massyn (2009)
Negotiated learning goals and objectives	Gambiza (2009), Massyn (2009), Pool (2014)
Peer support and feedback	Rajkoomar (2015)
Problem-solving	Le Roux and Nagel (2018), Gambiza (2009)
Progress at students' own pace	Rajkoomar (2015)
Providing multiple representations or perspectives of content	Gambiza (2009)
Reflection	Massyn (2009), Pool (2014)
Self-driven assessment	Gambiza (2009), Rajkoomar (2015)
Setting high expectations	Massyn (2009)
Student-centredness	Bosch and Pool (2019), Cruywagen (2015), Le Roux and Nagel (2018), Rajkoomar (2015)
Students taking responsibility for their own learning	Bosch and Pool (2019), Rajkoomar (2015)
Students planning, monitoring and managing tasks	Pool (2014)
Supporting individual learning preferences	Le Roux and Nagel (2018)
Transformation learning	Massyn (2009)
Using activities facilitating higher-order learning	Massyn (2009)
Using material relevant to students	Hlatshwayo (2018)
Working in CL groups	Bosch and Pool (2019)
Working independently	Hlatshwayo (2018)

CL, cooperative learning; SDL, self-directed learning.

☐ Affordances of self-directed learning

Several affordances were identifiable regarding the included focus of SDL in the corpus. In this regard, the following issues can be highlighted:

- In the research by Bosch and Pool (2019), the affordances of SDL in terms of self-management, self-control and desire for learning were clear. They also found that students in their study had more opportunities to be responsible for their learning, engage in problem-solving and evaluate their learning. Furthermore, in addition to encouraging critical thinking and deep learning, the students also displayed intrinsic motivation.
- Golightly and Van der Westhuizen (2018) specifically noted that the implementation of PBL ensured that students took responsibility for their own learning, the learning was more student-driven and that they could be more autonomous.
- Le Roux and Nagel (2018) stated that the use of seminars in a collaborative space contributed towards deep learning and problem-solving, whilst using a flipped-classroom approach and videos instead of live lectures led to student autonomy and a sense of independence, leading to an increase in motivation.
- According to Protsiv et al. (2016), SDL meant flexibility in terms of students' performance of learning activities.
- According to Gani (2018), SDL leads to students being independent and critical thinkers and promotes a sense of flexibility, problem-solving skills, as well as dialogue.
- Hlatshwayo (2018) emphasised the fact that specific student needs can be addressed through SDL.

Apart from the varied affordances emanating from the corpus of studies, some challenges were also identified.

☐ Challenges of self-directed learning

Through the SDL-focused analysis, certain challenges were also identified by the authors in the corpus. This included the following:

- Golightly and Van der Westhuizen (2018) identified the fact that students expected support in terms of explaining content, selecting learning material, as well as assessment.
- Pool et al. (2017) noted the affordances of SRL – as associated with SDL – where aspects such as time management, self-discipline, setting specific goals, being self-reliant and being able to divide tasks were identified.
- Cruywagen (2015) found that certain students did not prefer to take responsibility for their own learning.
- Hlatshwayo (2018) noted that, in the context of SDL, some form of teaching or support is necessary and that in the ODL environment, some students may not be able to work independently.
- Pool (2014) also noted concerns about SRL with regard to a learning presence.

These challenges provide useful guidance for future SDL interventions. However, this aspect could have been addressed more prominently, and thus this seems to be an area of future development.

Discussion

Clear trends were identifiable from the analysis of the common research methodologies used in CoI for blended SDL. With regard to research paradigms, interpretivism and pragmatism were the most common approaches. However, it was significant that no studies could be considered as being positivist or transformative by nature. The research methodologies used in these studies were mainly qualitative research followed by mixed-methods research; hence, there seems to be a need for more quantitative studies in this context. The qualitative instruments used in these studies were mainly document analyses followed by both individual and focus group interviews and some observations. Quantitative data were obtained by means of existing questionnaires and data analysis software. Interestingly, a number

of questionnaires were created to obtain both quantitative and qualitative data.

The contexts of the different studies in the corpus also showed some limited variation. Concerning discipline, the studies covered various fields; however, most studies were within education, followed by economic and management sciences, and humanities. With regard to research populations, the studies were more homogeneous as, in most cases, university students were used as the primary source of data. Most students were undergraduates, with one study focusing on PhD students. In some studies lecturers were also consulted. A clear gap in the research was not only the lack of research involving other university staff, such as support staff and management, but specifically learners at school level, as well as school teachers.

The analysis focusing on SDL determined a number of SDL skills that were identified in the corpus, as well as specific SDL and SDL-related strategies that were employed. However, in both cases, there were no consistent interpretation of the concepts and a clear overlap was evident in different skills and strategies. However, the lists provided a useful reference for further investigations. Furthermore, specific affordances and challenges of SDL in the varied contexts are in support of the broader SDL literature. However, further research can be conducted in this regard. A key finding was that SDL was not the central focus in most of the studies, and quite often there would only be a cursory reference to this concept, which led to the study being included in the corpus but very little new insights could be gained from some studies.

From the corpus of documents, the affordances of BL were identified by most of the authors. Aspects such as flexibility, effective collaboration and interaction between students, the advantages of self-paced learning and interactive teaching strategies were commonly cited in the documents. Few authors had pointed out the benefits of having a face-to-face component in their BL courses. The discussion tended to focus on the online

component of the courses. As there was no clear distinction in the documents between approaches and activities used in BL, we defined the terms and were able to identify three approaches that were commonly used, namely, CL, PBL and flipped classroom. A variety of activities were discussed that featured in these approaches.

The type of technologies that were used in the BL environments was also examined. In all the BL environments that were studied, an LMS was used as the main online platform. Various technologies were incorporated into the LMSs, which can be categorised into one or more of the following:

- collaboration tools
- presentation resources
- online assessment tools
- multimedia resources.

The blending ratios of face-to-face and online learning varied in the corpus. This was presented and summarised in 'The type of blend'. As mentioned in the sections 'Blended Learning' and 'Blended learning challenges', the challenges of implementing BL in a developing country remain a reality. The challenges that were evident in the studies were categorised as student, lecturer, institutional and technology challenges. To address these challenges, constant reflection, planning and course redesign are necessary. A framework such as CoI can provide lecturers guidance in addressing such challenges. In a developing country such as South Africa, the challenges relating to technology (i.e. infrastructure, skills and accessibility) seem to be more prominent than that in developed countries. This leads one to wonder whether the challenges relating to the incorporation of BL have influenced institutions' formal implementation of policies and frameworks for BL.

The three traditional elements (social, cognitive and teaching presence) and the dynamic interaction between them were evident in all the documents. The learning approaches discussed in 'Blended learning technologies' were emphasised as ways in which a social presence could be promoted. In some of the

studies, collaborative learning was used to promote social responsibility in students through communication, conflict resolution and peer support, which, in turn, assisted in establishing a social presence. However, the outcomes in one of these studies differed from the rest, and we suggest that further research should be conducted to explore the use of collaborative learning in establishing a social presence. Problem-based learning – where group work was used – also proved to be a successful approach in promoting a social presence. An important aspect highlighted by various researchers regarding establishing a social presence is the focus on not only student–student interaction but also student–lecturer interaction.

Cognitive presence is essential in promoting critical and higher-order thinking. The interaction between a cognitive presence and the other presences features strongly in the corpus of documents. Various studies have indicated the effect of a social presence and a teaching presence in establishing a cognitive presence, hence highlighting the importance of the dynamic interaction between the presences.

It is evident from various documents that establishing a teaching presence is not the sole responsibility of the teacher or lecturer. In many cases, facilitators and even students can assist in mentoring, monitoring and communicating, thereby promoting a teaching presence. A number of suggestions as to how a teaching presence can be established were offered in the texts. In addition to the traditional presences, the documents revealed other presences. A learning presence is not a completely unfamiliar concept in research relating to the CoI framework. Four documents in the corpus reported on the existence thereof, especially in terms of self-regulation and motivation. An emotional presence and an agency presence were discussed in only one document, which calls for future research in this field.

In the process of scrutinising the documents, we tried to identify recommendations the authors had made for future research. Whilst some documents pertinently had a section

dedicated to future research, others presented the suggestions in their discussions. Table 2.8 presents a summary of the suggested future research, as revealed in the corpus of documents. The main themes of the study served as the method of categorising the suggested future research.

The category that featured the most in the suggested future research was BL. Items 1 and 2 in Table 2.8 identified research relating to institutional issues. Both suggested that the institutional role should be investigated in the implementation of BL, with specific reference to infrastructure and staff-related matters. From the research conducted in this study, we further suggest that institutional BL policies should be investigated and recommendations should be made for the refinement thereof.

Suggested research items 3 – 7 are related to contextual issues. The suggestion indicates the need for studies to be conducted in different modes of delivery, especially distance learning, and also in different content areas. The need is also expressed for studies to explore the use of BL in varying contextual backgrounds, such as disadvantaged and rural areas, as well as various HEIs In the light of the South African context, we suggest that research should be conducted to explore cost-effective ways (such as mobile learning) in which to implement BL. There is also a need to investigate the improvement of rural distance education students' access to technology. Other factors such as online assessment, ethical issues and general teaching and learning aspects also need to be investigated. There is also a call for BL studies to take place over an extended period in order to obtain more reliable results.

Few future research suggestions were related to the CoI framework and SDL. Items 14 and 15 suggest that SDL skills such as self-regulation and motivation should be investigated in terms of the CoI framework, with specific reference to a learning presence and an emotional presence. We concur from this study that there is a need to explore the promotion of students' SDL skills in general in BL environments.

TABLE 2.8: Future research as suggested in the corpus of documents.

Number	Source	Suggested research	Categorisation according to themes
1	Protsiv et al. (2016)	The institution should take responsibility to establish BL structures such as: • implementation of BL strategies • improving technical infrastructure • providing training opportunities for staff • providing incentives to motivate staff	BL
2	Gani (2018)	Further studies that investigate institutional role in using online learning	BL
3	Gani (2018)	Research relating to the most suitable ways in which online learning can be integrated in distance learning environments	BL
4	Cruywagen (2015), Modise (2016)	Various contexts should be studied in terms of: • the use of discussion forums (Modise 2016) • comparing multimodal experiences in different HE institutions (Cruywagen 2015) • BL applications in disadvantaged and rural areas (Cruywagen 2015)	BL
5	Cruywagen (2015)	Exploring the use of online technologies in postgraduate studies	BL
6	Cruywagen (2015)	Investigating the value of multimodality in practical subjects such as music	BL
7	Massyn (2009)	The area of learning design, which refers to the implementation of a pedagogical model that aims to address learning outcomes in a given context, needs to be studied further	BL
8	Modise (2016)	Further research relating to the role of rubrics as support and motivation for students in a distance and eLearning environment	BL
9	Hlatshwayo (2018)	Ethical issues relating to students' authentic work in online education should be explored further	BL
10	Golightly and Van der Westhuizen (2018)	To explore the use of PBL in online modules in various disciplines, subject areas and levels	BL

Table 2.8 continues on the next page→

TABLE 2.8 (Continues...): Future research as suggested in the corpus of documents.

Number	Source	Suggested research	Categorisation according to themes
11	Cruywagen (2015)	The researcher suggests that research should be conducted over a longer period to establish the effectiveness of a BL intervention	BL
12	Bosch and Pool (2019)	The structure of groups in CL–BL environments requires further study	CL BL
13	Gambiza (2009)	To study the association between CL and academic performance	CL
14	Pool et al. (2017)	The role of self-regulation skills in the learning presence of the CoI framework in a BL environment	SDL CoI BL
15	Le Roux and Nagel (2018)	To explore an additional presence (emotional presence) and its effect on the motivational aspect of SDL	CoI SDL
16	Le Roux and Nagel (2018), Pool (2014)	Research with larger population should be conducted to achieve more significant quantitative results relating to CoI	CoI

BL, blended learning; CL, cooperative learning; CoI, community of inquiry; HE, higher education; PBL, problem-based learning; SDL, self-directed learning.

Conclusion

This systematic literature review explored the affordances of the CoI framework for SDL and BL. Research published in the South African context between 2009 and 2019 was reviewed. In this book, BL is regarded as an iteration of instructional multimodality and here it relates to the mixing of face-to-face and online modes of instruction.

By means of carefully selected corpus, the following areas were investigated: common research methodologies used in CoI for blended SDL; the nature of the different research contexts; and how the concepts of BL, CoI and SDL were realised in the corpus of documents. Ultimately, through reviewing the recommendations made by the different authors of studies in the corpus, and based on the analysis of the corpus, certain recommendations could be made.

The authors found the use of G Suite, and specifically Google Docs and Google Drive, as very handy research collaboration tools for a study of this nature. In the systematic review process, it is, however, important that consistency with regard to coding is ensured. Unfortunately, despite an initial co-coding exercise and constant communication and negotiation on the codes and themes identified through ATLAS.ti™, it still happened that, after the coding, source documents had to be reconsulted in order to inform the analysis.

There were some limitations to this research. The low number of publications adhering to the search and selection requirements limited the scope considerably. The concepts of BL, CoI and SDL were present in all the studies; however, the treatment and importance thereof were not equal between the different studies. Consequently, this is also an important finding on the trends within the existing scholarship.

The contribution of this chapter is evident as it provides not only a snapshot of the South African literature on BL, CoI and SDL over the past 10 years, but also identified clear gaps and opportunities for future researches. This chapter shows the current trends within the triadic focus adopted in the chapter.

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Chapter 3

Adaptive learning technology to enhance self-directed learning

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Abstract

Taking a self-directed and lifelong approach to learning is one of the core attributes necessary for the 21st-century workforce. Learning resources have evolved alongside learning psychology and technology. In the Fourth Industrial Revolution, the e-Textbook has metamorphosed into a computer algorithm that can adjust according to each student's cognitive and metacognitive demands. Adaptive learning technology enables each student to create a set of well-defined learning goals, then continuously approximates the extent of knowledge for each student, before using continual re-assessments to evaluate the student's progress,

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and ultimately creates a tailor-made learning path based on the student-specific data. By utilising background assessment to inform future learning, adaptive learning technology enables the 21st-century classroom to transform into a dynamic, engaging and participative experience that can enhance SDL. This chapter connects the attributes of adaptive learning technology to the assumptions and principles of SDL by proposing a conceptual model to guide future research and implementation.

Keywords: 21st-century skills; Adaptive learning technology; Artificial intelligence; Blended learning; Individual multimodality; Contextualised teaching; Fourth Industrial Revolution; Motivation; Self-directed learning; Technology integration.

Introduction

The rising enrolments in HE bring about an international clientele and result in a student force with diverse cultural, contextual and educational backgrounds. How do we accommodate these learners who enter our classrooms, each with a different amount of prior knowledge and an individual multimodal context? Do we bore the more knowledgeable? Do we leave behind the less progressed? Or do we endeavour to find that compromise somewhere in-between? Do we adore the talented or ignore the silent cries for help of the confused? These questions have driven the 'one-size-fits-all approach' to education (Matar 2011:404; Murray, Shea & Shea 2004:33; Pratt 2002:12). This challenge of student diversity within a multimodal learning context has resulted from the redundancy of traditional teaching methods and the increasing expectations of the modern student cohort, with the latter being as diverse as the students themselves (Altbach, Reisberg & Rumbley 2019:47). However, this is only one of the challenges that the HE sector faces.

Increasing automation and technological advances, such as the advent of artificial intelligence (AI), have created a major

sense of job uncertainty in the wake of the Fourth Industrial Revolution (Shoss 2018:1). This leaves the upcoming workforce (current student corps) to look to HE institutions for answers and solutions to fill the gaps in the rapidly changing job market and to 'top up' skills development to prepare them for the new demands of the new era. Higher education perceives this as more of a 'student problem' than as a 'teaching problem' and that the student is accountable for adapting learnt skills to the 21st-century context (Gorard et al. 2006:56). If HE continues to generalise teaching, most new students will become less attracted to post-secondary education (Altbach et al. 2019:47). These fundamental challenges in HE have driven the need for alternative teaching and learning strategies that can adapt to the needs of the students. Electronic learning (eLearning), also known as online or even multimodal learning, has been advocated to offer a variety of solutions to the education sector – adaptive learning being held up as the panacea of the 21st-century HE problems (Murray & Perez 2015:123).

We are living in an era where HE experiences an explosion of technological innovations to support learning in the form of smartphone applications, LMS and other Web-based material, and students rapidly find themselves in the centre of educational noise. Faculties are also increasingly expected to employ a variety of digital tools. Do we really need another digital add-on to our already-blended and technologically satiated teaching strategies? The shift to student-centred learning further drives the evolving digitalisation of the teaching–learning environment for instructors to shift to roles as facilitators or guides (Becker et al. 2018:34). This, in turn, supports active teaching and learning strategies – such as PBL (Savin-Baden 2000), project-based learning (Lee et al. 2014) and inquiry-based learning (Spronken-Smith 2012), *inter alia* – that need to be applied in university classrooms that consist of hundreds of students. The sheer size of the need for post-secondary education has made the necessity for innovations in HE more urgent than ever before.

Advances in psychology, AI, technology accessibility, cost of technology and generational evolution have caused a shift in digital learning, which made adaptive learning relevant. Adaptive learning addresses the issues in HE, mentioned above by providing a personalised learning path for each student. Adaptive learning is a concept that applies to a variety of technologies and methods concerning the use of software that tracks student performance and engagement with digital resources, often in combination with an LMS, and modifies the learning path experienced by each student based on the data collected from the student-resource engagement (Smith 2016).

Adaptive learning technology has obvious benefits for the education sector and has been around for at least four decades (e.g. Carbonell 1970). Why, then, has adaptive learning technology not scaled to its required potential in the 21st century? The challenges adaptive learning technology faces are, amongst others, investment (e.g. time, money, resources and vision) needed to implement and scale the technology (Mirata & Bergamin 2019:671; Weber 2019:34). The need for adaptability in existing eLearning tools is extensively described in the literature to curb the undesirable 'one-size-fits-all' viewpoint in the expansion of educational courseware (e.g. Imhof, Bergamin & McGarity [forthcoming]; Koychev, Nikolov & Dicheva 2009:1; Matar 2011; Newman et al. 2016:3).

Electronic learning has become a pivotal concept in 21st-century education. In one of the 10 statements made towards a theory for eLearning, Nichols (2003:8) argues that eLearning 'can be used in two major ways; the presentation of educational content, and the facilitation of education processes'. The use of adaptive learning technology as a tool can be designated to both: using sound pedagogical principles to facilitate the process of learning and presenting the right content at the right time to the right student. Out of the many topics on eLearning that exist today, why is adaptive learning technology worth our time any more than other technological innovations? The New Media

Consortium Higher Education Horizon Report is an acknowledged frontier report published annually, which discusses promising innovations and developments in educational technology in HE that are expected to influence learning, teaching and creative inquiry. In their 2018 report, adaptive learning technology was set to be one of the three key trends accelerating HE technology adoption, assigned with a period to adopt within two to three years (Becker et al. 2018:42).

Imagine that you are a student and your course instructor tells you that you need to study a section in one chapter of your textbook for the next day. Now imagine opening the textbook on your laptop or mobile smart device and you start reading the section to obtain an overview of the content, but you get interrupted just before you start forgetting what you have read. The textbook now prompts you that you need to practise some questions to test your knowledge and comprehension. After you have answered some questions correctly, the questions increase in difficulty. However, as soon as you answer some of the questions incorrectly, the textbook directs you to the specific paragraph, video or animation that you need to read or watch again in order to sharpen your knowledge regarding the applicable topic you are struggling with, and the difficulty of the questions is also adjusted to an easier level. Whilst performing these analyses, the textbook also collects metacognitive data on how you interact with the questions – for example, the time you take to read the text and your certainty when answering a question, amongst other data – and informs both you and your instructor about the progress you have made. The textbook also communicates any misconceptions you have and also does so for the whole class. In the next contact session, your instructor immediately starts discussing these misconceptions and provides the class with an opportunity to engage with the content in an active learning activity. This scenario provides a theoretical and simplified example of what a course using adaptive learning technology looks like – a complex set of algorithms to use student performance

and engagement to inform and individualise the teaching and learning process.

Because of the potential disruption adaptive learning holds for the education sector, many varieties of definitions of adaptive learning exist. Musimbi and Mutuku (2019:91) define adaptive learning as 'an educational method which uses computer algorithms to orchestrate the interaction with the learner and deliver customised resources and learning activities to address the unique needs of each learner'. Although the definition of Musimbi and Mutuku is correct, in its conciseness, it does not address the sequence of instruction in its broadest sense. In their report on the evolution of adaptive learning in HE, Newman et al. (2016) comprehensively define adaptive learning:

> [*S*]olutions that take a sophisticated, data-driven, and in some cases, non-linear approach to instruction and remediation, adjusting to each learner's interactions and demonstrated performance level and subsequently anticipating what types of content and resources meet the learner's needs at a specific point in time. (p. 3)

Adaptive learning technology is, therefore, a major leap of progress made towards scalable, personalised learning.

'Adaptive learning' is an umbrella term used to describe the collection of technologies that are used to continuously adapt the teaching process to the changing needs and cognitive demands of students' learning progress (Imhof et al. forthcoming). Adaptive and intelligent Web-based educational systems attempt to be more adaptive by building a model of the goals (defined by students), preferences (aids in learner motivation) and knowledge (a student does not need to read what he or she already knows) of each individual student and using this model throughout the interaction with the student in order to adapt to the needs of that student (Brusilovsky & Peylo 2003:156). These affordances of adaptive learning technology also offer support to some of the attributes that increase self-directedness in students' learning, which entail taking initiative for one's own learning, identifying learning needs, setting goals, identifying resources, deciding on

learning strategies and evaluating learning outcomes (Knowles 1975:18).

This chapter is grounded in the adaptive learning theory, which posits that personalised instruction enhances learning (Cronbach 1957; Murray & Perez 2015), and in terms of multimodality the chapter functions on both individual and instructional levels. When referring to the importance of adaptive learning technology in the adaptive learning process, Rashied (2018:118) aptly referred to the influential historic behaviour psychologists, namely, Sidney L. Pressey, who advocated that learning is a behaviour governed by meaning, intention and purpose; and Burrhus F. Skinner, who promoted learning as a behaviour determined by its consequences. The importance of adaptive learning technology for adaptive learning processes epitomises the theories of these psychologists.

This was a conceptual and exploratory study that had a two-pronged focus born out of two descriptive and exploratory research questions:

1. What are the attributes of adaptive learning technologies that ensure that effective learning takes place?
2. Can we use adaptive learning technology to enhance SDL as defined by Knowles (1975)?

The first question draws upon existing literature to dissect the affordances, features and benefits of adaptive learning technology and how it is used to increase learning effectiveness. The second question focuses on these qualities by exploring how adaptive learning technology aids in goal-setting, identifying human and material resources, increasing motivation, monitoring and evaluating learning outcomes, incorporating prior context, prior knowledge and experience, and diagnosing learning needs, which form part of the theory towards SDL. The principles and assumptions of Knowles are also discussed in the light of the attributes of adaptive learning technology. Finally, a model of an adaptive SDL environment is proposed.

The affordances and petri plates of adaptive learning technology

Digital technology has undergone rapid evolution over the past few decades and so have adaptive learning technology and the science of learning. I have referred to the first development of an adaptive system using computer-assisted instruction (CAI) in the 'Introduction' of this chapter. This nascent adaptive programme of its time, named SCHOLAR, used the application of AI within CAI and was developed four decades ago in the field of geography (Carbonell 1970:190). In his paper, Carbonell called this system an ad hoc frame-oriented CAI system, with the word 'adaptive' not used once in the text. Since then, we have seen a plethora of new terminology introduced with the advent of the use of the BL–teaching approach (cf. ch. 2, ch. 4, ch. 6, ch. 9 & ch. 10). Therefore, to acquire a nuanced understanding of where adaptive learning fits into the vast world of eLearning and BL, it is necessary to briefly review the terminology according to the most recent literature (Table 3.1). This is also necessary to exclude ambiguity because of the considerable variation that occurs in the context in which a term is used (Imhof et al. forthcoming:3).

Bath and Bourke (2010:2) describe three modes for BL. Mode 1 is where technology is used to upload information and resources and for basic administrative functions. When technology is utilised to enhance the quality of the student learning experience through interactive learning activities, the level of BL is categorised as Mode 2. In Mode 3, technology is employed to support learning that is mainly self-directed and also involves the use of interactive and collaborative learning activities and is also the mode with the highest level of technology integration (Bath & Bourke 2010). When using BL in its third mode, learning is immersed in a technological environment or ecosystem when there is a coordinated interaction between online learning and face-to-face sessions. Adaptive learning provides one such environment, where the digital technology consists of many interactive components – for example, user interfaces, software

TABLE 3.1: Definitions of terminology used across the field of eLearning applicable to this study and what they mean in the context of this chapter.

Term	Definition	References
Effective learning	An activity of construction (making meaning of new knowledge), handled with (or in the context of) others, driven by learners' agency, monitoring and review of whether approaches and strategies are proving effective for the pre-set goals and context.	Watkins, Carnell and Lodge (2002:4), Watkins et al. (2007:19)
eLearning (online learning is used synonymously in this chapter)	Learning experienced using various technological tools that are Web-based, Web-distributed or Web-capable, to deliver information to students through the Internet or online computers in a synchronous classroom where students interact with instructors and other students and are not dependent on their physical location to participate in this online learning experience.	Singh and Thurman (2019:302), Sun et al. (2008:1196), Nichols (2003:2)
Blended learning	Krause (2008) argues that '[b]lended learning is realised in teaching and learning environments where there is an effective integration of different modes of delivery, models of teaching and styles of learning as a result of adopting a strategic and systematic approach to the use of technology combined with the best features of face-to-face interaction'.	Krause (2008:1)
Adaptive educational hypermedia	A systemic process to tailor individual content to the user through websites that automate the learning process. Hypermedia is the combination of hypertext and multimedia.	Brusilovsky (1996,1998, 2001)

applications, hardware devices and adaptive algorithms. Adaptive learning environments will always be categorised in the third model proposed by Bath and Bourke and, as an inherently human–computer interactive system, has a set of specific affordances (Hartson 2003:323). However, because adaptive learning systems can be used in an autonomous learning environment, for example, in a MOOC, it does not necessitate a blended approach.

Within a decade, the heavy, 2000-page textbook along with the swaths of lecture printouts had been replaced with a downloadable e-textbook and all fit on one thin device that you can control one-handedly (Rockinson-Szapkiw et al. 2013:77). Then, with the advent of adaptive learning systems and learning

analytics, the technologies were combined to form textbook-bundled study tools and the SmartBook (Thadani & Bouvier-Brown 2016). Faculty members can choose to create their own content to integrate with an adaptive system or can choose the textbook-bundled option that comes with ready-to-teach content.

The affordances of an adaptive learning system

Affordances are properties of an object (in this case, an adaptive learning technology) that display the ways of engagement via possible actions users can take with it, thereby implying how they may interact and relate with that object (Kaptelinin 2013). Affordances, in the context of this chapter, describe interactions between the user and the adaptive system and what such a system offers, provides or furnishes (Hartson 2003:316). Hartson (2003:323) identified four types of affordances that are used in user–technology interaction design, namely, cognitive affordances, physical affordances, sensory affordances and functional affordances. It is not the aim of this chapter to dissect and elaborate on all possible connotations of the term 'affordance' – in this instance, I refer the reader to an extensive and in-depth history and study of affordances of Kaptelinin (2013) and McGrenere and Ho (2000).

Physical affordances help users doing a physical action using the interface (Hartson 2003:323). Possible actions in an adaptive learning platform may include the physical interaction with devices, such as the screen (reading and viewing), keyboard (typing, controlling and calculating), mouse (clicking, scrolling, dragging and dropping), smart device (pressing on the screen with fingers or smart pen) and biometric sensors (measuring heart rate, eye movement and physical movement). However, affordances are more than merely the physical features of the

system. The interface or dashboard of adaptive learning technology also offers possible actions (together with the interactions mentioned above), such as text editing, searching, drawing, etc. The user-invokable functions are the affordances of the software and are specified by the graphical information, for example, buttons or menus (McGrenere & Ho 2000:7). Throughout the user–technology interaction, users actively make sense of the technology whilst participating in certain activities like reading and responding to prompts (Vyas, Chisalita & Van der Veer 2006:94). Vyas et al. (2006) also underscore the fact that users' active interpretation is essential to the development of affordances that are also socially and culturally determined. Cognitive affordances help users in knowing something – for example, a link that will take the user to a resource that will help answering a question (Hartson 2003). According to Hartson, sensory affordances are features that help users sense the use of a cognitive or physical affordance. Lastly, functional affordances are features that help users accomplish a specific task – for example, algorithms that present course content and questions in response to the user interaction with the system or adaptive educational hypermedia (AEH) (Hartson 2003).

Adaptive learning platforms: The petri plates

The use of the analogy of adaptive platforms as petri plates is especially appropriate because it aptly links with the concept of *affordances of adaptive learning*. A petri plate is a shallow, circular, transparent dish with a flat lid, used to cultivate microorganisms such as bacteria, yeasts and moulds. Hot water is used to dissolve some agar, a gelatine-like product, and mixed with a growth medium of whatever the microorganism needs to grow and may include nutrients, blood, salts, carbohydrates, amino acids, etc. A layer of a few millimetres thick of this hot agar-nutrient broth is then poured in the petri plate and left to

cool down and solidify. The plate is then inoculated with a sample of the microorganism cells and then turned upside down and placed in an incubator that is set at the optimal temperature for the bacteria to grow. Therefore, the petri plate affords the microorganism with all the components that it needs to flourish, and the affordances of the plate describe interactions between the microorganisms and the plate components. To place this analogy into context, microorganism growth can be viewed as being analogous to effective learning (see Table 3.1 for the definition of effective learning), and the plate and all its components are analogous to the platform and the infused adaptive learning system. The affordances of the adaptive platform should, therefore, provide each student with an environment where effective learning can take place.

Currently, there exists an abundance of companies that offer a range of adaptive learning technology platforms. Some companies are start-ups (e.g. CogBooks and Smart Sparrow), whilst others are education powerhouses like McGraw-Hill Education, Pearson and Cengage that partnered with or acquired some of these ed-tech start-ups. These platforms vary in which data are used to affect adaptive capabilities, the level of configuration that they allow faculty, how they integrate with the institution's LMS, and how content is sourced. Newman et al. (2016:18) provide a wide-ranging list of companies currently offering platforms for adaptive learning systems. For each company profile, they also provide an overview, the type of platform offerings (e.g. self-authoring or off-the-shelf), which student inputs influence the adaptive capabilities, and faculty customisation. Data commonly used to inform adaptation of the system include learner confidence levels, time to complete learning exercises, performance on questions with the learning objective, learning style preference, mastery of prior learning objectives, past performance of students with a similar profile, elapsed time since the last interaction with the relevant content, and error diagnosis (Newman et al. 2016:19).

Vagale and Niedrite (2012:163) identified three core components of an adaptive learning system, namely, the domain model, the student model and the adaptive model (cf. Imhof et al. forthcoming:4). The domain model, also called the content model, includes the content of a specific course and links the topics to that applicable content. The student model, also named the learner model, keeps profile information about the student – for example, demographic data, knowledge data and personal preference data. According to Vagale and Niedrite (2012:164), these two models are connected with the aid of the adaptive model, which ensures that the student model informs the domain model to supply an adaptive environment (cf. Esichaikul, Lamnoi & Bechter 2011:343).

What makes adaptive systems attractive for the 21st-century classroom?

The sticky situation of the HE sector and the need for adaptive, more personalised education were briefly discussed in the introduction of this chapter to contextualise the problem statement as well as the educational need. But what benefits does this technology hold for its users (the student and the university faculty), as well as for post-secondary institutions and countries? The apparent benefit is that adaptive systems can recognise at-risk students and activate mediation activities. Additionally, it can inform adaptive learning tools that can aid more progressed students to continually remain challenged (Becker et al. 2018:38).

Advantages of the use of adaptive systems for the student:

- Allow for independence and autonomy.
- When adaptive technologies are combined with a learner console, students stay up to date with their individual advancement (Becker et al. 2018:39).

- Well-defined and clear goals adaptable for each student.
- Continuous re-assessments to evaluate the progress and to design the optimal learning path for the user until he or she attains the goal.
- Provide instant feedback (advantageous for both student and faculty).
- Render the space and time barriers irrelevant.
- Using background assessment to inform learning.
- Break the bulk of information into smaller chunks.
- Cater for the needs of diverse students (Przemyslaw et al. 2015:43).
- Educational content is presented via personalised paths (Przemyslaw et al. 2015).
- Adapt to students' skill level (Przemyslaw et al. 2015).
- Content should be accurately designed, which enables the system to assess students' ability and assign tasks within their capability (Przemyslaw et al. 2015).

Advantages of the use of adaptive systems for the university faculty:

- Faculty can uncover opportunities to redesign courses or make corrections to better meet students' learning needs (Becker et al. 2018).
- More flipped-classroom approach.
- Less time spent on formative assessments.
- More focused facilitation.
- Provide instant feedback.
- More time spent on interaction (Przemyslaw et al. 2015).
- Easier to manage mixed-ability classes (Przemyslaw et al. 2015).
- Aid the instructor to identify natural talents and skills of students (Przemyslaw et al. 2015).
- Enable the instructor to monitor each student's progress, often in real-time (Przemyslaw et al. 2015).

Advantages for implementing adaptive systems for the university are evident – a decrease in dropout rates (e.g. Correia et al. 2015; De-La-Fuente-Valentín, Pardo & Kloos 2013). Higher education institutions' dropout rates are a global phenomenon, which is increasing every year because of students abandoning their studies or changing their degrees (Araque, Roldán & Salguero 2009:563). Spain, for example, has documented dropout rates between 30% and 50% (Araque et al. 2009), Austria 45% (Araque et al. 2009), South Africa 50% (Letseka & Maile 2008:5) and the United States of America 40% for universities and up 80% for community colleges (Schneider & Yin 2012:1). Dropout rates have a monetary value to post-secondary institutions as well as for the economy of the country. Schneider and Yin (2012:3) put the possible economic gain of lowering dropout rates into perspective by calculating that, if the United States of America was to halve the number of students not finishing their courses in community colleges, it would amount to $30 billion of income over this 'lost' cohort's lifetime, creating a surplus of overall $5.3bn in taxpayer returns. Letseka and Maile also stated a loss of R4.5bn (~$300 million, $1 = R15.11 as on 01 November 2019) in grants and subsidies to HEIs that have not matched return of investment in 2008. Therefore, adaptive systems also have the potential to alleviate the effects of these forfeitures. But why has the technology not been scaled?

Adaptive learning systems have not featured as a promising education technology again in the 2019 EDUCAUSE Horizon report. According to Weber (2019:34), the reason for this might be that there is a greater need for this technology to become more relevant by aiding in the redesign of the curriculum and to bring down the costs of implementation. Przemyslaw et al. (2015:43) argue that the technology still has a long way to go in providing information that is subject to interpretation (e.g. semantic analysis of content) and that adaptive techniques are less appropriate in fields like philosophy.

The affordances of adaptive learning technology to enhance self-directed learning

The ever-changing demands of the 21st century necessitate a set of skills that will promote adaptability in the future job market. One such characteristic is self-direction (Rotherham & Willingham 2009:19). Morris (2019:56) argues that 'self-directed learning is a critical competence that empowers adults to adapt accordingly to fluid and complex social contextual changes'. Self-directed learning is also becoming increasingly important in the eLearning context, as well as in HE (Bedard 1997:281; Francis & Flanigan 2012:2; Teo et al. 2010:1764; Saks & Leijen 2013:190; Wilcox 1996:165).

Self-directed learning and self-regulated learning

It is important to first distinguish between SDL and SRL. These two terms have been used ambiguously in the literature (Benson 2011; Bracey 2010; Brockett et al. 1991; Ng 2008; Van der Walt 2019:2). Self-directed learning and SRL can also be confused with similar terms like autonomous learning, self-planned learning, self-teaching and independent study (Saks & Leijen 2013:191). To zone in on the affordances of SDL, it is necessary to clarify the context in which SDL is used.

Self-directed learning is an adult-education concept, also called andragogy, developed by the American adult educator Malcolm Shepherd Knowles. Knowles (1975) defines SDL:

> [*A*] process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes. (p. 18)

Saks and Leijen (2013:192) extensively reviewed the difference between SDL and SRL in an eLearning context and described a

self-directed learner as 'able, ready and willing to prepare, execute, and complete learning independently'. Jossberger et al. (2010:419) stated that SDL is situated on the macro- concept level that concerns the learning trajectory in its entirety, as opposed to SRL which is situated on a micro concept level (cf. Niemiec & Ryan 2009:134). Therefore, self-directed learners could self-regulate their learning, but self-regulated learners do not have to self-direct their learning (Jossberger et al. 2010:420).

The trend towards self-directed learning environments

Self-directed learning has been the focus point for adult education for the past four decades (cf. Brockett 2000:1). In a study conducted on how employers rated graduates on areas of learning and which were most in need of improvement, they rated self-directedness at one of the lowest ranks (Peter D. Hart Research Associates Inc. 2008:3). Self-directed, online, informal learning is undertaken by countless people around the world, either individually or collaboratively (Bonk & Lee 2017:36; Kim et al. 2015). Because of the era of information technology, there is significant importance placed on SDL because students are managing their own learning activities (Brookfield 2013; Sze-Yeng & Hussian 2010). This is particularly applicable in online environments (Song & Hill 2007).

Towards a model for an adaptive learning environment that enhances self-direction

Because of this learning trend, it has become necessary to look to employ adaptive systems to enhance students' self-direction. Existing adaptive systems attempted to build a model of goals (defined by students), preferences (aids in learner motivation) and knowledge (students do not need to read what they already know) of each individual student, using this model throughout the interaction with the student in order to adapt to each

particular student's needs (Brusilovsky & Peylo 2003:156). A conceptual model for understanding SDL in an online environment context was compiled by Song and Hill (2007:31) but did not integrate the concepts of adaptive systems. Adaptive systems may also find benefits to be more sensitive to data that enhance self-direction in HE, as is described for adult learning.

Such a self-directed and adaptive learning model needs to incorporate all principles and assumptions made for SDL as defined by Knowles (1975:18). These include the six principles about the characteristics of adult learners by Knowles (Knowles 1973; Knowles, Holton & Swanson 2005:3), as well as the assumptions discussed by Knowles (Knowles 1973:45–47; Knowles et al. 2005:64–67). The principles of the characteristics of adult learning have relevance to SDL, as Knowles based his theory of SDL on andragogy. These include:

1. the learner's need to know
2. self-concept of the learner, describing how a person matures from dependence to become self-directed
3. role of experience, describing the learning experience as a resource for learning
4. readiness to learn, describing the change of a person's evolving tasks in his or her social context
5. orientation to learning, describing the immediacy of knowledge utilisation that results in learning shifting from content-centredness to problem-centredness
6. motivation to learn, describing how learners are motivated by internal incentives, which was added in a later paper.

Knowles (1970:43) also identified four principles that apply to adult learning:

1. involvement in the planning of an evaluation of their learning
2. prior learning experience (which includes mistakes) provides a foundation for learning activities
3. immediate relevancy is a motivator of learning
4. adult learning is problem-centred rather than content-oriented.

It is, of course, not practical to include every assumption and every principle of SDL as outlined by Knowles. However, a conceptual model of SDL integration with an adaptive learning system can explore the combined affordances. In the proposed model, I merged some of the core principles of SDL with an adaptive model to explore how self-direction can be enhanced when using an adaptive learning system – a learning tool in the HE context (Figure 3.1). This model by no means provides a solution to any problem; on the contrary, it raises more questions for inquiry.

The model is discussed as an exchange between two main components, namely, the learner profile and the adaptive system. The following principles of SDL are identified to be infused in such a system.

☐ Goal orientation

Goal orientation in HEIs is determined by the curriculum in the form of study outcomes. One of the strides that adaptive learning technologies need to make is to aid in redesigning the curriculum (Weber 2019:35). The model therefore includes cyclical arrows between goal orientation and the adaptive system, with input of goal orientation from the educator. Instruction is often directed to what will be assessed, which is seldom intended to correspond with what students actually want to learn (Murray et al. 2004:33). For example, Murray and colleagues suggested the use of an inquiry-based approach to drive the 'what and how' of instruction. Olivier et al. (2019:4) stated that 'technology has to be appropriate to the community that it serves and meet and satisfy the sociocultural needs of local people'. Contextualised education is important to enhance self-directedness (De Beer 2016:34; Van der Walt & Potgieter 2018:140) and can be provided by adaptive learning technologies. Therefore, the model directs an arrow from the context or background of the student, as well as from prior knowledge to goal-setting (Figure 3.1).

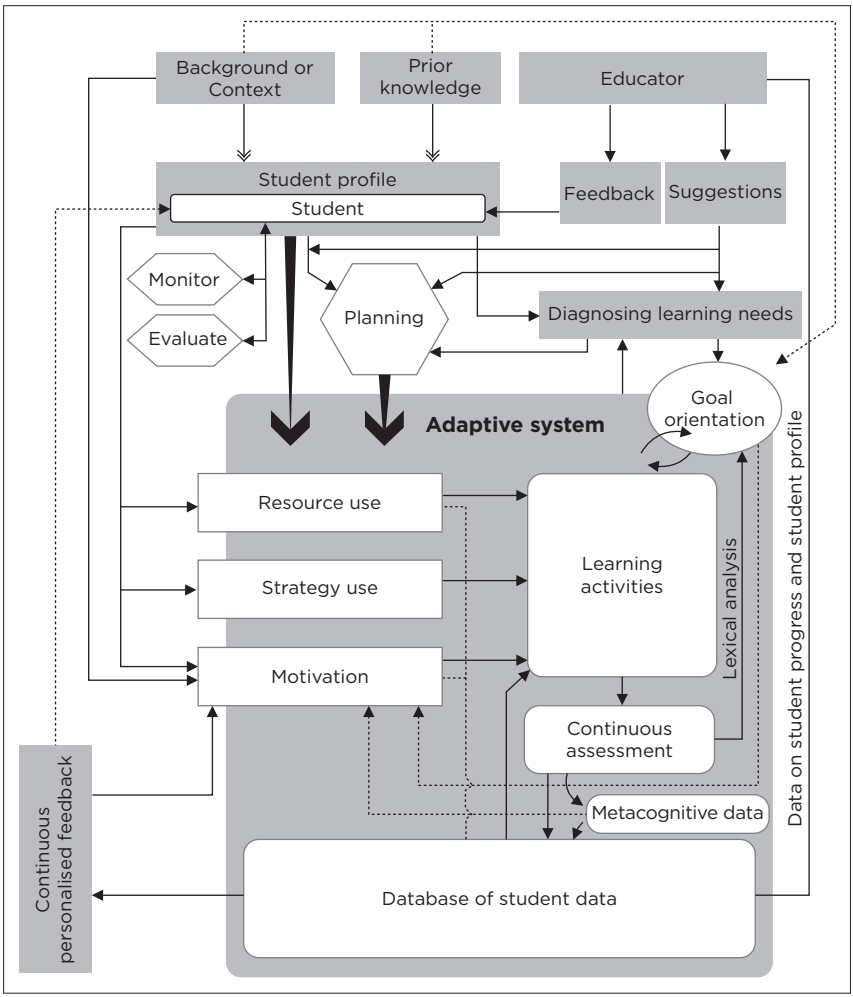

FIGURE 3.1: A conceptual model for integrating principles and assumptions for self-directed learning into an adaptive learning system.

Diagnosing learning needs and planning

To diagnose one's learning needs, with or without assistance, is the first aspect mentioned in the definition by Knowles (1975:18). Bergamin and Hirt (2018:231) discussed the dilemma

of self-direction in adaptive systems as not knowing how much control over the planning and assessment strategies needs to be given to students, because overloading might lead to random and inadequate decisions. This learner control can be detrimental to learning outcomes, as well as at an affective (motivation) level (Bergamin & Hirt 2018:231). To curb this issue, the model incorporates suggestions from the educator (informed by the adaptive system providing data about student progress and student profile) and the adaptive system itself. However, this also is still an aspect where the model conceptualised here can be improved by further studies.

☐ Resource and strategy use

Further decision-making that needs to take place is which human and material resources, as well as the learning strategy, are to be used to reach a specified goal or study objective. This also is a question of how much control should be given to the student (Bergamin & Hirt 2018:231). Both processes (as well as motivation, discussed separately) are resting on the adaptive system to indicate its dependency. However, if students can rate their level of preference whilst engaging with resources and learning strategies, it can be data used by the adaptive system to inform future learning (presented by the dashed lines from these components in Figure 3.1). In an ideal situation, the system will also inform students when their assessment data would show that they perform better with specific strategies, even if their preference indicates something else.

☐ Prior knowledge and experience

Prior knowledge and experience enable the adaptive system to adjust the presented content and assessments to the student's cognitive and metacognitive level. This is important for the system to accurately connect new information to existing student schemas, which will increase student performance (Song, Kalet & Plass 2016:32).

☐ Monitoring and evaluating

In his comprehensive model of SDL, Garrison (1997:24) included self-monitoring as a vital part leading to self-direction and stated that it is 'the process whereby the learner takes responsibility for the construction of personal meaning (i.e., integrating new ideas and concepts with previous knowledge)'. Therefore, monitoring and evaluating one's own learning also play a fundamental role in prior knowledge and experience. To be able to evaluate personal learning outcomes is also part of the definition of SDL (Knowles 1975:18). The adaptive system continuously collects cognitive and metacognitive data on all these constructs to inform future learning. Monitoring is also further supported by the educator in the form of feedback and suggestions, which the educator personalises for each student.

☐ Motivation

Motivation plays an integral part in self-regulation (and therefore, self-direction) as it can be inspired by peripheral factors and can affect performance (Garrison 1997:22; Gabrielle 2003:2568). Motivation is situational in that learners can have different levels of motivation for different topics at different times (Daskalovska, Gudeva & Ivanovska 2012:1189). Zimmerman (2008:178) outlines four elements of self-motivation, namely, self-efficacy, outcome expectations, task interest or value, and goal orientation. All these elements can be increased with training (Zimmerman 2008:175). Self-efficacy can by reinforced by metacognitive and cognitive feedback that the adaptive system provides. The system also uses these data to adapt the learning activities to the cognitive level of the student in such a way that the student will not be demotivated by the difficulty but still be cognitively challenged. Task interest or value can be enhanced by infusing data from the student's context and profile, and goal orientation provides another feedback line to link to outcome expectations and self-efficacy.

Conclusion

Improving self-direction in adaptive learning for the 21st century

The affective domain

The affective domain is often neglected in education (De Beer 2016:34; Jackson, De Beer & White 2018:218). The field of learning science has evolved over the past century, and we have honed our understanding of how learning takes place and what the process entails. This includes the interplay of various regions of the brain (neurophysiology) and the role of emotion and interest (affect) in learning. If we begin to understand the implications of these discoveries, we can create goals and models of curricula that are significantly different from the typical one-size-fits-all approach.

Emotion detection and semantic analysis (also known as sentiment or lexical analysis) from digital text, e.g. texting on social learning platforms and typed answers, is also an increasingly popular topic to support learning motivation on an individual and personal level (Saif et al. 2014:5). In their review on individual differences of learner models in adaptive systems from 2001 to 2013, Nakić, Granić and Glavinić (2015:473) found that few studies have included reasoning ability. As research intensifies in this domain, it will become progressively easier to use text for sentiment analysis to enhance feedback of the affective domain in learning.

The future of an adaptive learning environment to enhance self-direction

The conceptual model provided in this chapter can be used as a platform to inform future research on how SDL can be enhanced by adaptive learning technologies. Measuring the characteristics of the student to provide valid feedback for adaptation remains

a challenge (Imhof et al. forthcoming:19). Furthermore, not every construct or component provides best practices for meaningful adaptation and adaptive systems remain complex because of the countless configurations of constructs, characteristics and other data that can be combined to study the effects on learning (cf. Imhof et al. forthcoming). Adaptive and personalised learning also still only support traditional computers or devices, and few studies incorporate wearable devices (Xie et al. 2019), which also entails specific aspects of individual multimodality.

One such study that included wearable devices was conducted by Ciolacu et al. (2018:23). They explored AI-assisted processes with smart sensors and wearable devices and incorporated Zimmerman's cyclical model for SRL to reduce the failure rate of examinations by identifying at-risk students at an early stage. They also proposed a non-cyclical method to incorporate sensor data within adaptive feedback (Ciolacu et al. 2018:27). However, the students' context was not used in the analysis of their data. Ultimately, adaptive learning technology informed by the attributes of SDL has the potential to scale, improve accuracy, increase learner performance and reach more students (cf. Ciolacu et al. 2018; Imhof forthcoming:20; Xie et al. 2019:14) in multimodal learning contexts.

Chapter 4

A systematic literature review to probe design guidelines for a self-directed blended learning environment

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Abstract

Blended learning has developed dramatically over the past 20 years. At the beginning of the 21st century, the initial implementation of BL focused on face-to-face support for

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online learning environments. The emphasis in modern research seems to have shifted towards online support for face-to-face and distance learning environments. Blended learning has evolved into a concept much greater than technology-integrated learning. The literature is scrutinised in order to provide facilitators with comprehensive guidelines on designing effective BL environments. These guidelines also emphasise the aspects necessary to promote SDL in BL environments. In this chapter, we aim to critically analyse the design guidelines that were identified in the systematic review and make recommendations for designing a self-directed BL environment.

Keywords: Self-directed learning; Blended learning; Instructional multimodality; Multimodal learning; Design guidelines; Motivation; Learning environments; Collaboration; Systematic literature review.

Introduction

Because of ease of access and lower costs of online education (Bryan, Leeds & Wiley 2018; Deming et al. 2015), many HEIs are shifting from presenting traditional face-to-face courses to BL (cf. ch. 2, ch. 6, ch. 9 & ch. 10) courses as part of a greater move towards multimodal learning (cf. ch. 1). Trained instructional designers often assist in the process of designing BL courses (Arghode 2017; Margaryan, Bianco & Littlejohn 2015). However, with the increase in the number of BL courses in recent times, the responsibility to design such courses often lies with the facilitator (lecturer), who does not always have the design expertise to perform this task (Udermann 2019). The onus rests on facilitators to not only create effective BL environments, but also to teach students the necessary skills for coping in the 21st century. Self-directed and lifelong learning are processes in which individuals take responsibility for their own learning and set their own learning goals. Self-directed learning is an essential process that assists learners in the acquisition of 21st century skills, which are essential for them to cope in the interconnected, global society. Facilitators

should therefore value design guidelines that could not only assist with the design of an online environment but also incorporate SDL skills within such an environment.

In this chapter, we examine and summarise the past 10 years' literature, regarding guidelines for the design of BL environments and synthesise the suggestions into workable design guidelines that could be used by role-players who do, or do not, have instructional design training and experience. We further explore the role of SDL within these guidelines and also incorporate suggestions as to how BL environments can be designed to promote SDL in students.

This review critically examined and analysed significant studies relating to design guidelines that have been used in the BL domain. To examine the literature in relation to these aims, the following research questions were used:

1. What does the literature reveal about design guidelines used to create effective BL environments?
2. How do the design guidelines in the literature promote SDL?
3. What are the proposed guidelines that facilitators can use to design an effective BL environment?
4. How can an effective self-directed BL environment be designed?

A systematic literature review with the three main themes – design guidelines, BL environment and SDL – was conducted to address the research questions.

Research design and methodology

A systematic literature review is, amongst other reasons, conducted to produce an unbiased summary of a specific topic in order to draw comprehensive and vigorous conclusions (Siddaway, Wood & Hedges 2019). This was deemed as a suitable process whereby the relevant literature relating to design guidelines in an effective BL environment and their relation to SDL could be explored. The Preferred Reporting

Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines and flow charts directed the systematic literature review process. These entail a 27-step checklist, as well as a flow diagram that outlines the essential phases in conducting a systematic literature review (Moher et al. 2009).

Data sources and search terms

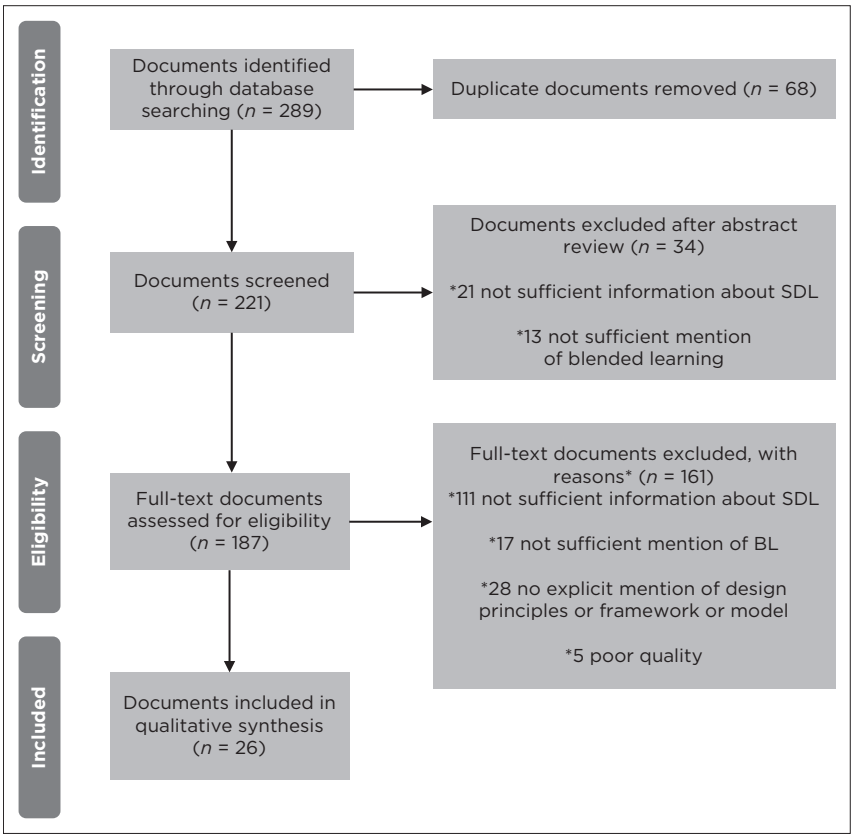
Data were retrieved from the following databases: EBSCO (Elton Bryson Stephens Company), Google Scholar, ScienceDirect, Academic Search Premier, ERIC (Education Resources Information Centre) and Web of Science. Varied combinations of the following keywords were used in a total of 65 searches: (design principles OR models OR guidelines OR frameworks) AND (blended learn* OR online learn* OR multimodal learn* OR tech* integrated learn*) AND (self-directed learn* OR SDL).

The coding and synthesising process

The inclusion criteria for the documents were as follows:

- The documents must have been published between 2009 and 2019.
- They must have been published in peer-reviewed publications.
- Publications had to include the three main themes (with variations on the search terms), namely, design guidelines, BL environment and SDL.
- They must be journal articles, books and conference proceedings.
- They must have utilised a qualitative, quantitative or mixed-methods approach in their research.

A flow diagram of the screening process is provided in Figure 4.1. Overall, 24 documents remained after the screening and evaluation process. The CAQDAS ATLAS.ti™ was used to organise and analyse the data. Two researchers coded all the documents to ensure reliability. Through an inductive process, we produced,



BL, blended learning; SDL, self-directed learning.

FIGURE 4.1: Flow diagram of the screening process.

reviewed and revised codes within the context of the data (Saldaña 2015). We did not impose a theoretical framework on the data but were open to the ideas that arose therefrom (Ranney et al. 2015). Ranney et al. (2015) highlighted the importance of not only creating, but also refining a codebook in the process of data analysis. As we did collaborative coding, we created a Google Sheet to constantly update and refine the code list and description of each code. The refinement process included revising definitions for each code and updating the examples of

typical codes. This codebook guided us to work consistently and reliably (Goodell, Stage & Cooke 2016). In total, 34 codes were created throughout the analysis process.

Intercoder agreement is a type of evaluation in the coding process that 'describes the level of sameness between two coders' (Goodell et al. 2016:580). The statistical calculation of Cohen's kappa describes the agreement between coders. For this project, Cohen's kappa was found to be 0.93, indicating an almost perfect agreement between the coders. To further ensure reliability, the codebook was updated, refined and finalised (Goodell et al. 2016). As mentioned above, this occurred in the process of analysing the data. In the next section, the main concepts of this study are contextualised.

Background of the study

In this section, a short theoretical background to the main concepts is presented. We briefly explore the definitions of BL, as well as the importance of design guidelines within BL environments. We also highlight the importance of SDL in relation to 21st-century learning within a technology-enhanced environment.

Blended learning

The notion of BL has existed since the early 1990s. Literature reveals that the term 'blended learning' is often used interchangeably with other terms such as 'hybrid', 'mixed mode' or 'flexible learning' and in this publication it is considered in terms of *instructional multimodality* (cf. ch. 1). Numerous definitions of BL can be found in the literature. Some of the definitions focus more on an institutional level, where authors refer to the different modes of delivery offered by institutions (Bersin 2004; Driscoll 2002; Singh & Reed 2001). Others focus on an instructional level, referring to the blending of learning styles or learning environments (Clark & Mayer 2016; Marsh 2012). However, the most common conceptualisation of BL is where

learning is referred to as a blend, which implies the combination of face-to-face and online or computer mediated instruction (Allen & Seaman 2010; Graham 2013; Sahare & Thampi 2010). According to Smith and Hill (2019), the lack of a clear definition for BL obscures it as a research field. In this chapter, we attempt to present a mutual understanding of what BL entails in practice.

Self-directed learning

The call for facilitators to empower students for the 21st century is emphasised strongly in HEIs. Students require new skills, knowledge and values that go beyond the learning of content knowledge and examination skills to thrive in this complex and interconnected, technological landscape (Teo 2019). Some of the desired skills include communication, digital literacy (cf. ch. 10), creativity, cultural competence, inventiveness, emotional awareness, entrepreneurship, critical thinking, problem-solving and collaboration (Bernhardt 2015; Teo 2019). According to Morris (2019), SDL is a critical competency that can assist students to acquire these 21st-century skills. Learning environments that promote SDL can prepare students for their working life and equip them to be lifelong learners (Morris 2019). The integration of technology into learning environments can offer many opportunities for students to be self-directed in their learning (Fahnoe & Mishra 2013).

Designing a blended learning environment

The learning environments we create should not only cater for, but also enhance meaningful learning and 21st-century skills (Alismail & McGuire 2015). It is the responsibility of facilitators to ensure that skills, such as communication, information literacy, problem-solving, higher-order thinking and social interaction, are created, fostered and enhanced in such environments (Bosch 2017; Garrison 2011). In a BL environment, facilitators can use the 'best of both worlds' to ensure that learning outcomes that are

more wide-ranging than just basic subject knowledge, are reached. Numerous educational technologies can assist facilitators with this immense task. However, it is important to understand that the mere integration of technology into a learning environment is not necessarily BL; BL only occurs if technology is used to create a collaborative, reflective environment that encourages meaningful SDL (Bosch 2017; Cooke 2014; Delialioğlu 2012). It has come to a point where designing BL environments is not the sole responsibility of instructional designers anymore. Facilitators should reflect on and redesign their own courses to fulfil the needs of 21st-century students (Vaughan et al. 2017). The course outcome, the mode of delivery and the learning context determine the correct blend for each classroom. Therefore, it is important to have guidelines or frameworks that will assist facilitators in this regard.

Discussion of results

The following themes in design guidelines emerged from the corpus of documents: course design, teaching–learning strategies, learning environment and facilitator. Under *course design*, the following sub-themes emerged: course structure, evaluation, feedback, tasks and resources. The sub-themes for *teaching–learning strategies* include motivation, collaboration, reflection and PBL (cf. ch. 6 & ch. 9). *Learning environment*, which refers to the design and structure of the online learning platform, is dealt with on its own, and *facilitator* encompasses aspects relating to the role of the facilitator, as well as support. We explore the way in which SDL featured in the analysed documents and discuss these findings under the identified categories of SDL skills, strategies to promote SDL and motivation as an aspect of SDL.

Course design

Course design refers to aspects that can assist in guiding facilitators when designing a BL environment. The guidelines

from the corpus of documents were organised into sub-themes, and are subsequently discussed.

Course structure

Various documents have identified design guidelines that refer to the structure of a course. Beckers, Dolmans and Van Merriënboer (2016), Cabi and Kalelioglu (2019) and Hammarlund, Nilsson and Gummesson (2015) highlighted constructive alignment – one of the essential principles of education – as a design guideline. They emphasised that the learning objectives, teaching and learning strategies and assessment activities should be aligned in a course. Other guidelines focus on the purpose and goals of a course, strategies that can be employed and student involvement. The purpose and goals should be clearly defined (Hammarlund et al. 2015; Holland 2019), communicated and reinforced; the project should be described in detail; and important information – such as deadlines, presentation formats and the rubrics to be used for assessment – should be communicated with students (Addo-Atuah, Dutta & Kovera 2014). Teaching strategies should be designed in such a way that they can promote freedom, choice and control and should ensure active participation (Firat, Sakar & Yurdakul 2016; Holland 2019; Idros et al. 2010). In addition, the course should be structured to involve students by identifying their learning needs, planning their learning strategies and utilising resources (Sze-Yeng & Hussain 2010; Wong et al. 2014). Students should have the freedom to manage their time (Bayrak & Akcam 2017; Firat et al. 2016; Pintz & Posey 2013). The course structure should also be designed to expose students to different and varied perspectives (Holland 2019).

Evaluation

When designing a learning environment, it is important to continually evaluate the design process (Auh & Sim 2019; Cremers et al. 2014). Course improvement should not only be a continuous

process (Addo-Atuah et al. 2014); developers should also be cognisant of student feedback and recommendations (Bayrak & Akcam 2017). The evaluation process should not only focus on the course structure but also on fundamental aspects, such as the learning theories that underpin the course design (Meyer & Murrell 2014). Pintz and Posey (2013) suggested that an evaluation should be done in phases: in the first phase, technical challenges should be identified and areas that require immediate attention should be addressed; the second phase is focused on user satisfaction. They also suggested that evaluation should be continuous.

☐ Feedback

In the documents, we identified two types of feedback: general feedback and assessment feedback. General feedback is the feedback given to students on their progress in general tasks and activities, whereas assessment feedback focuses on the feedback given in more formal assessment opportunities. Characteristics of general feedback highlighted in the literature are as follows: feedback should be individual (Holland 2019), of high quality (Hammarlund et al. 2015), continuous (Pintz & Posey 2013) and focused on student processes instead of the outcomes that students achieve (Butcher & Sumner 2011). The purpose of feedback in this regard is to reinforce and remediate (Pintz & Posey 2013).

Aspects relating to assessment feedback were discussed in several documents that referred to guidelines. Five of the guidelines emphasise the importance of assessment feedback. Sze-Yeng and Hussain (2010), and Zhang et al. (2010) conferred that assessment feedback must come from various sources, such as peers, teachers and experts. It is suggested that assessment feedback is continuous (Bayrak & Akcam 2017; Cremers et al. 2016) and timely (Bayrak & Akcam 2017; Hammarlund et al. 2015; Zhang et al. 2010). Assessment feedback should further be formative and integrated into the course (Sze-Yeng & Hussain 2010; Zhang et al. 2010).

☐ Resources

Resources are featured as an important aspect of course design. Resources should be used to promote authentic, meaningful learning (Firat et al. 2016; Zhang et al. 2010), for interaction (Cabi & Kalelioglu 2019), to provide access to information and expert knowledge (Holland 2019), and address the challenges of developing the processes of cognition (Zhang et al. 2010). It is of utmost importance that resources are easily accessible and available to students (Bayrak & Akcam 2017; Cabi & Kalelioglu 2019), that there are sufficient resources available and that they are of a high quality (Cabi & Kalelioglu 2019; Holland 2019) and of a wide variety (Firat et al. 2016). Various guidelines refer to the varied types of resources. These include mobile technologies (Firat et al. 2016; Wong et al. 2014; Zhang et al. 2010), cloud computing (Wong et al. 2014; Zhang et al. 2010), Internet resources (Wong et al. 2014), blogs (Ahram & Karwowski 2012), YouTube videos, Khan Academy, TED (technology, entertainment and design) talks and OERs (Auh & Sim 2019).

☐ Tasks

Various authors that had identified design guidelines highlighted different characteristics that tasks should encompass. Amongst these characteristics, the characteristic of authenticity dominates. Firat et al. (2016) and Pintz and Posey (2013) encouraged the use of tasks that relate to real-life scenarios, particularly to stimulate curiosity in students. Wong et al. (2014) expanded on this idea of integrating tasks into students' everyday lives and added that just-in-time learning tasks are useful. Cremers et al. (2016) highlighted the importance of linking learning and practice.

However, tasks should not only be authentic; the documents also revealed other characteristics of tasks. Cremers et al. (2014) and Firat et al. (2016) indicated that tasks should be ill-structured and non-routine. Tasks should also be open-ended, complex and diverse (Firat et al. 2016); they should be unambiguous (Severova

2015) and student-focused (Holland 2019); they should include elements of fun (Firat et al. 2016; Holland 2019; Lee et al. 2017); promote metacognition (Rum & Ismail 2017) and focus on quality rather than on quantity (Holland 2019). Furthermore, tasks should be structured in such a way that a learning community is established (Bosch & Pool 2019; Cremers et al. 2014; Hammarlund et al. 2015) and they should incorporate diversity (Cremers et al. 2014). With regard to the structure of tasks, certain information needs to be provided to the students in advance, such as the assessment criteria, timeframes, the format of the task and the responsibilities of the students (Addo-Atuah et al. 2014). There should also be many opportunities for practice (Pintz & Posey 2013).

Various aspects of assessment are suggested in the literature, such as teacher assessment, peer assessment and self-assessment (Intayoad 2014; Jimoyiannis & Tsiotakis 2017; Rum & Ismail 2017; Sze-Yeng & Hussain 2010). Furthermore, Bayrak and Akcam (2017) stated that online assessment tools need to be accurate. Assessment in the form of e-portfolios can develop SDL skills, such as self-assessment, formulating learning goals and selecting future tasks (Beckers et al. 2016).

Aspects of learning

The corpus of documents revealed design guidelines that refer to various aspects of learning. These have been categorised as *collaboration*, *motivation* and *reflection*. Most of the guidelines focus on collaboration.

Collaboration

Cremers et al. (2016) and Firat et al. (2016) referred to the creation of a learning community that gives students the opportunity to learn from one another. Holland (2019) and Zhang et al. (2010) expanded this idea by mentioning that the collaborative learning community should facilitate knowledge construction. They further

stated that such a collaborative environment should use community support and resources. Furthermore, the collaborative environment could assist students to benchmark themselves against peers and to evaluate their progress (Firat et al. 2016; Idros et al. 2010). Students should be encouraged, within the online environment, to collaborate and share knowledge (Firat et al. 2016; Holland 2019; Lee et al. 2017). Problem-based learning and inquiry-based learning are suggested as suitable approaches that could support investigation and collaboration and equip students with knowledge and skills required to take responsibility for their own learning (Intayoad 2014; Zhang et al. 2010). Beckers et al. (2016) further said that collaborative assessment is of importance in BL environments as it encourages students to revise their work.

☐ Motivation

Cremers et al. (2014) highlighted the importance of motivation, saying that one should pay attention to the emotional and motivational aspects that are evoked either by a shift in mindset or by resistance to and struggle with the process of self-direction. The course design should be made keeping the students' motivation in mind – which is possible only by paying attention to aspects such as ease of access and selection opportunities (Holland 2019).

Various researchers have recommended that collaboration within the online environment can increase student motivation (Cremers et al. 2014; Yilmaz & Yilmaz 2019). Hammarlund et al. (2015) stated that students' motivation is increased by communicating information early and allowing them to make their own choices. They added that this could also assist in students' planning. Cabi and Kalelioglu (2019) further stated that students should be motivated regularly through consistent communication. In addition to communication, allowing for regular dialogue can increase motivation within the online environment (Holland 2019).

Other aspects that are highlighted as important in increasing student motivation include the entertainment aspects in the online environment; making use of variable and mobile components; and allowing for student choice, depending on their requirements and interests (Firat et al. 2016). Ahram and Karwowski (2012) opined that social networking can contribute to motivate and engage students. Furthermore, the research revealed that scaffolding can increase student motivation (Beckers et al. 2016) and the use of PBL (Intayoad 2014; Shimizu et al. 2019) and case studies can increase motivation and inspire students (Intayoad 2014).

Reflection

Guidelines relating to both peer reflection and self-reflection are evident (Cremers et al. 2016; Firat et al. 2016; Jimoyiannis & Tsiotakis 2017). Generally, reflective practices are encouraged in four different texts (Cremers et al. 2016; Firat et al. 2016; Jimoyiannis & Tsiotakis 2017; Rum & Ismail 2017). Reflection is important not only for students but also for facilitators. Critical reflection is a valuable mechanism for facilitators to change their perspectives about their role as a facilitator in BL environments, as well as their views about student learning (Meyer & Murrell 2014).

Learning environment

The learning environment refers to the design and structure of the online learning platform. The documents that were analysed revealed the following sub-sections under the theme of *learning environment*: collaboration, skills and structure. The structure of the online environment should promote collaboration between students by providing opportunities for communication and sharing where they can learn from each other (Firat et al. 2016). Furthermore, the collaborative learning environment should encourage knowledge building (Zhang et al. 2010) and promote peer collaboration (Auh & Sim 2019; Hammarlund et al. 2015;

Zhang et al. 2010). The learning environment should be designed in such a way that critical thinking and self-reflecting are encouraged (Auh & Sim 2019) and provision should be made for the incorporation of time management tools (Bayrak & Akcam 2017; Firat et al. 2016; Pintz & Posey 2013).

The structure of an online learning environment should be designed with the main purpose of enhancing students' learning experience. Some pointers relating to course design, revealed in the documents, are as follows: the course design should be student-centred (Wong et al. 2014; Zhang et al. 2010) and should make provision for personalised, as well as social spaces where information can be shared (Ahram & Karwowski 2012; Holland 2019; Wong et al. 2014). Multimedia design aspects, such as using animation and interactive features, should also be considered in the course design (Pintz & Posey 2013). These authors further pointed out that course components should be divided into smaller sections to manage complexity. Holland (2019) suggested that the online learning content should be search-friendly. The learning environment should be authentic and should encourage SDL (Cremers et al. 2014).

The role of the facilitator

When designing a BL environment, the role of the facilitator is of utmost importance. The corpus of studies revealed various important aspects relating to the role of the facilitator. The facilitator should be available and accessible (Cabi & Kalelioglu 2019); he or she should plan well (Intayoad 2014); engage in discussions with students (Intayoad 2014) and ensure a social presence (Holland 2019), teaching presence, cognitive presence and learning presence in the online environment (Bosch & Pool 2019). The lecturer should fulfil his or her role as the facilitator and project supervisor (Holland 2019).

In online environments, the facilitator has a very specific role regarding the use of technology. The facilitator needs to act as a mediator so that students can engage with each other on social

media platforms (Holland 2019). Holland further emphasised that one of the responsibilities of the facilitator is to ensure that scaffolding takes place throughout the course. Shimizu et al. (2019) also suggested that facilitators should take cognisance of students' anxiety and satisfaction by decisively designing online courses. Other ways in which facilitators could support students in the online environment are by providing multimedia support (Firat et al. 2016) and metacognitive support to students (Yilmaz & Yilmaz 2019) and by using basic learning analytics (Wong et al. 2014). The facilitator should also provide students with individual coaching and feedback (Cremers et al. 2014). Additional skills, such as simple web design, can be useful for a facilitator when designing a BL environment (Severova 2015). The next section presents a synthesis of the design guidelines featured in the corpus of documents.

Synthesis of guidelines in the documents

Table 4.1 critically analyses the design guidelines under the four identified categories, namely, course design aspects of learning, learning environment and the role of the facilitator. It is also indicated when cases made no reference to these themes.

Self-directed learning

This section presents the matters relating to SDL that were evident in the documents. Beckers et al. (2016) acknowledge SDL as an umbrella term for different learning processes, such as self-regulation, self-paced learning and goal-direction. They refer to the definition of SDL as conceptualised by Knowles (1975):

> A process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes. (p. 15)

In the corpus of documents, Cremers et al. (2016) and Rum and Ismail (2017) also refer to Knowles' definition of SDL.

TABLE 4.1: Synthesis of guidelines in the documents.

No.	Reference	Title	Guidelines			
			Course design	**Aspects of learning**	**Learning environment**	**Role of the facilitator**
1	Addo-Atuah et al. (2014)	Instructional design and assessment: A Global Health elective course in a Pharm D curriculum	**Course Structure:** Goals should be defined, communicated and reinforced. The project should be described in detail. **Feedback:** Nothing explicit **Resources:** Nothing explicit **Tasks:** Provide students with assessment criteria, time frames, task format and responsibilities. **Evaluation:** Evaluation should be continuous and should take student feedback into consideration	**Collaboration:** Nothing explicit **Motivation:** Nothing explicit **Reflection:** Nothing explicit	Nothing explicit	Nothing explicit
2	Ahram and Karwowski (2012)	Visual social network analysis: Effective approach to model complex human social, behaviour and culture	**Course Structure:** Nothing explicit **Feedback:** Nothing explicit **Resources:** Various technologies, such as blogs and social networking, are encouraged. **Tasks:** Nothing explicit **Evaluation:** Nothing explicit	**Collaboration:** Peer feedback within social networking is encouraged. **Motivation:** Social networking can assist in motivating and engaging students **Reflection:** Nothing explicit	Nothing explicit	Nothing explicit

Table 4.1 continues on the next page→

TABLE 4.1 (Continues...): Synthesis of guidelines in the documents.

No.	Reference	Title	Guidelines			
			Course design	**Aspects of learning**	**Learning environment**	**Role of the facilitator**
3	Auh and Sim (2019)	Uses of social network topology and network-integrated multimedia for designing a large-scale open learning system: Case studies of unsupervised featured learning platform design in South Korea	**Course Structure:** Nothing explicit **Feedback:** Nothing explicit **Resources:** Various forms of resources that support multiple learning styles can enhance the learning experience for example, YouTube, Khan Academy, TED talks, OERs. **Tasks:** Nothing explicit **Evaluation:** Nothing explicit	**Collaboration:** Learner-centred collaboration is encouraged. **Motivation:** Nothing explicit **Reflection:** Nothing explicit	The learning environment should encourage the building of knowledge, peer collaboration, critical thinking and self-reflection	Nothing explicit
4	Bayrak and Akcam (2017)	Understanding student perceptions of a web-based BL environment	**Course structure:** There should be sufficient opportunity for students to manage their own time. **Feedback:** Assessment feedback should be continuous, accurate and timely. **Resources:** Should be easily accessible and available. **Tasks:** Nothing explicit **Evaluation:** When evaluating courses, student feedback and recommendations should guide the process	**Collaboration:** Nothing explicit **Motivation:** Nothing explicit **Reflection:** Nothing explicit	They suggest the use of time management tools	Nothing explicit

Table 4.1 continues on the next page→

TABLE 4.1 (Continues...): Synthesis of guidelines in the documents.

No.	Reference	Title	Guidelines			
			Course design	**Aspects of learning**	**Learning environment**	**Role of the facilitator**
5	Beckers et al. (2016)	e-Portfolios enhancing students' SDL: A systematic review of influencing factors	**Course structure:** Apply the principle of constructive alignment **Feedback:** Nothing explicit **Resources:** Nothing explicit **Tasks:** e-Portfolios can be used to facilitate skills development for SDL, for example, self-assessment, formulating goals for learning and selecting future tasks. **Evaluation:** Nothing explicit	**Collaboration:** Collaborative assessment is suggested as it can encourage revision of work. **Motivation:** Scaffolding can increase student motivation. **Reflection:** Nothing explicit	Nothing explicit	Nothing explicit
6	Bosch and Pool (2019)	Establishing a learning presence: CL, BL, and self-directed learning	**Course structure:** Nothing explicit **Feedback:** Nothing explicit **Resources:** Nothing explicit **Tasks:** Task design should encourage a learning community. **Evaluation:** Nothing explicit	**Collaboration:** Nothing explicit **Motivation:** Nothing explicit **Reflection:** Nothing explicit	Nothing explicit	Ensure the following presences in the online environment: social, teaching, cognitive and learning

Table 4.1 continues on the next page→

TABLE 4.1 (Continues...): Synthesis of guidelines in the documents.

No.	Reference	Title	Guidelines			
			Course design	**Aspects of learning**	**Learning environment**	**Role of the facilitator**
7	Cabi and Kalelioglu (2019)	A fully online course experience from students' perspective: Readiness, attitudes and thoughts	**Course structure:** Apply the principle of constructive alignment. **Feedback:** Nothing explicit **Resources:** High-quality resources should promote interaction and should be easily accessible and available. **Tasks:** Nothing explicit **Evaluation:** Nothing explicit	**Collaboration:** Nothing explicit **Motivation:** Consistent communication should be used to motivate students **Reflection:** Nothing explicit	Nothing explicit	The facilitator should be available and accessible
8	Cremers et al. (2014)	Self-directed lifelong learning in hybrid learning configurations	**Course structure:** Nothing explicit **Feedback:** Nothing explicit **Resources:** Nothing explicit **Tasks:** Tasks should be authentic, ill-structured and non-routine. **Evaluation:** Nothing explicit	**Collaboration:** Nothing explicit **Motivation:** Emotional and motivational aspects must be kept in mind. **Reflection:** Nothing explicit	The learning environment should be authentic and should encourage SDL	Individual coaching and feedback are encouraged

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TABLE 4.1 (Continues...): Synthesis of guidelines in the documents.

No.	Reference	Title	Guidelines			
			Course design	**Aspects of learning**	**Learning environment**	**Role of the facilitator**
9	Cremers et al. (2016)	Design principles for hybrid learning configurations at the interface between school and workplace	**Course structure:** Nothing explicit **Feedback:** Assessment feedback should come from various sources, for example, peers, teachers and experts. **Resources:** Nothing explicit **Tasks:** Learning and practice should be linked. Tasks should assist in establishing a learning community and incorporate diversity. **Evaluation:** Nothing explicit	**Collaboration:** Allow for a learning community of collaboration. **Motivation:** Nothing explicit **Reflection:** Encourage self- and peer reflection	Nothing explicit	Nothing explicit
10	Hammarlund et al. (2015)	External and internal factors influencing self-directed online learning of physiotherapy undergraduate students in Sweden: A qualitative study	**Course structure:** Apply the principle of constructive alignment; purpose and goals must be well defined. **Feedback:** Feedback must be of a good quality, and assessment feedback should be continuous and timely. **Resources:** Nothing explicit **Tasks:** A learning community should be established. **Evaluation:** Nothing explicit	**Collaboration:** Nothing explicit **Motivation:** Early communication and allowing students to make their own choices can promote motivation. **Reflection:** Nothing explicit	Peer collaboration should be encouraged	Nothing explicit

Table 4.1 continues on the next page→

TABLE 4.1 (Continues...): Synthesis of guidelines in the documents.

No.	Reference	Title	Guidelines			
			Course design	**Aspects of learning**	**Learning environment**	**Role of the facilitator**
11	Holland (2019)	Effective principles of informal online learning design: A theory-building metasynthesis of qualitative research	**Course structure:** Purpose and goals should be clearly defined; freedom, choice, control and active participation should be promoted. Students should be exposed to different perspectives. **Feedback:** Individual feedback must be provided. **Resources:** Access to information and expert knowledge should be provided. Resources should be of a high quality. **Tasks:** Quality tasks should be student-focused and should incorporate fun elements. **Evaluation:** Nothing explicit	**Collaboration:** A collaborative community should encourage knowledge construction and sharing. **Motivation:** Regular dialogue can assist with motivation. **Reflection:** Nothing explicit	Make provision for personalised and social spaces for knowledge sharing. Course components should be divided into smaller sections.	The lecturer should act as a facilitator and establish a social presence. The facilitator should act as a mediator and ensure that tasks are scaffolded.
12	Idros et al. (2010)	Enhancing SDL skills through e-SOLMS for Malaysian learners	**Course structure:** Freedom, choice and control should be built into the course. **Feedback:** Nothing explicit **Resources:** Nothing explicit **Tasks:** Nothing explicit **Evaluation:** Nothing explicit	**Collaboration:** Collaboration is useful to assist students to benchmark themselves against their peers. **Motivation:** Nothing explicit **Reflection:** Nothing explicit	Nothing explicit	Nothing explicit

Table 4.1 continues on the next page→

TABLE 4.1 (Continues...): Synthesis of guidelines in the documents.

No.	Reference	Title	Guidelines			
			Course design	**Aspects of learning**	**Learning environment**	**Role of the facilitator**
13	Intayoad (2014)	PBL Framework for enhancing software development skills: An empirical study for information technology students	**Course structure:** Nothing explicit **Feedback:** Nothing explicit **Resources:** Nothing explicit **Tasks:** Teacher-, peer- and self-assessments are encouraged. **Evaluation:** Nothing explicit	**Collaboration:** PBL can promote student collaboration. **Motivation:** The use of PBL and case studies can inspire and motivate students. **Reflection:** Nothing explicit	Nothing explicit	Facilitators can engage in discussions with students to support the learning process
14	Jimoyiannis and Tsiotakis (2017)	Beyond students' perceptions: Investigating learning presence in an educational blogging community	**Course structure:** Nothing explicit **Feedback:** Nothing explicit **Resources:** Nothing explicit **Tasks:** Peer-, self- and teacher assessments are encouraged. **Evaluation:** Nothing explicit	**Collaboration:** Nothing explicit **Motivation:** Nothing explicit **Reflection:** Encourage peer- and self-reflection	Nothing explicit	Nothing explicit

Table 4.1 continues on the next page→

TABLE 4.1 (Continues...): Synthesis of guidelines in the documents.

No.	Reference	Title	Guidelines			
			Course design	**Aspects of learning**	**Learning environment**	**Role of the facilitator**
15	Lee et al. (2017)	Self-directed learning and the sense-making paradox	**Course structure:** Nothing explicit **Feedback:** Nothing explicit **Resources:** Nothing explicit **Tasks:** Include elements of fun **Evaluation:** Nothing explicit	**Collaboration:** Collaboration and knowledge sharing are encouraged **Motivation:** Nothing explicit **Reflection:** Nothing explicit	Nothing explicit	Nothing explicit
16	Firat et al. (2016)	Web interface design principles for adults' self-directed learning	**Course structure:** Teaching strategies should allow for active participation and should encourage freedom, choice and control. **Feedback:** Nothing explicit **Resources:** A wide variety of resources should promote authentic and meaningful learning, for example, mobile technologies. **Tasks:** Tasks should be based on real-life scenarios. They should also be ill-structured, non-routine, open-ended, complex, diverse and should promote metacognition. **Evaluation:** Nothing explicit	**Collaboration:** A learning community should be created in which students can learn from one another, share knowledge and benchmark themselves against peers. **Motivation:** Entertainment elements should be included to increase motivation. **Reflection:** Peer and self-reflection are encouraged	The learning environment should promote collaboration and sharing. Time management tools should be included in the learning environment	Nothing explicit

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TABLE 4.1 (Continues...): Synthesis of guidelines in the documents.

No.	Reference	Title	Guidelines			
			Course design	**Aspects of learning**	**Learning environment**	**Role of the facilitator**
17	Meyer and Murrell (2014)	A national study of theories and their importance for faculty development for online teaching	**Course structure:** Nothing explicit **Feedback:** Nothing explicit **Resources:** Nothing explicit **Tasks:** Nothing explicit **Evaluation:** Learning theories that underpin the design should also be evaluated	**Collaboration:** Nothing explicit **Motivation:** Nothing explicit **Reflection:** Faculty members can change their perspectives about their role as facilitators in a BL environment through critical reflection	Nothing explicit	Nothing explicit
18	Pintz and Posey (2013)	Preparing students for graduate study: An eLearning approach	**Course structure:** Students should have the opportunity to manage their own time. **Feedback:** Feedback should be continuous and should reinforce and remediate. **Resources:** Nothing explicit **Tasks:** Tasks should relate to real life to stimulate student curiosity. Numerous practice opportunities should be provided. **Evaluation:** Nothing explicit	**Collaboration:** Nothing explicit **Motivation:** Nothing explicit **Reflection:** Nothing explicit	Time management tools should be incorporated.	Nothing explicit

Table 4.1 continues on the next page→

TABLE 4.1 (Continues...): Synthesis of guidelines in the documents.

No.	Reference	Title	Guidelines			
			Course design	**Aspects of learning**	**Learning environment**	**Role of the facilitator**
19	Rum and Ismail (2017)	Metacognitive support accelerates computer-assisted learning for novice programmers	**Course structure:** Nothing explicit **Feedback:** Teacher-, peer- and self-assessments are encouraged. **Resources:** Nothing explicit **Tasks:** Tasks should promote metacognition. **Evaluation:** Nothing explicit	**Collaboration:** Nothing explicit **Motivation:** Nothing explicit **Reflection:** Peer- and self-reflection are encouraged	Nothing explicit	Nothing explicit
20	Severova (2015)	Basic and additional Fine and Graphic Arts education in the situation of the Bologna Process: Problems and solutions	**Course structure:** Nothing explicit **Feedback:** Nothing explicit **Resources:** Nothing explicit **Tasks:** Tasks should not be ambiguous. **Evaluation:** Nothing explicit	**Collaboration:** Nothing explicit **Motivation:** Nothing explicit **Reflection:** Nothing explicit	Nothing explicit	A skill such as being able to create a simple website is an important skill for a facilitator in a BL environment
21	Shimizu et al. (2019)	Does blended PBL make Asian medical students active learners?: A prospective comparative study	**Course structure:** Nothing explicit **Feedback:** Nothing explicit **Resources:** Nothing explicit **Tasks:** Nothing explicit **Evaluation:** Nothing explicit	**Collaboration:** Nothing explicit **Motivation:** The use of PBL in BL environments enhances students' motivation and self-efficacy. **Reflection:** Nothing explicit	Nothing explicit	The facilitator should be sensitive to students' satisfaction and anxiety

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TABLE 4.1 (Continues...): Synthesis of guidelines in the documents.

No.	Reference	Title	Guidelines			
			Course design	**Aspects of learning**	**Learning environment**	**Role of the facilitator**
22	Sze-Yeng and Hussain (2010)	Self-directed learning in a socio-constructivist learning environment	**Course structure:** The structure should allow for students to identify their learning needs, plan strategies for learning and use resources. **Feedback:** Assessment feedback should come from peers, teachers and experts. It should also be informative and integrated into the course. **Resources:** Nothing explicit **Tasks:** Nothing explicit **Evaluation:** Nothing explicit	**Collaboration:** Nothing explicit **Motivation:** Nothing explicit **Reflection:** Nothing explicit	Nothing explicit	Nothing explicit
23	Wong et al. (2014)	Employing the TPACK Framework for researcher-teacher co-design of a mobile-assisted seamless language learning environment	**Course structure:** Students should be allowed to identify their learning needs, plan learning strategies and use resources. **Feedback:** Nothing explicit **Resources:** Include mobile technologies and Internet resources. **Tasks:** Tasks should be authentic and just-in-time tasks should be incorporated. **Evaluation:** Nothing explicit	**Collaboration:** Nothing explicit **Motivation:** Nothing explicit **Reflection:** Nothing explicit	The learning environment should be student-centred and make provision for personal and social spaces suitable for information sharing	The facilitator should use learning analytics to support students

Table 4.1 continues on the next page→

TABLE 4.1 (Continues...): Synthesis of guidelines in the documents.

No.	Reference	Title	Guidelines			
			Course design	**Aspects of learning**	**Learning environment**	**Role of the facilitator**
24	Yilmaz and Yilmaz (2019)	Impact of pedagogic agent-mediated metacognitive support towards increasing task and group awareness in computer supported CL	**Course structure:** Nothing explicit **Feedback:** Nothing explicit **Resources:** Nothing explicit **Tasks:** Nothing explicit **Evaluation:** Nothing explicit	**Collaboration:** Nothing explicit **Motivation:** Collaboration can increase student motivation. **Reflection:** Nothing explicit	Nothing explicit	Metacognitive support should be given to students
25	Zhang et al. (2010)	Deconstructing and reconstructing: Transforming primary science learning via a mobilised curriculum	**Course structure:** Nothing explicit **Feedback:** Assessment feedback should be from peers, teachers and experts. It should be timely, formative and integrated into the course. **Resources:** Resources should promote authentic and meaningful learning and should address challenges of cognitive processes. Mobile computing and cloud technologies should be incorporated. **Tasks:** Nothing explicit **Evaluation:** Nothing explicit	**Collaboration:** The collaboration should facilitate the construction of knowledge. They suggest problem-based and inquiry-based learning as suitable teaching strategies. **Motivation:** Nothing explicit **Reflection:** Nothing explicit	The learning environment should promote collaboration and knowledge building and should be student-centred	Nothing explicit

BL, blended learning; CL, cooperative learning; OERs, open educational resources; PBL, problem-based learning; SDL, self-directed learning; SOLMS, student-oriented learning management system; TED, technology, entertainment and design; TPACK, technology, pedagogy and content knowledge.

☐ Self-directed learning skills

Various skills are deemed important for a successful lifelong learner. Self-directed learning skills form part of this skills set. Some of the SDL skills that are mentioned in the corpus of documents include goal-setting, planning, problem-solving, time management, critical thinking, self-assessment and self-reflection.

Beckers et al. (2016) suggest practical guidelines to facilitate SDL skills relating to the use of e-portfolios. They suggest guidelines for different stakeholders at various levels. At the institutional level, they recommend professional development to assist facilitators in implementing SDL in their classrooms. They also say that institutional policy should be aligned with the educational goals that support SDL. At the curriculum level, the use of e-portfolios should be combined with assessment strategies that support collaboration and should be integrated with other teaching–learning activities. At the learning–process level, they suggest that students have access to suitable ICT facilities. At the personal level, students should be motivated and encouraged to use reflective practices to enhance their SDL. Finally, at the portfolio level, they encourage planning, goal-setting, task analysis and self-assessment.

Blended learning environments should encourage time management, planning and problem-solving (Bosch & Pool 2019; Hammarlund et al. 2015). When students are actively involved in the learning process within an authentic context, critical thinking can be promoted, resulting in deeper learning (Bosch & Pool 2019). Beckers et al. (2016) identified the following SDL skills that should be incorporated into the design of tasks (in their case, e-portfolio): the setting of goals, analysis of tasks, and planning and self-assessment. In addition, Zhang et al. (2010) incorporated a course design to promote SDL skills. Some of the skills they fostered included good questioning, designing investigations, collecting, analysing data and drawing conclusions. Jimoyiannis and Tsiotakis (2017) found that educational blogging creates the opportunity for students to promote various SDL skills.

These include deeper understanding, using shared resources in the construction of knowledge, exchanging and articulating ideas, critical thinking, collaboration and reflection.

The learning environment should encourage the skills of critical thinking and self-reflection (Ahram & Karwowski 2012; Auh & Sim 2019), which could promote SDL. The focus should not only be on developing students' self-direction but also on the facilitators. Meyer and Murrell (2014) emphasised the importance of the critical reflection of facilitators in the evaluation and redesign of their courses. Cremers et al. (2014) provided design guidelines based on the following components: diagnosing, setting goals, planning, monitoring and evaluating.

☐ Strategies to promote self-directed learning

Different strategies are associated with the promotion of SDL, such as PBL, collaborative learning, CL and project-based learning. In the studied documents, some of the strategies were the integration of various technologies, collaboration and PBL.

In BL environments, social networks can promote SDL by creating an interest in a learner to access and transfer information (Ahram & Karwowski 2012). Bayrak and Akcam (2017) suggested that computer simulations can be used for class preparation and homework activities without facilitator supervision, thereby enhancing learners' SDL. In addition, Beckers et al. (2016) suggested the incorporation of e-portfolios to support SDL. This can only be done with institutional approval and support. They explained that, when incorporating e-portfolios, and when students are not familiar with SDL, the students should be eased into the process and should not be overwhelmed with new strategies and information. Blogs are also suggested as a suitable tool to promote SDL and can also assist in promoting reflective practices (Ahram & Karwowski 2012; Jimoyiannis & Tsiotakis 2017). Furthermore, improved access to online educational materials allows students to engage in SDL (Sze-Yeng & Hussain 2010).

Hammarlund et al. (2015) proposed the following strategies, amongst others, to promote SDL within a BL environment: collaboration and communication that can assist in the transition from students being dependent to active learners who take responsibility for their own learning. Idros et al. (2010) emphasised that students should take responsibility for their own learning. Intayoad (2014) and Shimizu et al. (2019) suggested that PBL is a strategy that can promote SDL in students. Yilmaz and Yilmaz (2019) conferred that the manner in which a task is structured and students' task awareness and group awareness help to increase their motivation and metacognitive awareness.

Social technologies, in general, are said to provide students with an interactive and engaging environment that could enhance their SDL and learning experiences (Lee et al. 2017). Research conducted by Lee et al. focused on the use of YouTube™ and they highlighted that this technology allows student autonomy and control regarding what and how to learn. It also enables students to take initiative in their own learning (Lee et al. 2017). Also, according to Ahram and Karwowski (2012) and Sze-Yeng and Hussain (2010), web technologies like *Wikispaces*, *Moodle*, *Google Docs* and *Facebook* can assist in encouraging SDL. The use of these technologies encourage independence and creativity and allow students the opportunity to set personal learning goals, identify resources (both human and material) to select and implement suitable learning strategies, and appraise their learning outcomes (Sze-Yeng & Hussain 2010). Cremers et al. (2016) reported on various strategies that were built into a BL environment that assisted students to gradually become more self-directed, enabling reflexivity, connecting working and learning, individual coaching, and making personal professional development clear and transparent.

☐ Motivation as an aspect of self-directed learning

Motivation is a well-established concept in teaching and learning. In a student-centred approach, motivation is even more essential

than in a teacher-centred approach, and a large part of the responsibility lies with the facilitator. In the documents studied, motivation appeared in several instances.

When a BL environment is designed as a socio-constructivist learning environment, it creates the opportunity for, supports and motivates students to take initiative in following their learning goals (Sze-Yeng & Hussain 2010). Students who are intrinsically motivated are keen to explore information and learn autonomously (Bosch & Pool 2019). Rum and Ismail (2017) recommended SDL to increase student motivation and enthusiasm, as students can manage, choose and evaluate their own learning activities. According to Lee et al. (2017), motivation can be promoted by allowing students to search for educational videos.

The e-portfolios can allow for the integration of multiple types of resources and have proved to increase student motivation (Beckers et al. 2016). Beckers et al. (2016) further suggested that, in order to enhance motivation, scaffolding and coaching sessions should be used and that further research should be carried out to investigate the optimal use of e-portfolios to enhance SDL. Cremers et al. (2014) proposed the following guidelines to promote motivation: schedule work sessions on SDL, arrange opportunities for alumni to share their experiences of SDL with students, allow students the opportunity to implement their own learning goals and ensure diversity. Students who work collaboratively may also have increased motivation (Cremers et al. 2014). Hammarlund et al. (2015) stated that the facilitator should provide motivation by encouraging feedback when students experience performance anxiety and low self-efficacy.

☐ Designing for self-directed learning

After a thorough literature exploration, Cremers et al. (2014) suggested that motivation and emotional aspects should be taken into consideration when designing a learning environment. They suggested various design guidelines, namely, providing

multiple design cycles of SDL, providing educational support, being cognisant of aspects relating to emotion and motivation, treating SDL as a social learning process and ensuring the integration of SDL in the course design. These multiple design cycles include processes of diagnosing, setting goals, planning, monitoring and evaluation, which, according to Cremers et al. (2014), encompass self-directed lifelong learning.

Firat et al. (2016) suggest several design characteristics in BL environments that support SDL, namely, being user-focused, ensuring that variety is used, incorporating learning analytics, providing motivation and encouraging sharing. Sze-Yeng and Hussain (2010) underpinned the design guidelines for a learning environment that promote SDL by making students aware of their learning needs and encouraging self-assessment, and allowing them to plan, develop and apply their own learning strategies. The next section presents a summary of how SDL featured in the corpus of documents.

Summary of self-directed learning in the documents

The aspects relating to SDL that were identified in the documents are summarised in Table 4.2. These are presented in the three categories as discussed above, as well as in an additional category for other aspects that relate to SDL but do not resort under the other three themes.

Findings and conclusion

The first two research questions that guided this study were as follows: 'What does the literature reveal about design guidelines used to create effective blended learning environments?' and 'In what way do the design guidelines used in the literature promote SDL?' In 'Discussion of results', we presented the results that emerged from the systematic review that could address the

TABLE 4.2: Aspects of self-directed learning in the corpus of documents.

No.	Reference	Title	Aspects relating to SDL			
			SDL skills	**Strategies to promote SDL**	**Motivation as an aspect of SDL**	**Other aspects of SDL**
1	Addo-Atuah et al. (2014)	Instructional design and assessment: A Global Health elective course in a PharmD curriculum	Nothing explicit	Nothing explicit	Nothing explicit	SDL features in the course design in this study. However, the concept is not explored further in the document.
2	Ahram and Karwowski (2012)	Visual social network analysis: Effective approach to model complex human social behaviour and culture	They refer to the value of reflective practices in a BL environment.	Social networks and blogs are suggested as technologies that can promote SDL.	Nothing explicit	Nothing explicit
3	Auh and Sim (2019)	Uses of social network topology and network-integrated multimedia for designing a large-scale open learning system: Case studies of unsupervised featured learning platform design in South Korea	Critical thinking and self-reflection as aspects of SDL are evident in the study.	The study proposes social learning networks as platforms to promote SDL.	Nothing explicit	Nothing explicit

Table 4.2 continues on the next page→

TABLE 4.2 (Continues...): Aspects of self-directed learning in the corpus of documents.

No.	Reference	Title	Aspects relating to SDL			
			SDL skills	**Strategies to promote SDL**	**Motivation as an aspect of SDL**	**Other aspects of SDL**
4	Bayrak and Akcam (2017)	Understanding student perceptions of a web-based BL environment	Nothing explicit	Web-based BL platforms provide opportunities for students to explore various technologies to promote SDL. The article suggests that computer simulations can be used for class preparation to assist autonomous learning.	Nothing explicit	Nothing explicit
5	Beckers et al. (2016)	e-Portfolios enhancing students' SDL: A systematic review of influencing factors	They refer to Knowles' (1975) definition of SDL in the text. They facilitate the acquisition of SDL skills by using e-portfolios.	They suggest the use of e-portfolios is an effective strategy to promote SDL.	e-Portfolios allow for the integration of multiple types of resources and can be used to increase student motivation.	Nothing explicit.

Table 4.2 continues on the next page→

TABLE 4.2 (Continues...): Aspects of self-directed learning in the corpus of documents.

No.	Reference	Title	Aspects relating to SDL			
			SDL skills	**Strategies to promote SDL**	**Motivation as an aspect of SDL**	**Other aspects of SDL**
6	Bosch and Pool (2019)	Establishing a learning presence: Cooperative learning, blended learning, and self-directed learning	They suggest that time management, planning and problem-solving should be encouraged in BL environments. Active student involvement in An authentic learning context results in critical thinking and deeper learning.	Nothing explicit	Nothing explicit	They refer to an additional component of the CoI Framework, learner presence, which represents elements of SDL.
7	Cabi and Kalelioglu (2019)	A fully online course experience from students' perspective: Readiness, attitudes and thoughts	Nothing explicit	Nothing explicit	These authors highlight the importance of motivation to promote SDL.	Nothing explicit
8	Cremers et al. (2014)	Self-directed lifelong learning in hybrid learning configurations	They provide design guidelines and base them on the following components: diagnosing, setting goals, planning, monitoring and evaluating	An authentic learning environment has the potential to promote SDL.	They also refer to various guidelines on how to promote motivation and SDL.	Nothing explicit

Table 4.2 continues on the next page→

TABLE 4.2 (Continues...): Aspects of self-directed learning in the corpus of documents.

No.	Reference	Title	Aspects relating to SDL			
			SDL skills	**Strategies to promote SDL**	**Motivation as an aspect of SDL**	**Other aspects of SDL**
9	Cremers et al. (2016)	Design principles for hybrid learning configurations at the interface between school and workplace	They encourage reflexivity.	They include various strategies in a BL environment to promote SDL.	They suggest that collaboration in learning can increase motivation.	The authors refer to the definition of SDL as presented by Knowles (1975).
10	Hammarlund et al. (2015)	External and internal factors influencing self-directed online learning of physiotherapy undergraduate students in Sweden: A qualitative study	A BL environment encourages the following skills: time management, problem-solving, collaboration and communication.	They suggest the following strategies to promote SDL: collaboration and communication.	Encouraging feedback can assist with motivation.	Nothing explicit.
11	Holland (2019)	Effective principles of informal online learning design: A theory-building metasynthesis of qualitative research	Nothing explicit	Nothing explicit	Nothing explicit	This article presents a systematic review of online studies that referred to SDL in the context of adult learning.
12	Idros et al. (2010)	Enhancing SDL skills through e-SOLMS for Malaysian learners.	The design of a student-oriented BL environment which enhances SDL skills is discussed.	Nothing explicit	Nothing explicit	They emphasise how important it is that students take responsibility for their own learning.

Table 4.2 continues on the next page→

TABLE 4.2 (Continues...): Aspects of self-directed learning in the corpus of documents.

No.	Reference	Title	Aspects relating to SDL			
			SDL skills	**Strategies to promote SDL**	**Motivation as an aspect of SDL**	**Other aspects of SDL**
13	Intayoad (2014)	PBL Framework for enhancing software development skills: An empirical study for information technology students.	Nothing explicit	They suggest that PBL can be used as a strategy to promote SDL.	The use of PBL contributes to motivation.	The research makes use of PBL in a BL environment and they conclude that PBL can enhance, amongst others, SDL skills.
14	Jimoyiannis and Tsiotakis (2017)	Beyond students' perceptions: Investigating learning presence in an educational blogging community.	Blogs are used in a BL environment to promote SDL.	Reflective practices through the use of blogs are encouraged to promote SDL.	Nothing explicit	Nothing explicit
15	Lee et al. (2017)	Self-directed learning and the sensemaking paradox.	Nothing explicit	Social technologies like YouTube are explored and how these technologies allow students autonomy in their learning is discussed.	Allowing students to search for educational videos can promote motivation.	Nothing explicit

Table 4.2 continues on the next page→

TABLE 4.2 (Continues...): Aspects of self-directed learning in the corpus of documents.

No.	Reference	Title	Aspects relating to SDL			
			SDL skills	**Strategies to promote SDL**	**Motivation as an aspect of SDL**	**Other aspects of SDL**
16	Firat et al. (2016)	Web interface design principles for adults' SDL.	Nothing explicit	Nothing explicit	Nothing explicit	The authors suggest various design characteristics relating to the user interface, Resources and collaboration that support SDL.
17	Meyer and Murrell (2014)	A national study of theories and their importance for faculty development for online teaching.	They refer to the importance of critical reflection for facilitators.	Nothing explicit	Nothing explicit	Reference is made to the definition of SDL as set out by Knowles (1975).
18	Pintz and Posey (2013)	Preparing students for graduate study: An eLearning approach.	Nothing explicit	Nothing explicit	Nothing explicit	The course design that is referred to was based on a series of self-directed online modules. The participants in this study are reported to have liked the self-paced nature of the course.

Table 4.2 continues on the next page→

TABLE 4.2 (Continues...): Aspects of self-directed learning in the corpus of documents.

No.	Reference	Title	Aspects relating to SDL			
			SDL skills	**Strategies to promote SDL**	**Motivation as an aspect of SDL**	**Other aspects of SDL**
19	Rum and Ismail (2017)	Metacognitive support accelerates computer-assisted learning for novice programmers.	Nothing explicit	Nothing explicit	By promoting SDL, student motivation and willingness are increased.	Knowles' (1975) definition is referred to in the text. They stress the importance of students taking Responsibility for their own learning.
20	Severova (2015)	Basic and additional Fine and Graphic Arts education in the situation of the Bologna Process: Problems and solutions.	Nothing explicit	Nothing explicit	The participants' motivation and independence are reported to have increased after completion of the course.	The course design is reported to include aspects of SDL.
21	Shimizu et al. (2019)	Does blended PBL make Asian medical students active learners?: A prospective comparative study	Nothing explicit	The eLearning PBL course was designed to be student-centred and encouraged knowledge building to support students' SDL.	Nothing explicit	Nothing explicit

Table 4.2 continues on the next page→

TABLE 4.2 (Continues...): Aspects of self-directed learning in the corpus of documents.

No.	Reference	Title	Aspects relating to SDL			
			SDL skills	**Strategies to promote SDL**	**Motivation as an aspect of SDL**	**Other aspects of SDL**
22	Sze-Yeng and Hussain (2010)	Self-directed learning in a socio-constructivist learning environment.	Nothing explicit	They made use of web technologies to assist students in taking responsibility for their own learning.	A learning environment based on socio-constructivist principles can promote motivation.	The course design is based on the principles of socio-constructivist learning.
23	Wong et al. (2014)	Employing the TPACK Framework for researcher-teacher co-design of a mobile-assisted seamless language learning environment.	Nothing explicit	They made use of collaborative learning strategies.	Nothing explicit	A socio-techno-pedagogical learning environment that is authentic and contextualised is designed to promote self-directed, collaborative language learning.
24	Yilmaz and Yilmaz (2019)	Impact of pedagogic agent-mediated metacognitive support towards increasing task and group awareness in CSCL	Nothing explicit	They suggest PBL as a strategy to promote SDL.	They report that task structure, task awareness and group awareness prove to increase student motivation and metacognitive awareness.	Nothing explicit

Table 4.2 continues on the next page→

TABLE 4.2 (Continues...): Aspects of self-directed learning in the corpus of documents.

No.	Reference	Title	Aspects relating to SDL			
			SDL skills	**Strategies to promote SDL**	**Motivation as an aspect of SDL**	**Other aspects of SDL**
25	Zhang et al. (2010)	Deconstructing and reconstructing: Transforming primary science learning via a mobilised curriculum	The course design was structured in such a way that students could acquire SDL skills and develop habits that are transferrable. Some of the skills that are fostered in the process are good questioning, the design of investigations, the collection of data, data analysis and making conclusions.	Nothing explicit	Nothing explicit	Nothing explicit

BL, blended learning; CL, cooperative learning; CoI, community of inquiry; CSCL, computer supported collaborative learning; PBL, problem-based learning; SDL, self-directed learning; SOLMS, student-oriented learning management system.

above questions. To answer the third research question – what are the proposed guidelines that facilitators can use to design an effective BL environment? – we proceed to present the proposed guidelines in the next section. These were derived from a synthesis of the guidelines identified in the systematic review.

Proposed guidelines for designing blended learning environments

Table 4.3 presents a set of design guidelines for each category identified in the systematic review.

TABLE 4.3: Proposed guidelines for designing BL environments.

No.	Category	Design guidelines
1.	Course design	
	1.1. Course structure	• The purpose and goals of the course should be clearly defined and clearly communicated to students.
		• Adhere to the principle of constructive alignment.
		• Teaching strategies should be aligned with SDL strategies (e.g. time management, planning, freedom of choice, student control and active learning).
	1.2. Feedback	• Course design should expose students to varied perspectives.
		• Feedback should be individual and of high quality.
		• Feedback should reinforce and remediate.
		• Assessment feedback must come from various sources.
		• Assessment should be continuous and timely.
	1.3 Resources	• Resources should promote authentic and meaningful learning and promote interaction.
		• Resources should be of high quality and easily accessible.
		• Various types of resources should be used (e.g. the Internet, multimedia and OERs).

Table 4.3 continues on the next page→

TABLE 4.3 (Continues...): Proposed guidelines for designing BL environments.

No.	Category	Design guidelines
	1.4. Tasks	• Tasks should be authentic. • Tasks should be ill-structured, non-routine and open-ended. • Tasks should be student-focused. • Tasks should focus on quality rather than on quantity. • Tasks should be designed to establish a learning community and should be fun.
	1.5. Evaluation	• SDL skills should be evident in task design (e.g. collaboration and promoting metacognition). • Course evaluation and improvement should take place continuously. • Course structure and underpinning learning theories should be evaluated.
2.	Aspects of learning	
	2.1. Collaboration	A collaborative learning environment needs to be established to: • give students the opportunity to learn from one another • facilitate knowledge construction • make use of community support and resources • assist students to benchmark themselves against peers.
	2.2. Motivation	Motivation in a BL environment can be increased by: • collaboration • timely and consistent communication of information • allowing students to make their own choices • including entertainment aspects • using variable and mobile components • social networking • scaffolding • using PBL and case studies.
	2.3. Reflection	• Peer and self-reflection should be used for students. • Facilitators should reflect critically on course design and teaching aspects.

Table 4.3 continues on the next page→

TABLE 4.3 (Continues...): Proposed guidelines for designing BL environments.

No.	Category	Design guidelines
3.	Learning environment	• The learning environment should promote collaboration and knowledge building. • The learning environment should encourage critical thinking and self-reflection. • Time management tools should be used. • The learning environment should make provision for personalised and social learning. • Multimedia design aspects should be included. • Course content should be presented in small sections. • The learning environment should be authentic and should encourage SDL.
4.	Role of the facilitator	The facilitator should: • be available and accessible • plan and be well-prepared • ensure a social, teaching, cognitive and learning presence • act as a mediator on social media platforms • ensure that scaffolding takes place • be sensitive to students' anxiety • provide students with individual coaching and feedback.

BL, blended learning; OERs, open educational resources; PBL, problem-based learning; SDL, self-directed learning.

A self-directed blended learning environment

The final research question was the following: 'How can an effective self-directed BL environment be designed?' In this section, we make recommendations on how to create a self-directed BL environment (see Table 4.4). This is done by incorporating the literature relating to SDL with the proposed guidelines in 'Proposed guidelines for designing blended learning environments'.

TABLE 4.4: Proposed recommendations for a self-directed BL environment.

No.	SDL Category	Recommendations
1	SDL skills	• Institutional policy should support SDL. • Facilitators should enrol for professional development on SDL. • The learning design should encourage the use of SDL skills (e.g. planning, goal-setting, task analysis and self-assessment). • Encourage critical thinking and reflection.
2	Strategies to promote SDL	• The use of social technologies can create interest in students. • The use of various web technologies can create independence and creativity (e.g. Wikispaces and Facebook). • Varied use of technologies (e.g. blogs and computer simulations). The following strategies can promote SDL: • PBL • collaborative learning • CL • Project-based learning
3	Motivation as an aspect of SDL	• To increase motivation, allow students to manage, choose and evaluate their own learning. • Scaffolding and coaching sessions can increase motivation. • Facilitators should provide encouraging feedback. • Incorporate a variety of learning tasks and resources. • Make learning fun.
4	Designing for SDL	• Authentic tasks and learning environments can promote SDL. • A BL environment should be user-focused. • Incorporate learning analytics. • Encourage sharing. • Make students aware of their learning needs. • Encourage self-assessment. • Allow students to plan, develop and apply their own learning strategies.

BL, blended learning; CL, cooperative learning; SDL, self-directed learning; PBL, problem-based learning.

Conclusion

The purpose of this chapter was to probe and synthesise design guidelines relating to self-directed BL environments. It scrutinised the past 10 years' literature on design guidelines in BL environments. Through a systematic literature review, we provided a synthesis of guidelines from the corpus of documents regarding designing effective BL environments. A set of clear and helpful guidelines and recommendations on creating a self-directed BL environment was provided. These guidelines and recommendations focus on equipping facilitators to effectively design their own self-directed BL environments within the wider context of multimodal learning. One of our main reasons for using a systematic review was to produce an unbiased summary of the literature to draw comprehensive and vigorous conclusions relating to design guidelines for self-directed BL environments. We believe that this chapter has provided a true representation of the current literature and would equip facilitators to assist their students to acquire both 21st-century and SDL skills.

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Chapter 5

Diffractive pathways in self-directed multimodal learning: Experiences from Botswana and South Africa

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Abstract

This chapter reports on a comparative autoethnographical study comparing experiences of self-directed multimodal learning at two institutions of HE in a Southern African context. The comparison aims to explore lived experiences in the context of a long history of distance education versus the context where this approach has recently been implemented in addition to face-to-face instructions. Through this process of self-reflection, diffractive pathways are explored with regard to how both distance and contact modes can influence each other in blended spaces within the context of Botswana and South Africa. With diffractive practices, similar to diffractive methodology, the focus is on using one text (in this instance, experiences of a distance mode of delivery) to interpret another totally different but intersecting text (the contact experience).

Keywords: Blended learning; Diffraction; Diffractive methodology; Lecturer reflection; Diffractive pathways; Self-directed multimodal learning; Teaching presence; Institutional multimodality; Instructional multimodality.

Introduction

This chapter reports on autoethnographical reflections of the simultaneous implementation of a leadership programme at the Botswana Open University (BOU) and an Afrikaans-language module as part of a Bachelor of Education degree at the NWU, Potchefstroom, through face-to-face and online modalities. To this end, the researchers 'offer complex, insider accounts of sensemaking and show how/why particular experiences are challenging, important, and/or transformative' (Adams, Jones & Ellis 2015:27) in the two different multimodal contexts (cf. ch. 1). The presence of different modes of delivery at universities should be regarded within a context where certain African and international universities have increasingly added distance delivery (cf. ch. 7 & ch. 8) to their more traditional contact offerings (Nage-Sibande & Van Vollenhoven 2012:33–34). Furthermore, Balfour et al. (2015:2–3) emphasise that

an increase in the number of students necessitates the application of ODL and other hybrid strategies. In this chapter, the focus is on multimodality at both instructional and institutional levels (cf. ch. 1). Two groups of students had to cover the same outcomes, assessments and content, despite their distinctly different contexts.

As a method of analysis, diffraction is employed to 'study the entangled effects differences make' (Barad 2007:73). Bozalek and Zembylas (2018) note how diffractive analysis has been used in different studies, specifically in education contexts. Moreover, the differences discussed in this chapter are, in terms of contact and distance, educational modes of delivery, as well as in terms of voices of the two authors of this chapter. The choice to approach this research in an autoethnographical mode could be substantiated by the following sentiments by Adams et al. (2015:38): 'We try to contribute to existing research and theory by using personal experience to describe, understand, and challenge cultural practices and beliefs'. Hence, the focus is on the personal experiences relayed by the two researchers. Similarly, Bezuidenhout (2013) successfully employed an autoethnographical methodology to explore a journey from being a lecturer in a conventional university to functioning in an ODL environment. The methodology, therefore, seems to be apt as it has also been used in a similar context.

The following research question served as an impetus for the research: what is the nature of the diffractive pathways of two lecturers within self-directed multimodal learning contexts at universities from Botswana and South Africa?

To answer this research question, a literature review is provided on the concepts of BL, multimodal learning and SDL. Furthermore, regarding the research methodology, both autoethnography, as a research design, and diffraction, as a method of analysis, are discussed. In addition, more information on the two different contexts is provided, whereafter the process of data collection and analysis is described. Finally, some reflections and diffractive pathways in terms of the two experiences are discussed, followed by a synthesis and recommendations.

Literature overview

Blended learning

In order to be effective, institutions can make BL (cf. ch. 2, ch. 4, ch. 6, ch. 9 & ch. 10) an integral part of their course design and development. According to O'Halloran et al. (2018:94): '[d]igital technology provides access to resources extending beyond the boundaries of the classroom'. This could allow for more interactive and engaging content as it will be designed such that it is presented using multiple modalities. This could also facilitate different learning strategies to take care of the diverse students enrolled in the institution. Blended learning has (as stated by Sriarunrasmee, Techataweewan & Mebusaya 2015) over time been employed:

> [/]n classrooms to nurture the skills of students in the 21st Century … involves using technologies as learning tools where learners are able to directly access knowledge by themselves instead of just attending classes. (pp. 1564–1565)

Importantly, Balfour et al. (2015:5) emphasise how difficult it is to define BL. However, for the sake of this chapter, the concepts of BL and multimodal learning are delineated.

In this chapter, BL is regarded as 'a combination of traditional face-to-face and online instruction' (Graham 2013:334). However, it is evident from the literature that the term is used for different purposes in different contexts and that it can relate to the mixing of instruction, modality or even instructional method, which can also involve different models based on the nature of either face-to-face or online engagement (Graham 2013). Relevant to this context, the concept of *online education* is defined by Picciano (2019:20) as 'all forms of teaching and learning using the Internet'. Importantly, Picciano (2019) is of the following opinion:

> [*T*]hat online education is not just an evolution of distance education; it is a distinct entity that has provided new instructional models for all education and not just for students who study at a distance. (p. 20)

For the purpose of this chapter, BL is confined to the blending of in-person face-to-face classroom interaction together with an

online component. As such, this term links up with the instructional aspect of multimodality (cf. ch. 1).

Different circumstances require different approaches and blends in terms of modalities. In this regard, Picciano's (2019:57) *blending with pedagogical purpose* model is a useful guide. He notes that '[t]he model also suggests that blending the objectives, activities, and approaches within multiple modalities might be most effective for and appeal to a wide range of students'. However, to describe the different types of modalities relevant to educational contexts, the concept of multimodal learning is also pertinent to this discussion.

Multimodal learning

Broadly speaking, multimodal learning relates to the mixing of different modes within an educational context. The level of multimodality in this chapter relates to institutional multimodality (cf. ch. 1); hence, the concept of distance education is also relevant. In this regard, the focus is on the use of different modes of presentation and delivery in education towards achieving multimodal learning (cf. Olivier 2018:7, 2020; Redelinghuys 2017:59). According to Picciano (2019:30), distance education has a long history with a focus 'on the available communications technology of a given time' and, as such, adaptations in terms of modes would be a logical development within distance education. In addition, O'Halloran et al. (2018) observe the following:

> [*I*]n the digital age, tools of communication that require familiarity with multimodal technologies, such as audio, video and text chat, have begun to permeate a wide variety of learning contexts. (p. 95)

Yet, despite the fact that multimodality has (O'Halloran et al. 2018):

> [*A*]lways been part of learning environments, whether mediated face-to-face or through online technologies, digital environments present very different experiences for learners and teachers than those encountered in traditional face-to-face settings. (p. 95)

This is also relevant in contexts where more than one mode of delivery is used.

As was alluded to in the previous section, multimodal learning relates to the concept of BL, as it involves learning through face-to-face and online modes; but the former pertains to the institutional and the latter to the instructional aspect. The focus in this chapter is, however, on a mixed means of delivery using a combination of learning materials to facilitate a better understanding and retention of content by students (Sankey, Birch & Gardiner 2010). A multimodal learning approach has proved to be effective in producing the 21st-century learners who need to be 'proficient in interpreting text, discourse to socio-culture … based on reason and intervention supported by data and arguments' (Firmansyah 2018:1). The approach further 'focuses on how meaning is made through the use of multi-communicative models' (Chen & Fu 2003).

In the South African context, it is significant that even the Department of Higher Education and Training is acknowledging that there is not necessarily a clear distinction between contact and distance education and that 'there is now a convergence of these two modes of delivery' (Balfour et al. 2015:10). Within the African context, the concept of dual or multimodal HEIs is also common. According to Nage-Sibande and Morolong (2018:498): 'In a dual-mode university setup, there are two modes of delivery operating side by side' and more specifically, there could be a 'campus-based face-to-face mode and the ODL mode', which is also a focus of this chapter. For the purposes of this chapter, the term *multimodal* is used, as in both the mentioned modes, there could be even further uses of different interactional and instructional modes (cf. Olivier 2020).

Within an institutional multimodal context, certain elements of the instructional multimodality or BL are unique in terms of communication. In this regard, Bezemer and Kress (2016:37) observe that, in online communication, individuals – whether lecturers or students – could act in different spatio-temporal frames because communication does not happen synchronously or in the same space, as they can be 'in different locations, and their sign-making was differently organized temporally'. In such

contexts, lecturers and students act as sign-makers. According to Bezemer and Kress (2016:37), they can be 'sign-makers selecting modes for making signs and sign complexes that they believe are apt for their rhetorical purposes, given the affordances of the modes chosen'. Consequently, for effective communication, and even learning, a number of appropriate modes of sign-making need to be available, the sign-makers must be able to use them and ultimately be able to select the relevant mode as necessary.

The concept of interest underlies the process of sign-making. Bezemer and Kress (2016:37) state that the interest of sign-makers emanates from 'the text-maker's social, cultural, affective and material experiences and present position in the world, shaping his or her attention to and engagement with the world'. Therefore, no action within a multimodal or BL context can be separated from the wider context of the individuals involved. As such, the listed experiences and dispositions inform or impede the sign-making process. Within the context of this chapter, the interest of sign-making students is also varied as they access the learning space, not only physically but, in some cases, also virtually from various contexts.

As stated earlier, the concept of institutional multimodality relates to the combination of contact and distance modes. As such, the implementation of both modes at a single institution could also lead to a disconnecting between lecturers functioning in either mode, or even negative perceptions heralded by different lecturers. For example, Brown, Lewin and Shikongo (2014) found some negativity from contact lecturers towards ODL in a study in which they explored the attitudes and perceptions of lecturers at a Namibian university.

According to Kress (2003:5), technology can contribute to using more than one mode; these 'naturalised uses of modes will lead to greater specialisation of modes: affordances of modes will become aligned with representational and communicative need'. Social practices are, therefore, translated into technological

practices and mediums. One of the desired outcomes of multimodal learning is students' ability to develop potential for self-study, which enables them to create their own knowledge and access information. Consequently, the concept of SDL is also relevant to this chapter.

Self-directed learning

Self-directed learning is defined as an approach to learning in which students take charge of their learning (cf. Knowles 1975:15). Knowles (1975) describes the phenomenon as follows:

> [*A*] process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes. (p. 18)

The students remain at the centre of their learning and delivery of instructions. They are able to share experiences about their learning. This is made possible by the fact that most of the students who embrace this approach have the same interest (Brockett & Hiemstra 1991).

From the description above, it is evident that the concept of self-directedness is not only relevant for any educational context but it is also particularly appropriate in distance and multimodal contexts. Such contexts require a specific learner-centredness and abilities to take charge of learning in situations where students feel isolated. In addition, the student needs to be responsible, not only for the process, but also for the resources involved. To this end, in this chapter, the concept of self-directed multimodal learning is used, and, consequently, in addition to the varied needs with regard to the multimodal nature of the learning taking place, the researchers also considered aspects of self-direction.

The next section deals with relevant research methodology in order to provide more details about the route the researchers followed to open up some diffractive pathways.

Research methodology

Research design

The research in this chapter involves autoethnography as a means of data collection and draws on diffraction as a means of data analysis. According to Adams et al. (2015:21), '[a]utoethnography is a qualitative method – it offers nuanced, complex, and specific knowledge about particular lives, experiences, and relationships rather than general information about large groups of people'. Importantly, Savin-Baden and Tombs (2017:60) emphasise that autoethnography 'see identity and personal stance as central to the research process, portrayal and presentation'. This chapter deals with experiences and reflections by and about the two researchers.

The research presented in this chapter is situated within the constructivist paradigm, as for the researchers in this context, '[r]eality and knowledge reside in the minds of individuals' and '[k]nowledge may be uncovered by unpacking individual experiences' (Savin-Baden & Tombs 2017:42). Cohen, Manion and Morrison (2018:23) state that, within this paradigm, 'people actively and agentically seek out, select and construct their own views, worlds and learning, and these processes are rooted in sociocultural contexts and interactions'. Through the reflections and consequent analysis in terms of and towards diffractive pathways, new insights are uncovered about the lived experiences of the two authors of this chapter. However, the researchers are also upfront that their views are limited to their lived experiences and that in no way would this research apply to others in the same context or have any generalisable quality.

As autoethnographical researchers, research ethics also need to be considered. Ethical considerations are important and imply 'acknowledging and meeting the ethical standards of respect for persons, beneficence, and justice when we use and write about personal experiences', as well as 'seeking consent, limiting risks and maximising benefits, and protecting participants' (Adams et al.

2015:57). Because of the nature of the research, the confidentiality of the primary researcher-participants cannot be assured; however, care has been taken to exclude any personal information or specific details that might identify others functioning within the research contexts.

Diffraction

The intersections of diverging experiences are fundamental to this discussion. The phenomenon of diffraction is used as metaphor and semantic key in this chapter. Barad (2007:28) describes *diffraction* as 'the way waves combine when they overlap and the apparent bending and spreading out of waves when they encounter an obstruction'. With diffractive practices, the focus – similar to diffractive methodology – is on using one text (in this instance, experiences of a distance mode of delivery) to interpret another totally different but intersecting text (the contact experience). Here, the 'superposition or interference of waves' (Barad 2007:79) becomes interpretable entangled experiences.

As was stated at the start of the chapter, the data used for this research emanated from reflections of the two researchers. This choice also makes sense in the light of Adams et al.'s (2015:29) following description: 'Reflexivity consists of turning back on our experiences, identities, and relationships in order to consider how they influence our present work'. However, within the context of diffraction, the concept of reflection needs to be interrogated critically. For Barad (2007:86), reflexivity is regarded as 'critical scholarly practice that aims to reflect on, and systematically take account of the investigator's role as an instrument in the constitution of evidence'. Donna Haraway (cited in Barad 2007:29) suggests that 'diffraction can serve as a useful counterpoint to reflection: both are optical phenomena, but whereas reflection is about mirroring and sameness, diffraction attends to patterns of difference'. The focus, as in this study, is on entanglements and differences, rather than similarities, and

emphasises 'difference by breaking open the data' (Mazzei 2014:743). In addition, Bozalek and Zembylas (2018:48) concur that 'reflexivity remains caught up in sameness because of its mirroring of fixed positions, whereas diffraction is specifically attuned to differences and their effects in knowledge-making practices'. So, within this chapter, the term *reflection* just refers to the act of recalling experiences, whilst *diffraction* is specifically used for the analysis and interpretation of these recollections.

Practically, 'diffraction involves reading insights through one another in ways that help illuminate differences as they emerge: how different differences get made, what gets excluded, and how those exclusions matter' (Barad 2007:30). Importantly, as two researchers are involved in this chapter, another level of diffraction is evident, as this could potentially also allow for 'reading insights through one another in attending to and responding to the details and specificities of relations of difference and how they matter' (Barad 2007:71). According to Bozalek and Zembylas (2018:47), diffraction is 'a process of being attentive to how differences get made and what the effects of these differences are'.

An important aspect of diffraction is the concept of entanglements, which, in this chapter, refers to modes of delivery, as well as researchers. In this regard, Barad (2007:74) observes that 'entanglements are highly specific configurations and it is very hard work building apparatuses to study them, in part because they change with each intra-action'. Furthermore, Bozalek and Zembylas (2018:48) observe that '[d]iffraction is thus predicated on a relational ontology, an ongoing process in which matter and meaning are co-constituted'. This process of co-constitution of meaning took place in two distinct contexts in Botswana and South Africa.

Context

This chapter reports on experiences at two different universities: one an ODL university in Botswana, and another multi-campus university providing contact and distance education in South

Africa. In autoethnographic research, it is important to start where the researcher-narrators find themselves in the 'story' (Adams et al. 2015). Consequently, more information is provided on the research contexts.

The first geographical context for this chapter is the country of Botswana. According to Nage-Sibande and Morolong (2018:495), in this country, 'provision of higher education and training is regarded as one of the most critical pre-requisites for sustainable development', hence ODL has also evolved steadily in this context. The BOU – formerly Botswana College of Distance and Open Learning (BOCODOL) – was commissioned as a distance and open learning university in December 2017. This research should also be considered within a wider Botswana ODL context (cf. Biao & Maruatona 2015; Nage-Sibande & Van Vollenhoven 2012; Tladi & Seretse 2018) and its government's 'aspiration for emergence of knowledge-based society' (Jaiyeoba & Iloanya 2019:158). In this regard, Biao and Maruatona (2015:101) also observe that 'the education sector in Botswana [has] expanded exponentially during the second half of the twentieth century through the implementation of the two national policies on education'. Furthermore, Jaiyeoba and Iloanya (2019) state the following:

> [/]n Botswana, the burgeoning demand for ODL institutions including Botho University and Botswana Open University to provide opportunities to learners to pursue higher education has shifted the attention of stakeholders and interested parties to the importance of quality. (p. 160)

In this context, Nage-Sibande and Morolong (2018) agree:

> [*F*]or Botswana, as is the case in most African countries, ODL is regarded as an important alternative for the expansion of access to higher education for both youth and adults. (p. 500)

According to Biao and Maruatona (2015; cf. Tladi & Seretse 2018:3):

> [/]n the early part of 2013 the [*Botswana*] government sent a bill to parliament, asking it to approve the upgrading of the only government college of distance learning, the Botswana College of Distance and Open Learning, into an open university, to be known as Botswana Open University. (p. 101)

During BOU's existence as BOCODOL, the institution offered study programmes through the ODL mode as its core mandate. This mode of delivery involves separation of the facilitator and the student. Isolation is the key disadvantage of this mode of delivery. During its transformation phase to an open university in December 2017, BOU continued to increase its programmes of study for HE, which continued to be offered purely through the ODL mode. This, however, changed when the Master's in Educational Leadership (MEdEL) programme was introduced in 2014. This programme was presented through a blended mode of delivery. The first two cohorts enrolled in July 2014 and July 2015 and were registered in the Gaborone region, where delivery was supported by face-to-face support sessions. However, from July 2016, the programme was rolled out at Maun region, a town located over 1000 km from Gaborone, which is the capital city of the Republic of Botswana. The department enrolled almost 60 students between the Maun and Gaborone regions between July 2016 and July 2018. These two groups of learners were exposed to similar content and assessment. As Maun is far from the headquarters, where lectures and overall coordination of the programme took place, the Department offering the programme decided to offer the MEdEL programme virtually in the Maun region. Students were given the same materials and everything else remained the same. However, the virtual class study followed the live presentations of face-to-face class through interactive whiteboards (IWBs).

The tutorial support arrangement involved tutors coming to the Gaborone region for face-to-face delivery and support. Here, the tutors and students were in the same place at the same time. The same content was shared with Maun region students through the IWB technology at their regional centre. Provision was made for those who could not make it to the regional offices to connect to their virtual class through Zoom and Google Hangouts from their distinct locations. This arrangement, however, has not been easy because of problematic internet connectivity – the success of virtual delivery relies on steady

internet connectivity. The virtual delivery for the Maun cohort was further interrupted by power cuts, common in most parts of Botswana's towns and villages.

In South Africa, the focus was on NWU. The NWU is a residential university comprising three campuses located in Mahikeng, Potchefstroom and Vanderbijlpark, which are located respectively in North West and Gauteng provinces. However, this multi-campus university also has an established distance education mode. The NWU, in its current form, was founded in 2004 after the merger of Potchefstroom University for Christian Higher Education, the University of the North West, and the Sebokeng Campus of Vista University (De Klerk & Du Pisani 2005; Pretorius 2017:14, 18). This merger was part of the South African government's attempt to eliminate segregation at the HE level based along racial lines (Ministry of Education, Republic of South Africa 2002; Pretorius 2017:22–29). The context of this reflection within the NWU relates to the more recent simultaneous implementation of both contact and distance modalities within the university's faculty of education. At NWU, the School of Continuing Teacher Education was established in 2004 to provide for additional training for teachers by means of a distance mode, followed by the establishment of the unit for open distance learning (UODL) in 2013 (Combrinck, Spamer & Van Zyl 2015:101; Esterhuizen 2012:1–2; Mdakane 2011:14; Pretorius 2017:213; Schutte 2018:18–19; Taylor 2018:7).

Different aspects concerning distance learning at NWU have been researched and reported widely in the literature (Combrinck et al. 2015; Dreyer 2015; Du Toit 2011; Du Toit-Brits 2015; Esterhuizen 2012; Geduld 2011, 2013; Kruger 2010, 2015; Kruger, De Witt & Van Rensburg 2015; Laubscher 2010, 2017; Mdakane 2011; Redelinghuys 2017; Schutte 2018; Spamer & Van Zyl 2013; Taylor 2018; Van Deventer & Van de Merwe 2011; Van Niekerk 2015). However, limited research has been conducted on comparing the contact and distance offering of similar modules at this institution.

Fundamental to the distance delivery at this institution are the use of IWBs (Combrinck et al. 2015; Dreyer 2015; Kruger 2015;

Van Niekerk 2015) and the number of study centres in South Africa and Namibia (Dreyer 2015:4; Laubscher 2017:13; Pretorius 2017:213; Redelinghuys 2017:7–8; Taylor 2018:8). A number of multimedia studios on the campuses, with IWBs and recording devices, are used to facilitate online broadcasts and recordings (Combrinck et al. 2015:102; Kruger 2015:9).

Data collection

Autoethnography entails the investigation of the researcher's own experience by means of analysis of a personal narrative or reflection (Adams et al. 2015). Moreover, Adams et al. (2015:1) state that autoethnography relates to 'stories of/about the self told through the lens of culture' and that these 'stories are artistic and analytic demonstrations of how we come to know, name, and interpret personal and cultural experience'. According to Cohen et al. (2018:297), 'autoethnography places the self – the researcher – at the centre of research about himself/herself in a social context'. Furthermore, according to Cohen et al. (2018), it:

> [*R*]ecognizes the unavoidable influence of the researcher on the research process, and raises reflexivity … subjectivity, emotionality, personal characteristics of the researcher and autobiography to new prominence in the research. (p. 298)

This inquiry also allows the researchers to use self-reflection and writing to explore anecdotal and personal experiences and connect to wider cultural, political and social meanings and understandings.

The data collection involved our retrospective systematic reflection of two parallel modules presented through different modes of delivery. To this end, we wrote down our reflections independently, after which we made use of Google Docs to share our experiences and collaboratively explore common trends and, ultimately, diffractions in order to reach a conclusion. Prior to the data collection, we had a face-to-face discussion about the process but not the data. The presentation and analysis of the data took place afterwards by means of Google Docs.

In this chapter, we provide an overview of our own practices and reflections/diffractions recorded over the period of one year (in South African university) and two years (in Botswana University). In this process, according to Cohen et al. (2018):

> [*T*]he researchers review personal experiences reflexively, usually retrospectively, and from this analyses distils key issues about that autobiography from an ethnographic stance, i.e. what the personal experiences say to the reader about culture, values, relations and society in relation to the topic of research interest. (p. 298)

The next section deals with the analysis of these experiences.

Data analysis

The interpretation of entangled strands of information through diffraction is a key to the analysis of the reflections by the two researchers. Considering diffraction as methodology, Barad (2007) notes:

> [*A*] diffractive mode of analysis can be helpful in this regard if we learn to tune our analytical instruments (that is our diffraction apparatuses) in a way that is sufficiently attentive to the details of the phenomenon we want to understand. (p. 73)

And Barad (2007):

> [*A*]t times diffraction phenomena will be an object of investigation and at other times it will serve as an apparatus of investigation. (p. 73)

This is also true for this chapter.

Representation and portrayal are two essential aspects for the presentation of data. Savin-Baden and Tombs (2017) describe representation as 'the way in which a research provides warranted accounts of data collected', whilst portrayal entails:

> [*T*]he means by which the researcher has chosen to position people and their perspectives in terms of the use of images, quotations and positioning in a social and political context. (p. 221)

In order to adhere to the requirements of sound representation, recollections are presented by the two researchers in a narrative format, whilst, in terms of portrayal, care is taken to provide

information on the research context, as well as offering an in-depth interpretation and synthesis of data analysis. Thick and detailed descriptions are provided to ensure the trustworthiness of the data.

The following two sub-sections present two separate reflections by the individual researchers involved.

Botswana Open University, Botswana

For the purpose of this chapter, practices and reflections of BOU over the last two years were analysed. These were for the 2016–2017 and 2017–2018 academic years. The BOU academic year starts in July of every year and ends in June of the following year. For the MEdEL programme, students cover two courses per semester, which are assessed through assignments, online discussion forums and chats. In the study, two groups of students were exposed to the same programme delivered simultaneously through a virtual, blended class and scheduled face-to-face support sessions. Students enrolled in these cohorts showed the following features:

The face-to-face contact cohort:

- these students came in for consultation with academics at headquarters
- attended face-to-face sessions
- had the opportunity to interact with both programme facilitators and lecturers
- had face-to-face discussions with both peers and facilitators during support sessions.

The virtual, distance learning cohort:

- was challenged with group work during face-to-face support sessions
- missed in-depth discussions during face-to-face sessions
- for them, communication was generally never easy during sessions and even discussions got constantly disrupted because of poor network connectivity

- because of the challenges they continually face, the virtual distance learning cohort devised means through which they could support one another, and they created learning communities to engage and interact with each other outside scheduled support sessions
- some individual learners developed the rare skills of SDL. This is where individual students, of their own volition, came up with strategies to meet their study needs
- high retention was observed because of constant interaction, and the Maun virtual learning cohort devised means to deal with their isolation by engaging with each other through varied means as they created WhatsApp groups, and the more innovative ones created Skype accounts to be constantly in touch with their peers.

I believe that the BOU students who attended virtual classes had over time proved to be more autonomous than their peers in the face-to-face group. The presentations in virtual classes were neither varied nor anyway different from face-to-face classes. It is for this reason that the virtual group devised means to fill in the gaps to facilitate learning even beyond the scheduled sessions. The more assertive students from the virtual group engaged with the rest of group members and even created online discussion communities. Over time, this helped to improve performance – hence, the Maun region, with virtual groups, has always outperformed the Gaborone region, which has face-to-face classes.

At BOU, over time, it further became apparent to me that the two groups doing the MEdEL programme had different approaches to autonomy, and as such, demonstrated different levels of SDL. The Maun region cohorts, who used IWBs, proved to be more autonomous and created means to further interact with each other. Of their own volition, they created WhatsApp groups to reach out to one another and supported each other during their study. They shared resources with others to facilitate learning on their own. This was indicated by their sharing of resources, such as library texts, which were never enough. These

students with the required texts would then print out relevant sections of the books and share them with their colleagues, who would more often be in very remote areas of the country. Maun region students, in both cohorts, demonstrated a much more developed, and continued to demonstrate, SDL than the Gaborone cohort and continued to outperform them.

In addition to the Botswana experiences, this chapter also deals with the experiences of another researcher in the South African context.

North-West University, South Africa

Considering the data related to the NWU, the focus is on the experiences of the researcher with two parallel modules during 2017. These two modules were first-year modules focusing on an introduction to the Afrikaans-language curriculum (February to June) and language norms (July to October) for language teachers in the senior and further-education and training phases. I was aware that in presenting the reflection here, very dynamic situations, actions and systems were reduced to more general recollections. However, the focus was specifically on the challenges experienced and the changes effected in different classes. I was also keenly aware that in-depth empirical research – which could include the learning content and student observations and views – would inform the findings even more. However, owing to the nature of the research methodology used in this chapter and the specific focus on the lecturer's experience, a specific perspective is presented.

The key impetus for the reflections presented here is the fact that the same content had to be presented simultaneously through contact and distance modalities. I am cognisant that the issue of consistency is problematic and even becoming a greater issue as even campus alignment is promoted at this specific institution where the same modules are also presented at different sites of delivery. Consequently, ways in which equivalence between the delivery of modules through different modes and at different sites of delivery could be explored empirically in future.

In terms of this reflection, it is important to take note that there was quite a difference in terms of student numbers and contact time. This context is summarised in Table 5.1.

Clearly, the amount of time allocated to face-to-face and broadcast lessons is not really comparable. Yet, this was in line with the way in which contact and distance classes were approached at this institution at this specific time. Interestingly, with regard to these modules, the distance classes were equivalent to respectively 11% and 13% of the class time of contact students. In previous research within this institution, a need was expressed to increase lesson time for distance students (Taylor 2018:166), and I agree with this sentiment.

My initial approach to two classes in the different modes of delivery was to keep the content, activities and assessments as close as possible to each other. Importantly, I aimed at creating similar experiences for the two sets of students. However, it was clear from the first lesson that it would be impossible. First the available online contact time with the distance module was limited in comparison with the contact module. Consequently, time was spent on sharing as much information as possible. There was just no time to establish a rapport, getting to know students, or even engaging critically with the needs of students. In retrospect, these issues could have been dealt with in an asynchronous manner prior to the starting of classes. However, it should be noted that because of specific administrative circumstances, I was only informed that I would be teaching this specific distance group a week prior to the commencement of distance classes.

TABLE 5.1: Student numbers and contact time for contact and distance classes at the North-West University.

Semester	Delivery	Number of students	Number of lessons	Class duration	Total class time
First	Contact	47	22	1 h 15 min	27 h 30 min
First	Distance	32	4	45 min	3 h
Second	Contact	42	19	1 h 15 min	23 h 45 min
Second	Distance	22	4	45 min	3 h

It cannot really be stated that self-direction was obvious amongst distance students. However, for students to be able to autonomously work through the study guide and handle assessments, at least some form of self-direction would be required. In retrospect, I do believe that much more opportunities for activities to support self-direction could have been included in the two modules. In this regard, there could have been more formal opportunities for collaborative learning. In terms of contact class, there were many opportunities for class discussions, collaboration with regard to classroom assignments and assessments.

Several interventions were used to compensate for (in my view) lack of contact and interaction between the lecturer and students, specifically in the distance mode. In this regard, because of limited spontaneous feedback from distance students, feedback prompts on the LMS were inserted. Students were requested to reflect on what they did not understand and what they enjoyed within each section. Similar feedback forms were also inserted in the online interactive study guide. However, maximum success was achieved with feedback opportunities linked with assessments. Furthermore, YouTube videos were used to substitute contact time for distance students. To this end, for example, MS PowerPoints with voice-overs were used to provide additional content for distance students. Using videos as additional resources is also supported by Taylor (2018:166), as well as Dreyer (2015:95), who suggests that recordings of 'solutions to common difficulties' could be 'made available to students as learning objects'. A further extension of this aspect would be to let students also contribute to the creation of such learning objects (LOs).

I was concerned about the computer literacy of distance students and actually, to an extent, all the students. It was evident that distance students could not access all resources as effectively as contact students could. In this regard, the mere use of YouTube videos, Google Forms and the LMS, with all its intricacies, posed challenges to the students. A frustrating issue was the fact that

limited information was available on the nature of the students. In addition, it seemed that there was reluctance from students to indicate their deficiencies in technology use, for example. The issues of low levels of computer literacy (Kruger 2010:244; Mdakane 2011:105) and access to the Internet (Esterhuizen 2012:82; Geduld 2011:223–224; Taylor 2018:158, 159) were also raised in earlier literature in the same context. Interestingly, Laubscher (2010:105) found that student teachers of mathematics at this institution did not show anxiety towards computers and that they felt confident in using them. Furthermore, after conducting research in the same context, Geduld (2013:121) recommended that 'ODL institutions should conduct research in order to understand their students' profiles, establish what their needs are, and make decisions on how to support students'. For Balfour et al. (2015), the onus rests on the lecturer, as they suggest that:

> [*H*]aving ascertained what technology is commonly available to students, and what familiarity each might have with technology, the teacher (or academic) engaged with curriculum design is required to consider the implications technology will have for students' learning styles, especially those involved in distance (open distance) learning, including blended learning. (p. 16)

In this regard, the nature of any multimodal intervention would rely on the information that lecturers have for students regarding different variables in addition to the ones mentioned above. However, in most cases, the design of the curriculum happens prior to students being enrolled and as such, a more dynamic approach to the design of the curriculum needs to be considered where the curriculum is adaptable to the needs of students.

Even though assessments were aligned in terms of outcomes, marks and content, in most cases distance students would always have access to any sources in completing even short informal assessments. The latter was handled in class without any sources and a time limit for contact students. As I observed a major difference in marks of shorter assessments (which involved questions with one-word answers or multiple-choice questions),

it was clear that, even in terms of assessment, there was no level playing ground.

From my reflections, it is apparent that for contact, but especially distance students, there are issues of availability of modes (cf. Bezemer & Kress 2016). Students from both modes of delivery have varying degrees of access to technology. The low number of views of YouTube videos provided to distance students – in an attempt to compensate for the limited contact time of distance students versus contact students – showed limitations with regard to being able to access the videos or having sufficient internet mobile data. From literature (e.g. O'Halloran et al. 2018:97), it is clear that videos could support collaboration or the creation of 'a sense of community'. However, this would require a greater sense of student engagement and the ability to create and upload videos. In my context, students were not able to do this, and my reflections are in line with O'Halloran et al. (2018):

> [*T*]he practice of teaching and learning with digital communication tools and technologies necessarily presents challenges for institutions to provide equitable multimodal learning experiences for students in both online and face-to-face delivery modes. (p. 106)

In order to address some of the above-stated problems, towards the end of the first semester, and specifically throughout the second semester, the approach to the contact class was increasingly changed to be more like the distance class. As such, more assessments were handled through the LMS and feedback was requested electronically after each assessment from both groups. This was regarded as a major shift in my approach, where, instead of compensating within the distance class for it to be closer to the contact class, I would rather bring the two closer together by bringing in elements from the distance class into the contact class.

Through various changes in my approach to contact and distance classes, I feel that their experiences were more aligned towards the end of the year. In addition, the assessments were also fairer in my opinion, and summative assessment marks

aligned better with the formative assessment throughout the semester. However, I still feel that the distance experience lacks stronger peer and lecturer presences. In addition, the lack of non-verbal feedback and physical interaction from distance students in technology-mediated contact sessions makes the task of the lecturer daunting. Furthermore, feedback provided through the LMS implied that students had to reduce their feelings to writing and possibly allow for a greater deal of self-censorship and editing in comparison to spoken feedback in contact classes. Misunderstandings with regard to what would be expected from assessments and requests for examples on how written tasks had to be conducted created a sense that the distance students were unsure of what to do regardless of detailed instructions. It seemed that, in comparison to the contact students, some distance students did not have the same confidence and self-efficacy to just complete certain assessments. Finally, this reflection does prompt the need for more empirical research on the nature of the differences between contact and distance experiences.

Diffractive pathways

The cynosure of this chapter is diffraction, and consequently the analysis of the reflections especially focused on the *entanglements* and *differences* rather than *similarities* found by the two lecturers.

An initial important diffractive pathway comes from literature as the two modes approached in this chapter are not regarded as being equal. Nage-Sibande and Morolong (2018:505) note in this regard that unfavourable views about ODL could lead to 'stigmatisation and negative attitudes from staff, students and the community, where they perceive ODL to be inferior, compared to the face-to-face mode'. From both reflections, differences between the two modes are evident and an apparent hierarchy with contact in the more powerful position could be surmised.

In the context of Botswana, the MEdEL students were provided with exactly the same content, which was structured in exactly the same way. The only difference was the mode of delivery, with

Gaborone cohort attending face-to-face and Maun cohort using IWB technology. Tutorial presentations were also structured in exactly the same way; assessments were the same; the tutorial delivery schedule contained the time and assignment submission dates, which were also the same for the two groups. All activities, for both learner support and academic support that were an integral part of the programme, were also the same, and so were the resources. During tutorials, students were exposed to the same presentations. After tutorial sessions, communication was through email for both groups and they interacted largely on discussion forums. Tutors used videos downloaded from YouTube, and there was very little to nothing created specifically for the students. It is important to note that not all students could access videos because of several reasons, including poor internet connectivity. There was no interactive content for virtual distance classes, and both had the same study guides. Though technology had improved the interaction and general learning of open and distance learners, adapting to technology skills – especially the elderly – remained the main challenge in both groups. This finding concurs with Jaiyeoba and Iloanya (2019), who, in a study with students from BOU, established:

> [*T*]he extent of e-learning adoption amongst university students in Botswana, the perceived ease of use and perceived usefulness of e-learning resources and learners' attitude are significantly and positively related to behavioural intentions of students. (p. 165)

Although BOU is making attempts to introduce technological interventions to improve their mode of delivery, its long history of distance learning in which print was used remains dominant to date.

In the South African context, the reflections on teaching through two different modes have led to diffractions in which both modes have influenced each other. It is evident from the narrative in the previous section that the entanglements between the contact and distance modes initially had a complementary role in the distance mode. However, owing to issues of pedagogical equivalence, true diffraction ultimately occurred when both modes were influenced by each other in a major way. In this

instance, the focus was especially on feedback, interaction, content and assessment. However, other aspects of the learning and teaching contexts in different modes could also be affected in this way. Outside of Botswana, the main medium of communication for distance students was through the limited classes, LMS and emails, whereas the main medium of communication in contact classes was classroom interaction with added supplementary LMS and email communication. For both the South African groups, lecturer-created YouTube videos were employed in addition to several electronically written resources.

Despite a need to ensure some form of classroom attendance on the part of the South African lecturer, it is interesting that empirical research with students from the same institution, serviced through the same mode, showed that there was no significant relationship between classroom attendance and the success of students (Spamer & Van Zyl 2013). However, it is essential to note that this specific research related to vacation schools presented to distance students in addition to their regular distance offering. Furthermore, the concept of classroom attendance also becomes problematic in a true self-directed multimodal learning environment where learning is not limited to a classroom, whether it is physical or virtual.

Synthesis of reflections

In the context of Botswana, it was obvious from the onset that the support the two groups would receive from both the programme facilitators and the institution would not be the same. The face-to-face groups were at an advantage in comparison to the virtual distance classes because they had unlimited access to tutors and course facilitators. Similarly, in the South African context, the contact mode offered clear advantages in comparison to the distance mode. Even outside scheduled face-to-face tutorials, the Botswana students enrolled in the face-to-face group had unlimited access to resources in the form of tutors, campus Wi-Fi and the library. As such, they could easily walk over to campus to

access the Wi-Fi, interact with course facilitators, or simply call for appointments with their tutors – most of whom were around Gaborone. However, the same could not be said about the virtual distance cohort, the members of which were dispersed geographically. They could not arrange to meet with the tutors who were based in Gaborone. In South Africa, the access to resources is also starkly different for contact and distance students, and this was evident from the observations made by the South African lecturer, as well as the earlier research conducted at this institution (Geduld 2011:297, 2013:117–118; Taylor 2018:159).

Furthermore, in the context of Botswana, the distance students spontaneously grouped together as the few like-minded students. These students, individually and as a collective, devised means to make up for the gap created by virtual learning and being secluded. They came up with means to establish a teaching presence amongst themselves. They created WhatsApp groups, and others created Google Hangout accounts to interact with each other. More innovative ones created Skype accounts to break the isolation they were experiencing. Through these initiatives, learners could engage with one another and interact from their respective localities to discuss their academic needs, as well as extend the much-needed academic support to one another. The progression rate of the virtual group remained very high since they started to manage their studies. As a result of the teamwork and collaboration amongst them, they motivated one another, and this meant that all of them were able to manage and monitor their academic progress. A few developed Gantt charts to closely monitor their studies in order to avoid falling back on their studies. In a more general sense, Jaiyeoba and Iloanya (2019:166) concur, as they are of the opinion that the '[e]-learning environment will thus provide an enabling environment that helps the youth of emerging economy like Botswana to compete in a dynamic twenty-first century'.

No similar spontaneous group interaction was observed from the researched South African group, and this is definitely an aspect that could also be explored further within this context.

However, Laubscher (2017:119) noted the effective use of WhatsApp in the context of NWU in mathematics classes, presented through the distance mode. In an earlier study carried out by Geduld (2013:114, 116–117), also within the same context, it was found that family and friends were regarded as an important support structure in the absence of classroom peers, but also that some form of peer learning would take place.

Combrinck et al. (2015:111) found that 'effective dialogue between students and lecturers does occur' at the NWU in terms of the distance offering, especially regarding the use of IWBs, as they observe '[t]he process of dialogue seems relatively strong, and it can be inferred that it is a result of the use of IWBs (interactive whiteboards)'. The use of IWBs, without any face-to-face functionality, but with limited disembodied voice interaction and the even more detached communication channel of typing responses during the broadcast do not constitute dialogue in any sense. In support of my view, Dreyer (2015) also observed:

> [*A*]lthough the UODL's main mode of delivery is via IWBs, the manner in which they currently apply the IWBs does not offer much interactive communication between facilitator and students or between students and other students. (p. 17)

The potential of IWBs and the reluctance of students to use them are also noted by Esterhuizen (2012:125). The need for group interaction during contact sessions and outside formal sessions was also expressed by Kruger (2010:250), whilst Taylor (2018:155) found that students regarded communication with lecturers as being very important and that they prefer contacting lecturers by email. However, Taylor (2018:156) also found that communication is sometimes regarded as problematic as it might be confusing, or lecturers would take long to respond.

Clear and consistent communication seems to be an important issue towards the success of any multimodal SDL. On the part of students, Mdakane (2011:133) also observed, based on research carried out with distance students studying at honours level, that

'students were not satisfied with the communication from the HEI [higher education institution] and indicated that communication and feedback on their requests were inadequate' and that the institution 'should seriously consider this issue as communication with ODL students is of utmost importance because distance learning is remote and becomes lonely'. The importance of educational dialogue was also supported by Du Toit-Brits (2015):

> [/]ndividual Distance Learning students at NWU are morally and educationally obliged to achieve significant quantities of bonding and connecting social capital themselves, so that they will be able to make capital investments in their own communities and the learners they teach. (p. 30)

Yet, as Dreyer (2015:30) notes, currently, 'students cannot interact freely with the lecturer or with other students during interactive whiteboards sessions, the sessions are merely presentations by the lecturer'. Redelinghuys (2017:112) also notes that students in his investigation at a South African institution valued interaction and interpersonal communication and regarded it as an aspect contributing to their success.

It was observed in Botswana that some students became 'study champions' in supporting their peers because whenever they got study resources that they thought could help others, they communicated on different social platforms with their learning communities to meet and use the available resource(s) for the common good. Hence, these actions were supportive towards fostering SDL amongst students, whereas in the context of South Africa, such collaboration and promotion of interdependence were not actively encouraged or spontaneously advanced by students. Opportunities for such peer-to-peer interaction should be considered in the instructional design process and be built into electronic study guides.

Within the South African context, the quality of distance offering was questioned, as it was perceived that the same experience could not be replicated. This finding relates to what has been found in literature. In this regard, in a Namibian context,

where similar modes of delivery were employed, Brown et al. (2014:106) found that contact lecturers believed that 'distance education does not offer a rich learning experience' and that they 'would view ODL in a negative sense if the pedagogical experience is not rich and if the material is not of a high quality, considering that students heavily depend on such materials'.

However, this issue is something that could be empirically investigated in the future in the two research sites identified in this research.

An important aspect of both contact and distance modes is the fact that the 'human element' needs to be considered. Similarly, Van Deventer and Van de Merwe (2011:191) note that, in terms of ODL, '[t]here needs to be more than technology, and "the more" can be found in the relational aspect between institutional support to student teachers enrolled'. Hence, it is important that this 'relation aspect' is extended from just administrative support to person-to-person support throughout the context of education. Geduld (2013:105) also acknowledges that students in distance education contexts seem to feel isolated and that technology is often used 'to bridge the distance and to combat isolation between students, lecturers and administrative staff'. Research by Mdakane (2011:106) also showed evidence of distance students feeling isolated. According to Combrinck et al. (2015:111), who did research in the same context, 'some students still prefer the previous method of face-to-face teaching by a facilitator' despite efforts to increase interactivity and dialogue by means of IWBs. In this regard, the spontaneously created student groups from BOU could have been beneficial in the South African context.

As stated in the previous paragraph, technology is often used to compensate for the aspects of classroom context that are eliminated when utilising a distance mode. However, often, not all the students are sufficiently computer literate to effectively make use of the technology provided (cf. Kruger 2010). This was particularly evident in the use of LMS by the students in the

South African context. Geduld (2013:107) concurs with this statement in her earlier research. In this empirical investigation by Geduld (2013:113), at the same South African institution, she found that most of the students indicated that they were computer literate, but that it was a concern that 'they do not have access to the Internet at home'. In a similar vein, Balfour et al. (2015:16) contend that 'any curriculum designed with an awareness of blended learning must begin, at the very least, with some assumptions about students' understandings of, and familiarity with, technology'. In this regard, computer literacy support by the institution and, to a lesser extent, the lecturer, is essential and this could be a potential future area of further research. Furthermore, it is critical that students are supported to become self-directed in their computer literacy and related skills in order to be adaptable to changing educational contexts.

From this synthesis and diffraction, certain recommendations can be made towards the praxis in similar contexts.

Recommendations

The following recommendations are made based on the diffractive pathways in this study:

- Student-driven interaction should be supported, and technological means should be established and embedded in LMS to this end.
- Videos need to be introduced to enhance teaching and learning, as well as to compensate for the lack of a physical presence, but they should be short and effective because most of the students use data to access the Internet, which remains very expensive in Botswana to date. The use of pre-downloaded videos on universal serial bus (USB) drives could be a solution in this context.
- Students should be empowered to not only be able to access video resources but also how to select and evaluate them critically and even be able to create the videos themselves.

- Reflection and feedback opportunities need to be imbedded in the formal assessments. Reflective assessment has always been a part of BOU's MEdEL assessment components where students keep journals and make entries that they then submit upon completion of the course for assessment and grading. The grade will then form part of the students' final rank, and this is one aspect of assessment that encourages students' participation in the programme. Students must make journal entries on challenges, frustrations and experiences, as well as their strengths during their learning journey. They also need to reflect on how the MEdEL programme has contributed to both their professional and personal development. Furthermore, they should evaluate the programme during this reflective assessment and suggest areas where they think improvement is needed, as well as suggest more topics that they feel should be covered in the programme.
- Assessments can be made to be more up to standard with variation in the type of questions and the use of open questions.
- Group activities were quite successful with contact students, and as such need to be extended for distance students.
- There is a need for greater flexibility with distance classes regarding the number of assessments, due dates of documentation and marks, especially with unreliable internet connections.
- In order to aid self-direction and reflective practice, it is suggested that portfolios could be used in the contexts described above, where appropriate (cf. Kruger 2015; Kruger et al. 2015).
- Opportunities for educational dialogue should be created (Du Toit 2015:29) and this 'demands that individuals be mutually approachable, sociable, accessible, open-minded and devoted; their dialoguing meetings should generate and preserve a Distance Learning environment of closeness, belonging, interaction, genuine connection and cooperation/collaboration as well as acceptance and mutual acceptance'.
- Spaces, in addition to whiteboard interactions, should be created to stimulate interaction between students themselves and lecturers. In this regard, Dreyer (2015:94) recommends

that 'by creating a space for collaboration between students on the web, on Whatsapp [*sic*], or in alternative spaces they may be able to communicate with each other as well as with the lecturer with accessible and familiar technology. Similarly, Kruger (2015:321) also suggests that social networks could be used to 'further support interaction and sharing of knowledge and experiences'.

- In order to establish a sense of social connectedness, the aspects of mutual trust and dependability need to be addressed. In this regard, Du Toit (2015:29) observes that 'mutual trust and dependability will encourage precise reciprocity, mobilise harmony and strengthen the characteristics of that particular distance learning community'.
- Support should be provided to improve computer literacy, and a thorough evaluation of student needs must be carried out continuously. Literature also supports this recommendation (Kruger 2010:245).
- There should be a separate delivery schedule for the two groups, especially and specifically tailor-made for each of the groups, guided by their uniqueness.
- Classroom planning and practices should be focused on supporting and fostering self-directedness in order for students to become independent and effective in learning for which they are responsible.

Conclusion

This chapter involved autoethnographical reflections and diffractive analyses of experiences by two lecturers at universities in Botswana and South Africa. The focus was specifically on their experiences in contexts where the same content was presented concurrently through different modes: contact and distance. However, these modes cannot be distinguished clearly because they have similar characteristics. The aim of this chapter was to explore the nature of diffractive pathways of the two lecturers within self-directed multimodal learning contexts at their respective universities.

In order to guide the exploration, the concepts of BL, multimodal learning and SDL were defined and unpacked. Despite the fact that these terms are used differently in different sources, for this chapter, BL related to the instructional blending, multimodal learning to the institutional blending, and self-direction was an ideal process aimed throughout for the learning–teaching experience.

Personal reflections were critically analysed in terms of the diffractive pathways identified by the two researchers. Central to the diffractive nature of the data, the focus was on intersecting and diverging experiences. The two different contexts were explained, after which the data collection process was noted.

The data analysis was presented as two reflections by the researchers on their experiences of the identified modules and modes of delivery. This was followed by a section where prominent diffractive pathways by means of entanglements and differences were described. Thereafter, some of the findings were synthesised with existing literature related to similar contexts. Finally, recommendations based on the diffractive pathways were made.

From this discussion, it is clear that, even though similarities could be expected in these two contexts, there are clear entanglements and differences. There seems to be challenges regarding technology and interaction in both contexts. However, in the case of BOU, students acted independently to create social spaces; this aspect was lacking at the NWU. On another level within the NWU context, the coming close of the two modes was significant and this was not observed at BOU. Consequently, the distance between modes could be adjusted depending on the need and context.

The findings from this research are limited. Suggestions were made for further empirical research where necessary. Importantly, as reflection after the completion of the research, the true voices of students are resoundingly quiet. Therefore, the future research could benefit from adding the voices of other relevant individuals and even points of data.

Towards a final diffraction, it is evident that more opportunities for reflection and entangling or differentiating discourses would be beneficial to any lecturer. A major affordance for the researchers in this chapter was not only to contribute to the scholarship regarding self-directed multimodal learning, but also to be informed on another level regarding the lived experiences (sometimes similar and often different) across borders and institutions. In an increasingly networked world, such diffractive interactions become even more relevant.

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Chapter 6

Implementing cooperative learning elements in Google Docs to optimise the online social presence in a self-directed environment

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Abstract

In an online learning environment, it is essential to create strong social, teaching and cognitive presences. One of the main challenges in an online learning environment where students should work together on a task is to ensure that all students participate equally with regard to goal achievement. The emphasis is often on the teaching presence, neglecting the social and cognitive presences, and according to literature, a strong relationship lies between social and cognitive presences. In this chapter, the emphasis is on creating social presences without neglecting the importance of teaching and cognitive presences in designing online learning environments. To establish a joint workspace in which students can communicate freely, promote each other's learning and share resources, we planned and incorporated the established CL elements into a problem-based online learning environment. The aim was to ensure that all group members take responsibility for their own learning whilst working actively together towards the shared goal, participating equally to achieve their goals and communicating effectively in the process to assist each other's learning. In this research, students had to engage in an online PBL activity in geography education in which the five elements of CL were integrated. We utilised Google Docs – managed within the university's LMS called eFundi – to ensure that all group members actively participated and equally shared the workload. With the evidence created through Google Docs, we analysed students' communication whilst solving the problem and simultaneously determined if the students worked interactively, promoted effective communication, experienced positive interdependence (PI) and contributed equally to goal achievement. We indicated the improvement to a better social presence and subsequent high cognitive presence. Both qualitative and quantitative data from the CoI framework and CL questionnaires, as well as evaluations of their cooperative roles were used. The study findings indicated that the use of Google Docs, combined with the elements of CL within a PBL task, contributes to a higher social presence online.

Keywords: Cooperative learning; Self-directed learning; Online problem-based learning; Online social presence; Blended learning; Instructional multimodality; Community of inquiry.

Introduction and problem statement

Online courses have become routine practice in most universities worldwide (Hartnett, St George & Dron 2011; Lim & Richardson 2016). In order to comply with the needs of the 21st-century learner to become a self-directed, lifelong learner, technologies as tools for learning should constantly be adjusted and evaluated for ensuring optimal learning gain (Collins 2009:620; Akyol & Garrison 2011; Rapchack 2017; Arbaugh et al 2008) within the wider multimodal learning setting. Taking into account the large numbers of students enrolling in online courses each year, it is of utmost importance that these developments are based on a sound theoretical framework to produce high-quality learning outcomes (Serdyukov 2017). Allen and Seaman (2017) reported growth in distance education enrolment in HEIs in the United States of America, with more than 6 million students taking at least one distance course. If not designed carefully, online learning can, however, result in feelings of isolation and disconnectedness in learners (Ali & Smith 2015). Thus, many researchers for almost two decades have been advocating the effective role of an online social presence in surmounting isolation issues and encouraging motivation to collaborate and enhance satisfaction with facilitation and achieving learning goals (Akyol & Garrison 2011; Picciano 2002; Swan & Shih 2005).

Already in 2009, Hrastinski (2009:81) argued that 'if we want to enhance online learning, we need to enhance online learner participation', which, according to Hrastinski, is supported by cooperative and collaborative learning theories. Although much has been done on technologies that allow students to collaborate with each other, there are still some issues with the implementation of collaborative learning in an online learning environment, of

which free riding – where one person does all the work and the rest do not necessarily have the same learning experience – is the most important one (Scager et al. 2016:69).

Garrison's (2009, 2015, 2016) CoI model (cf. ch. 2 & ch. 9) has been used widely in the literature on online learning. He identified cognitive presence, social presence and teaching presence as essential elements for successful online learning experiences. Cognitively, students need to think creatively and construct their own meaning through their interaction with peers and the facilitator in the online learning environment. Socially, students need to communicate with their peers, clarify concepts, ask for help and feel free to contribute to discussions without fear of isolation. Teaching presence implies a facilitator who regularly provides guidance and feedback, creating the feeling that help and assistance is not far away (Garrison 2009). According to Lehman and Conceição (2010):

> [/]n the current research discussion of presence in the world of online learning, the focus is on creating engagement, a rich environment for learner interaction, and a sense of community, which together result in an enhance [*sic*] social presence. (p. 4)

In a study conducted by Van der Westhuizen (2017) among Geography students (Bachelor of Education [BEd]) at a university in South Africa, it was found that cognitive, teaching and social presences can be increased when using Google Docs and PBL (cf. ch. 9) as a teaching–learning strategy. However, when looking at the scores for cognitive, teaching and social presences, social presence – although still within acceptable norms – was the lowest score and teaching presence was the highest and well above the norm.

The purpose of this chapter is to indicate the value of implementing CL elements to support online PBL with the use of Google Docs to optimise a social presence without sacrificing cognitive and teaching presences. Hence, this chapter also functions on the level of instructional multimodality (cf. ch. 1).

The research questions were as follows:

- What is the value of implementing CL elements in an online PBL environment for the social and cognitive presences in an online design?
- What are students' perceptions of the incorporation of CL into an online PBL activity?

Conceptual and theoretical framework

The study builds on the social constructivist theory of Vygotsky (1978) that knowledge construction first occurs during interaction with others and learning is actively constructed and situated within a social context. Nested in social constructivism, the CoI model of Garrison, Anderson and Archer (2001) provides a meaningful framework for online course development (Rapchack 2017) and was used in this research together with the social interdependence theory (Deutsch 1949) on which CL was grounded. The self-determination theory (Deci & Ryan 2004) is one of the key theories on which SDL was built and strongly connected to advantages of online technology-supported learning. Hartnett et al. (2011:22) define the self-determination theory as 'a contemporary theory of situated motivation that is built on the fundamental premise of learner autonomy'. It can be concluded that all these theories have a common emphasis on the learner at the centre of learning and creating meaningful learning experiences for them.

Self-directed learning

According to Mok (2014), the core aim of education is to foster a capacity amongst learners for knowledge creation, management, acquisition and transfer. In order to achieve this aim, learners should be self-directed in their learning, setting their own learning goals, managing their resources for learning, planning their

actions to reach their goals, monitoring their actions and adjusting through self-reflection if necessary. Knowles (1975:18) defines the SDL as a process in which students are able to determine their own learning needs, set learning goals accordingly, identify learning resources, select appropriate learning strategies to solve the problem and evaluate whether the goal has been reached. This is a continuous process. Some of the characteristics of a self-directed learner include motivation to learn, goal orientation and the ability to self-assess (Ge & Chua 2019; Zhoc, Chung & King 2018). Moreover, a self-directed learner has advanced skills in managing time and preparing tasks (Zhu, Bank & Doo 2020). An SDL environment facilitates students to learn at their own pace and in their own way Sharpe & Kelley, 2014). Furthermore, according to Singh et al. (2018), learning effectiveness should be determined by learners' understanding and demonstration of their SDL abilities.

Kim et al. (2014) view SDL as a theory on its own that can inform the conceptualisation, implementation and evaluation of an online system. Zhou and Lee (2009) stress the importance of SDL because it is needed in both the workplace and private life – people must constantly solve problems and transfer knowledge to new situations. The following abilities are more essential than ever: the ability to be a self-directed learner, continuously managing own learning and applying new knowledge and skills to new and unfamiliar contexts, setting own learning goals, identifying necessary resources and strategies to solve ill-structured and unfamiliar problems, evaluating whether the set goals are reached and determining new goals (Brandt 2020).

Self-directed learning is characterised by a love for learning, curiosity, taking own initiative, creativity, independence, persistence, self-discipline, goal orientation, self-efficacy and critical thinking, to name but a few (Guglielmino 1978). Knowles (1975) also adds the characteristics of being proactive and taking initiative for own learning. Self-directed learners do not wait to be taught as their curiosity and motivation drive them to engage in more meaningful and purposeful education (Klopfenstein 2003).

The key idea of SDL is thus the acceptance of personal responsibility for one's own learning for life. In the 21st century, it is a requirement to think critically, manage one's own learning, have good social abilities to collaborate and keep up with the rapidly changing world (Alismail & McGuire 2015).

Several researchers found that active teaching–learning strategies – like PBL and CL, which give the learner the responsibility for his or her own learning – enhance SDL (Gleason et al. 2011:186). In the next section, CL, as a typical active teaching–learning strategy, is discussed.

Cooperative learning

Cooperative learning was based on the social interdependence theory, amongst others (Johnson & Johnson 2008). Johnson, Johnson and Holubec (2008:5) define CL as 'the instructional use of small groups so that students work together on a challenging task to maximize their own and each other's learning'.

For successful cooperation and learning within a CL environment, the following five essential elements are needed (Johnson & Johnson 1994:6):

1. **Positive interdependence:** Positive interdependence (PI) creates a learning atmosphere in which learners realise that the success of the group depends on the success of every individual in the group. Within such a CL group, group members realise 'that they can only reach their goals "if and only if the other individuals with whom they are cooperatively linked also reach their goals"' (Johnson & Johnson 2008:11). This means that they assist one another in reaching their goals. There are different ways in which PI can be strengthened within a group. The group should decide on mutual goals and allocate different roles to group members performing specific tasks. The group must share resources and when they achieve their goals, they must celebrate their successes. All these actions motivate the group members to work closely together in achieving their goals.

2. **Individual accountability:** Within a group where PI is strong, a feeling of individual accountability and responsibility exists amongst group members to first contribute their share towards goal achievement and then support each other in reaching their goals (Johnson & Johnson 2008:22). The whole group should be held responsible for each group members' individual performance.
3. **Promotive interaction:** Students should commit themselves towards sharing resources and actively promoting each other's learning (Johnson & Johnson 1994:6). They should engage in group discussion as part of their learning by applying the following key principles: checking for understanding among fellow members; providing effective support and assistance to each other; challenging and evaluating each other's arguments and conclusions; promoting each other's learning and success; and encouraging and helping each other.
4. **Interpersonal and small group skills:** Students should be trained in good social skills and it should not be assumed that all students can work together. Social skills needed within a CL environment include: active listening; conflict management; social interaction; good communication skills; leadership; decision-making; trust-building; and acknowledgement of others' efforts.
5. **Group processing:** According to Johnson and Johnson (2008:25), regular reflection on how well the group is functioning and how the group can improve its processes can enhance PI. Students can be encouraged to reflect on their own learning by engaging them in self-evaluation exercises. They must determine if they have reached the goal and reflect on the strategies used, the successes, as well as the challenges.

Research conducted by Johnson and Johnson (2008:16) found the advantages of CL over individualistic or competitive learning. Cooperative learning environments are effective in developing a positive attitude towards learning (Mentz & Van Zyl 2016:2),

enhancing social and interpersonal skills (Ballantine & McCourt Larres 2009:391; Buchs & Butera 2015:202) and better academic performance (Kolawole 2008:35–36).

It is evident from a systematic review by Mentz and Bailey (2019) on the use of technology-supported CL over the past 10 years that the majority of research has been carried out on collaborative learning in an asynchronous environment and only a few have been conducted on CL. Collaborative learning environments have mostly been used for voluntary help-seeking on forums or discussion boards, and no formal structure for working together in groups has been provided.

Collaborative learning within a technology-rich learning environment is often used to foster and support meaning-making in a social constructivist paradigm (Isaacs 2013). It should be noted that CL is a special form of collaborative learning where the above-mentioned five elements are incorporated. Thus, in a collaborative learning environment, no such formal structure exists to ensure the incorporation of the five elements. Therefore, it is necessary to qualify technology-supported or online learning technologies in this study within a CL context.

Technology-supported cooperative learning environments

Technology-supported or multimodal CL environments can foster students' abilities to be more self-directed in their learning because of the extended opportunities to manage their own learning, receiving cognitive and emotional support whilst planning, and evaluating their learning (Robertson 2011). Fahnoe and Mishra (2013) indicated the value of technology-rich learning environments on SDL when they incorporated sixth graders in a traditional learning environment versus a technology-rich learning environment. They found a higher perception of

self-directedness amongst those students in the technology-rich learning environment. Rashid and Asghar (2016) also found a positive relationship between SDL and technology use amongst 761 female undergraduate students.

Online learning environments enable CL and PBL to be performed synchronously and asynchronously on compatible devices (Hazwanie et al. 2017). According to Hazwanie et al. (2017):

> In the online PBL environment, all discussions take place electronically, using smart phones, text-based chats, audio- or video conferencing, or asynchronously through discussion forums, or emails. The production of reports or presentations on their approach and solution is a common element of PBL activities. (p. 32)

In the online PBL design, tools such as Wikis or Google Docs offer ways for students in separate locations to create reports and presentations cooperatively in the same document.

One of the most effective functionalities is the capability to add synchronised comments with the commenter's name (Ó Broin & Raftery 2011). Thus, when compared to Wikis on LMSs, Google Docs holds more advantages for students working cooperatively in solving the PBL activity. It is also an effective platform to fulfil CL roles by group members in order to foster PI. Google Docs provides a virtual environment in which students can interact simultaneously, solve problems together and communicate with the members of their group, as well as with the facilitator. More features of Google Docs beneficial to online collaboration are (Reynolds 2016):

> [*A*] box at the bottom right-hand side shows when another person is editing the document at the same time; multiple users can collaborate and edit the document simultaneously. A very handy revision history is readily available that archives each saved version, which can be easily accessed, reviewed and allows [*sic*] for comparisons between versions with the advantage that changes made to the document are highlighted and colour-coded to indicate who has made the changes. (pp. 5–6)

Online problem-based learning

The online PBL method is led by an ill-structured, real-world problem that will always have more than one solution. The students are organised into online groups of four to eight students (five to six for most effective CL) who optimally collaborate as responsible team members (Chernobilsky, Nagarajan & Hmelo-Silver 2005; Dolmans et al. 2001). The students commence with the PBL activity by discussing the problem online and conceptualising their real-world problem into specific learning objectives through their CL groups. Group members have to do independent investigation of the stated learning objectives in their own time but share their findings in the collaborative online space. They must then consult different resources, such as textbooks, Internet articles and field studies. The students continuously 'share and work with new information on the problem together' (Lam 2009:1502). After the discussion and analysis of the problem, the group members formulate multiple solutions to the stated problem (Tick 2007).

The Community of Inquiry framework

The CoI framework (cf. ch. 2 & ch. 9) is known to be most suitable for analysing online learning environments in HE (Garrison, Anderson & Archer 2000). According to Shea et al. (2005):

> This framework is seen by many researchers as a valid and dependable instrument to measure the quality of online learning by focusing on three important presences that contribute to the quality of courses and can be used by lecturers to design and evaluate effective learning environments. (p. 265)

The CoI framework is a valid instrument to analyse the processes of online learning, especially for higher-order learning outcomes (Rapchak 2017; cf. Swan, Garrison & Richardson 2009; cf. Szeto 2015):

> This model has been studied well in the literature (the article has been cited nearly 3000 times in Google Scholar) and has been shown to be a meaningful framework for course development or design. Creating an online learning environment that generates effective teaching, social and cognitive presences, according to the model, will allow students to become engaged in the process of critical inquiry necessary to engage in higher-order online activities (according to Bloom's taxonomy). (p. 12)

It is necessary for the purpose of this study to contextualise and define the CoI framework in more depth. The CoI is theoretically grounded in social constructivism, which views cooperation amongst participants as essential for meaningful knowledge construction (Garrison, Cleveland-Innes & Fung 2010). Three types of presences make up the CoI framework, which include the social presence, cognitive presence and teaching presence. These are summarised below (Cho, Kim & Choi 2017; Morueta et al. 2016):

- Social presence refers to 'the ability of participants to identify with the community (e.g. course of study), communicate purposefully in a trusting environment, and develop interpersonal relationships by way of projecting their individual personalities' (Garrison 2009:352). Furthermore, it 'emphasises participants' communication skills in relation to other members and contributes to the creation of a [cooperative] learning environment (Akyol & Garrison 2011:184).

'Social presence is divided into three categories – affective, interactive, and cohesive – and reflects a supportive context for emotional expression, open communication, and group cohesion for the resolution of the respective tasks. Social presence – an important factor critical to face-to-face teaching – is a challenge for instructors to facilitate in online learning environments' (Morueta et al. 2016:123). Social presence links to the essential *social skills element* of CL.

- Cognitive presence refers to 'the extent to which learners are able to construct and confirm meaning through sustained

reflection and discourse in a critical community of inquiry' (Garrison, Anderson & Archer 2001:11). Through cognitive presence, students develop meaningful knowledge. Furthermore, a cognitive presence can be categorised 'into four phases with specific descriptors for each phase: (1) a triggering event (an issue is identified for inquiry), (2) exploration (exploring the issue through discussion and critical reflection), (3) integration (constructing meaning from the ideas developed through exploration), and (4) resolution (applying new knowledge in a real-world context)' (Morueta et al. 2016:122).

The *group processing* element of CL, where reflection plays a key role, links closely with cognitive presence.

- Teaching presence refers to 'the design, facilitation, and direction of cognitive and social processes for the purpose of realising personally meaningful and educationally worthwhile learning outcomes' (Anderson et al. 2001:5). Teaching presence plays a key role in nurturing, supporting and sustaining the social and cognitive presences of online learning environments (Akyol & Garrison 2011; Garrison et al. 2010). This presence consists of two general functions: (1) the design of the educational experience, and (2) facilitation among the instructor and the students. It is the responsibility of the instructor to design and integrate both cognitive and social presence for educational purposes through scaffolding, modelling or coaching' (Morueta et al. 2016:124).

Also, within a CL environment, a teaching presence is not only important in terms of the planning of implementation of the five elements but also for constant support and guidance during the completion of the task.

To summarise, social presence refers to the ability to connect and collaborate with members of an online community of learners more interactively in group contexts. Cognitive presence – as the most important part of online learning – is the process of creating

meaning, higher-order learning and deep learning through collaborative inquiry and interaction. The teaching presence is the integrating power and interactive online facilitation that structure and lead the educational process in a constructive, collaborative and continuous manner. The essential balanced overlapping of these three elements that generates the core of a CoI where collaborative constructivist teaching and learning experiences can be accomplished is imperative (Garrison 2006). The framework also suggests that online learning experiences should continuously advance in the interaction between these presences as they support and interact with each other, making it recursive in essence (Garrison 2006). In general, research indicates that a CoI could maximise students' learning experiences because the three presences essentially promote social, intellectual and cognitive interaction amongst participants and study materials in online learning situations to successfully achieve the learning outcomes (Annand 2011).

As PBL is seen as a higher-order learning activity (according to Bloom's taxonomy), it can also foster SDL skills in students. It is, therefore, necessary to ensure a proper design according to the CoI framework principles. To perform higher-order learning tasks online, the following guidelines need to apply (Morueta et al. 2016):

- 'A strong teaching presence is necessary, which entails continuous guidance, structure and support to students'.
- 'It is the responsibility of the facilitator to design, scaffold, model and coach properly before and during the online activity. As regards the social presence, the frequency of group members' involvement increases as the level of the task' (according to Bloom's taxonomy) increases.
- In support of this, Richardson and Ice (2010) found that 'a discussion based on real cases can stimulate more critical thinking than other types of tasks, such as a theoretical study, or debate'. (p. 125)

Finally, for more complex activities, needing more group cognitive activity, it is necessary to ensure a good social presence to achieve

a high cognitive presence and awareness (Morueta et al. 2016). Therefore, we decided to incorporate CL into a PBL multimodal environment to strengthen the online social and cognitive presences.

Research objectives

The main objectives of this research were:

- to determine the value of implementing CL elements into an online PBL environment for the social and cognitive presences in the online design
- report on students' perceptions of incorporating CL into an online PBL activity.

Research methodology

A design-based research (DBR) using both quantitative and qualitative data (Quan–qual) was used for this research (Leedy & Ormrod 2001).

Study context

In this study, the third-year BEd Geography student group of 2018 (n = 53) were introduced to an online PBL design in which CL elements were included. Cooperative learning principles were implemented to structure and guide the collaboration between students in their groups and to take responsibility to manage their own work and learning process. This correlates directly with the *Teaching and learning strategy – 2016 to 2020* of the university advocating active SDL (NWU 2016).

Furthermore, the third-year Geography student teachers received initial training in a workshop on PBL, online learning, CL principles, and CL role distribution and responsibilities. In order to structure positive role interdependence, the lecturers suggested six different roles that were assigned to group members (over and above the fact that all group members had the responsibility to achieve the goal): group leader, communication and social skills

person, time keeper, critical thinker, technical official, and presenter and summariser (see Box 6.1 for role descriptions). For practical reasons, if a group consists of only three, four or five members, roles must then be combined to cover all roles in the group (it is suggested that roles one to five can be combined very easily).

BOX 6.1: Cooperative role division for group members during the online problem-based learning activity in GEOE321, as well as general instructions.

Cooperative role division for group members

1. Group leader: The group leader is the spokesperson on behalf of the group to the lecturer, ensures the comprehensive completion of the report, ensures that all group members fulfil their cooperative roles, ensures that all members work frequently and contribute equally, and monitors that nobody stays behind.

2. Communication and social skills person: The communication and social skills person encourages communication and oversees that it takes place and, in good spirit, facilitates conflict and encourages individuals to work and communicate frequently.

3. Time keeper: The time keeper also known as the 'watchdog' oversees that continuous targets are met in accordance with the eFundi schedule and also oversees that members work on time and long before deadlines.

4. Critical thinker: The critical thinker keeps guard over the scientific quality of the report, that good relevant sources are used; asks critical questions to secure the focus of the report and ensure that work is still relevant to the focus, according to the set outcomes.

5. Technical official: The technical official, also known as the language and plagiarism officer, checks the daily update of the reference list; ensures the correct in-text referencing; that the layout is according to the planned structure; amount of detail under each section and subsection; ensures that the discussion does not rely too heavily on one source or reference and sees that a good amount of high-profile sources are used, etc.

6. Presenter: This is the PowerPoint builder (continuously) and summariser and presenter. IT-supporter (technical support). He/she ensures that all members work continuously on the slides and upload information as they go and not only at completion of the task (everyone work continuously together [as with Google Docs] AND on Google Slides [a Google slide is uploaded to the toolbar of eFundi]).

General instructions:

NB: Use the 'Comments thread' functionality on Google Docs to fulfil your role

(Group members are evaluated on how effective and frequent they conduct their cooperative roles. A mark is allocated according to the provided schedule [see below] and added to the report mark sheet).

BOX 6.2: Example of work schedule to ensure a strong teaching, social and cognitive presence and goal interdependence within a CL environment.

Deadline schedule for progressing through the PBL activity

23 August to 17 September (31/2 weeks)

1. **By Friday 23 August**: Do research and plan your PBL activity.

2. **By Monday 27 August** by 18:00 (after scheduled class time):

In Google Docs, upload one single sentence to demarcate the problem to solve. Upload the learning outcomes or objectives needed to successfully complete the activity. We will give feedback with comments in Google Docs.

Do research to collect the necessary information to answer to all possible outcomes that need to be achieved.

3. **By Thursday 30 August**: Broad structure and layout of the report. Insert basic definitions and start with the draft report. Keep a bibliography updated at the end of the report. Ensure that all group members work equally on Google Docs. Upload all your work documents and resources under 'Resources' on your group eFundi site (not the class site). We will give feedback. Complete the assessment rubric regularly. Complete the assessment rubric and upload under 'Resources' on the group eFundi site.

4. **By Monday 03 September**: Report should be 60% – 75% completed. All group members should have contributed equally daily, or according to this schedule. Bibliography should be updated. We will give feedback. Start building your PowerPoint presentations under PBL Slides on your group eFundi site so that they can be monitored and evaluated continuously. Complete your self-assessment rubric as far as possible and upload to your group eFundi site under 'Resources'.

5. **By Thursday 06 September**: Report should be 90% completed. Bibliography should be updated. Ensure throughout that resources used are uploaded to your eFundi group sites under 'Resources'. Your PowerPoint (eight slides for a 5-min presentation) should be 80%+ completed. We will give final feedback (if necessary) on the report. We will also give initial feedback on PowerPoint presentations. MAKE USE OF LOTS OF GRAPHS, MAPS AND DIAGRAMS IN YOUR PP-SLIDES.

6. **By Monday 10 September**: Report should be completed by end of the day. Draft final PowerPoint presentations; should be finalised for final feedback from lecturers.

7. **By Thursday 13 September**: Finalised report available on Google Docs. PowerPoint presentation should be finalised by the end of the day and ready to present on Monday. PowerPoint will be assessed by the end of the day. Presentations should be a summary of eight slides presented in 5 min.

8. **By Monday 17 September**: Possible PowerPoint presentations in class. Class starts normal time 07:30.

PBL, problem-based learning

BOX 6.3: Third-year online geography module.

	GEOE321 Climatology and Geomorphology
	Theme: Climate change in South Africa
Third year	Global warming and modern climate change are considered a serious problem worldwide and, according to scientists, this threatens the future existence of humans on earth. In South Africa there is great concern about the impact that climate change (global warming) will have on our country's people and environment. The Department of Agriculture Conservation and Environmental Affairs requests a report from the geography students with reference to the presence of climate change in South Africa, as well as possible measures which the South African government could implement to, firstly, help manage this problem and, secondly, to combat it drastically. The Department also wishes to know what can be done by individuals and households to make a meaningful contribution.

Source: Golightly (2018:465).

To help the students fulfil their roles properly, the facilitator provided a strict deadline schedule, which was closely monitored in order to ensure a good teaching presence and foster goal interdependence. This schedule is presented in Box 6.2. The online cooperative PBL activity was aligned with the outcomes of a third-year Geography module and dealt with the topic 'Climate change' (see Table 6.3).

Participants

The study participants comprised all the full-time undergraduate BEd Geography student teachers of a third-year Climatology Geography module of a South African university. A total of 53 students completed the CoI and CL questionnaires for 2018.

Data collection and analysis

Quantitative data: the third-year Geography student teachers of 2018 completed the two questionnaires as part of this explorative case study (cf. Leedy & Ormrod 2001), namely:

Community of Inquiry questionnaire

'The CoI was measured with the modified CoI [questionnaire], consisting of social presence, cognitive presence and teaching presence' (Arbaugh et al. 2008:134). The five-point Likert scale of the CoI questionnaire, which contains 34 items, was adapted to fit the research context, where 1 = 'strongly disagree' and 5 = 'strongly agree'. The overall reliability of the CoI scale was greater than 0.90, and the Cronbach's alpha values for the teaching, social and cognitive presences were 0.94, 0.91 and 0.95, respectively, suggesting a high internal consistency of the CoI scale. Descriptive statistics were used to examine the participants' responses to the three elements: teaching presence (items 1–13), social presence (items 14–22), and cognitive presence (items 23–34).

The items of the questionnaire were used as closely relevant to the current study so we could accurately measure the participants' perceptions of online PBL. For social presence, an example item was 'I felt comfortable conversing through the online medium'. An example item for cognitive presence was '[t]he topics stimulated my interest in the course', and for teaching presence, an example item was '[t]he instructor provided clear instructions on how to participate in course learning activities'. In this study, item reliability was evaluated as α = 0.82 for social presence, α = 0.90 for cognitive presence and α = 0.94 for teaching presence.

Cooperative learning preference (CLP) questionnaire

The CLP was developed by researchers in the CL subarea of the Research Focus Area SDL at the NWU. It comprises 22 items, measuring students' preferences, perceptions, attitudes and experiences about CL. A five-point Likert scale was used, ranging from 1 = 'strongly disagree' to 5 = 'strongly agree'.

Qualitative data: Attached to the CoI questionnaire, two open-ended questions at the end focused on the student teachers' perceptions of and recommendations for improving the online PBL activity, as well as their judgement regarding the use of the LMS, eFundi and Google Docs as supportive ICTs.

Open-ended questions regarding students' perceptions of CL were also attached to the CLP questionnaire. Students were asked to provide the researchers with positive and negative responses about their experiences with the inclusion of CL in the online activity. In the last question, they were requested to pose any recommendations for the improvement of the online activity.

In open-ended questions, the participants were asked to describe their experiences in detail.

The qualitative analysis starts with coding the data, dividing the texts into small units (phrases, sentences, and paragraphs), and assigning a label to each unit (cf. Creswell & Plano Clark 2007:76). The qualitative data were used to support and sometimes clarify quantitative findings, contributing to a better understanding and clarification of the research problem.

Ethical considerations

This research was approved by the ethics committee of the university and complied with all the ethical regulations of the university and adhered to the university's gatekeeper requirements. An independent person facilitated the data collection procedure. The participants provided written consent that the information could be used in this study. Participation in the study was voluntary and it was made clear that participants could withdraw from the study at any time if they wished so.

Results and discussions

Firstly, the student teachers' perceptions regarding the online PBL design according to the principles of the CoI framework

are discussed. The qualitative data will be integrated within the themes as discussed below.

Secondly, the students' perceptions of the incorporation of CL elements into the online PBL activity is addressed. Students' responses on the CLP questionnaire, as well as their narrative answers to the open questions about advantages of the CL intervention, the challenges they experienced and possible solutions to improve this intervention will follow the CoI framework discussion.

Evaluation of the Community of Inquiry elements of the online problem-based learning environment

Table 6.1 presents the guideline mean scores for the evaluation of the three elements of the CoI framework regarding students' experience of an online collaborative learning environment (according to Arbaugh et al. 2008). The three interdependent elements – namely, teaching presence, social presence and cognitive presence – should be, according to a five-point Likert scale, 4.18, 3.98 and 4.14, respectively, for an effective online learning environment, focusing on cooperation. Figure 6.1 depicts the comparison of scores presented in Table 6.1 to emphasise the fluctuations and support the discussions.

The results were also compared with the 2017 group that also did the online PBL activity on Google Docs, but in a collaborative learning environment.

From Table 6.1 and Figure 6.1, it is evident that the online activity of the 2018 third-year Climatology Geography module is slightly better than the recommended average scores of Arbaugh et al. (2008) for this online cooperative PBL activity, with 4.31 (4.18 recommended) for teaching presence, 4.18 for social presence (only 3.98 recommended) and 4.15 for cognitive presence (close to the recommended mean score of 4.14).

TABLE 6.1: Evaluated scores of the three presences against the CoI Framework as perceived by the third-year geography student teachers of 2018 (*n* = 53).

Presences	Mean suggested score	Mean online score 2018	% difference
Teaching	4.18	4.31	+2.6
Social	3.98	4.18	+4.0
Cognitive	4.14	4.15	+0.4

Source: Van der Westhuizen (2017), adapted from Arbaugh et al. (2008).

Problem-based learning is a higher-order learning activity, with Bloom's taxonomy as reference, and the student's evaluation correlates with the findings of Morueta et al. (2016) that for higher-order tasks online, a strong teaching presence is necessary on a continuous basis to supply guidance, structure and support to online students individually and in groups. For more complex activities, a good social presence is, therefore, essential in order to achieve a high enough cognitive presence (Morueta et al. 2016). It can, thus, be argued that online PBL activities in which CL elements were included resulted in higher than the guideline mean scores on social, cognitive and teacher presences.

Furthermore, from the results in Table 6.1, it is evident that a much higher than the norm (4.18) for *teaching presence* was achieved (4.31) with the implementation of the CL principles to manage and steer the progress and outcome of the online process on Google Docs, also because the role execution was monitored according to the schedule. This is also higher than the 2017 design which only used collaboration and excluded CL principles for group work (Van der Westhuizen 2017). From the open-ended questionnaires, students were positive about the online activity where the CL principles were included, which is evident in the following comments: 'It makes it much easier to the work this way, communication was made easier in the groups to complete the task at hand' (Student, female, 37); 'It is very interactive and promotes good communication' (Student, male, 24); and 'effective participation of each group member as well as effective communication with group members and lecturers' (Student, male, 39).

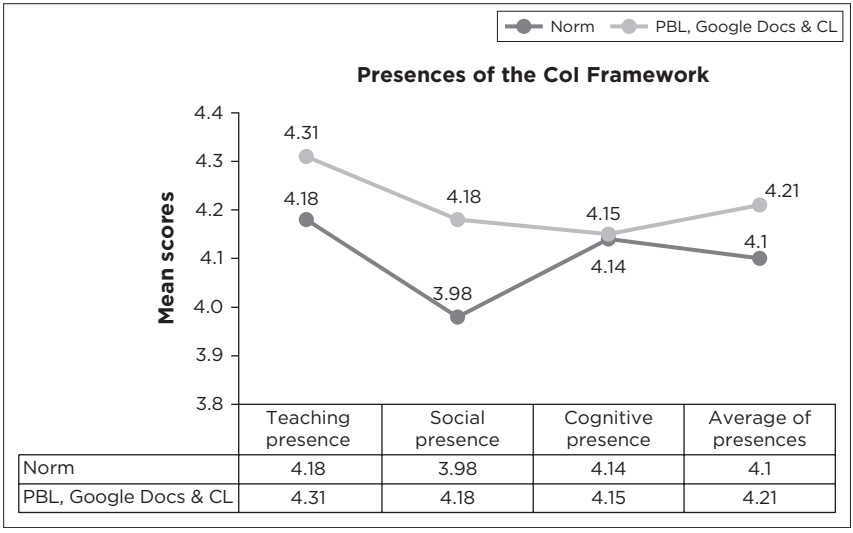
Most importantly, the use of Google Docs platform for the inclusion of the CL elements encourages all group members to pull their weight, as several students noted, as shown in the following quote: 'it forces everybody to work because everybody worked in a different colour in Google Docs' (Student, female, 17).

Regarding the *social presence,* the 2018 CL online PBL design also achieved a higher score (4.18) than the norm (3.98). It is also higher than the 2017 design score of 4.13, which excluded the CL elements (Van der Westhuizen 2017). This is proof that the implementation of the CL principles creates a higher social presence than a collaborative learning environment. From the open-ended questions, the majority of the responses referred to the effective communication and collaboration between group members, even building good friendships online, and can be best summarised by the following quotes:

> 'Our group worked nicely together and everybody done their part'. (Student, male, 10)
>
> 'It makes it very easy to do the work because communication was made easy'. (Student, female, 37)
>
> 'It was very nice to also build friendships like this … and we did not have to go to class'. (Student, female, 6)

The *cognitive presence* was also – as a result of the higher and effective social presence – higher (4.15) than the suggested mean score of 4.14. Because every group member was forced to do his or her part, as mentioned above, each student achieved the set learning outcome that is on a higher cognitive level:

> 'The execution of the task was made easy by this process because it was managed online'. (Student, female, 18)
>
> 'It makes it much easier to work this way, communication was made easier in the groups to complete the PBL task at hand'. (Student, female, 37)



	Teaching presence	Social presence	Cognitive presence	Average of presences
Norm	4.18	3.98	4.14	4.1
PBL, Google Docs & CL	4.31	4.18	4.15	4.21

CL, cooperative learning; PBL, problem-based learning.

FIGURE 6.1: Summary and comparison of the evaluated scores of the three presences of the CoI framework evaluation, as perceived by the third-year geography student teachers for 2018 (n = 53) compared to the norm scores.

Figure 6.1 illustrates the comparison between the online PBL CL design and the mean suggested score adapted from Arbaugh et al. (2008). Figure 6.1 emphasises the results of Table 6.1 and the graphs clearly show the improvement of the students' perceptions regarding the three presences' suggested mean scores.

This finding correlates with research conducted by Sua and Beaumont (2010) that proved that solving problems in online Wikis (Google Docs was used in this instance) promotes interactive and collaborative learning, reflection, discussions, the sharing of information, ideas and views amongst group members, which are also typical SDL skills. These findings are in line with the views of Brown and Adler (2008) that working cooperatively (either face-to-face or online) promotes a better learning than working individually.

TABLE 6.2: Cooperative learning questionnaire.

No.	Statements.	Strongly disagree A(1)		Disagree B(2)		Neutral C(3)		Agree D(4)		Strongly agree E(5)		Mean
		f	%	f	%	f	%	F	%	f	%	
1	CL is consistent with my teaching and learning philosophy.	0	0	1	2	14	26.4	23	43.3	15	28.3	4.0
2	CL is a valuable teaching and learning strategy in this subject.	0	0	2	3.8	6	11.3	24	45.3	21	39.6	4.2
3	I have enjoyed the CL in this class.	0	0	2	3.8	11	20.8	27	50.9	13	24.5	4.0
4	CL assists me in becoming an independent, self-directed learner.	1	1.9	1	1.9	7	13.2	25	47.2	19	35.8	4.1
5	Using CL in this module fosters a positive attitude towards learning.	0	0	3	5.7	13	24.5	22	41.5	15	28.3	3.9
6	The CL approach forced me to accept more responsibility for learning.	1	1.9	1	1.9	10	18.9	25	47.2	16	30.1	4.0
7	I experienced quality interaction in terms of learning with fellow group members in the CL environment.	0	0	4	7.5	10	18.9	26	49.1	13	24.5	3.9
8	Peer interaction helps to obtain a deeper understanding of the learning material.	0	0	1	1.9	9	17.3	28	53.9	14	26.9	4.1
9	Members of my group felt a commitment to other individuals in the group.	0	0	1	1.9	15	28.3	27	50.9	10	18.9	3.9
10	CL holds high-achieving academic students back.	8	15.4	9	17.3	11	21.2	18	34.6	6	11.5	3.0
11	In CL too many students expect other group members to do the work.	3	5.7	8	15.1	20	37.7	15	28.3	7	13.2	3.3
12	My fellow students are resistant to work in cooperative groups.	10	18.9	14	26.4	16	30.2	9	17.0	4	7.5	2.7

Table 6.2 continues on the next page→

TABLE 6.2 (Continues...): Cooperative learning questionnaire.

No.	Statements.	Strongly disagree A(1)		Disagree B(2)		Neutral C(3)		Agree D(4)		Strongly agree E(5)		Mean
		f	%	f	%	f	%	F	%	f	%	
13	I prefer CL above the traditional lecture-based methods.	2	3.8	1	1.9	20	37.7	14	26.4	16	30.2	3.8
14	CL promotes the communication skills of students.	1	1.9	0	0	12	22.6	25	47.2	15	28.3	4
15	In CL I feel intellectually challenged.	1	1.9	3	5.7	15	28.3	23	43.4	11	20.7	3.8
16	Working in CL environments means that you learn from one another.	1	1.9	0	0	7	13.2	30	56.6	15	28.3	4.1
17	All group members were well prepared for the CL contact sessions.	1	1.9	2	3.8	16	30.8	24	46.2	9	17.3	3.7
18	Group members helped me to understand the necessary concepts, ideas and study content.	1	1.9	1	1.9	9	17.3	28	53.9	13	25.0	3.9
19	Group members negatively influenced one another regarding CL.	11	20.8	14	26.4	15	28.3	10	18.9	3	5.6	2.6
20	All group members attended the CL contact sessions on a regular basis.	2	3.8	5	9.4	16	30.2	17	32.1	13	24.5	3.6
21	Studying with peers in a CL environment is very time-consuming.	5	9.6	5	9.6	20	38.5	18	34.6	4	7.7	3.2
22	CL enhances my self-assessment skills.	1	1.9	1	1.9	14	26.4	22	41.5	15	28.3	3.9

CL, cooperative learning.

Evaluation of the cooperative learning perception questionnaire

Table 6.2 summarises the results from the CL questionnaire. Students were overwhelmingly positive about the way in which CL was implemented in this class. Most students (71.6%) agreed that CL was consistent with their teaching and learning philosophy and were of the opinion that CL was a valuable teaching and learning strategy for Geography education (84.9%). Most of them (75.4%) stated that they enjoyed it and that it fostered a positive attitude in them towards learning (69.8%).

The learning gain that was reported by most of the students includes an in-depth understanding of the learning material (80.8%), better understanding of concepts, ideas and study content (78.9%) and an enhancement of self-assessment skills (69.8%). It is noteworthy to mention that 83% of students indicated that CL, as applied in this module, assisted them in becoming independent, self-directed learners, and 77.3% stated that it forced them to accept more responsibility for their learning as they also felt intellectually challenged when working in cooperative groups (64.1%).

When looking at the elements of CL, almost 70% of the students indicated that they felt a commitment to other individuals in the group, which indicated that PI was established in the groups. There was also an indication that most of the group members were well prepared for the CL contact sessions (63.5%), which was an indication of the individual accountability that students had towards achieving the group goals. What is noteworthy in this study is that the emphasis students put on quality interaction when learning with fellow students (73.6%), improved their communication skills (75.5%), and the fact that they learnt from each other (84.9%). This is an indication of the strength of social skills and promotive interaction as CL elements in this online environment.

Despite the high neutral opinion of 37%, the majority of students (56.6%) still preferred CL to the traditional lecture-based methods. Although it is clear that most of the students experienced CL very positively, it should also be mentioned that there were some students who had negative experiences towards CL, as implemented in this module. Although not the majority, a noteworthy percentage of students (46.1%) indicated that high-achieving students were held back, and 41.5% were of the opinion that too many students expected other group members to do all the work. A small percentage of students (24.5%) were of the opinion that their fellow students were resistant to work in cooperative groups, and the same percentage also indicated that group members were negatively influencing each other regarding CL. On the question on time related to study with peers, 42.3% responded that it was time-consuming. It should be noted that there was a large amount of neutral responses for all these questions on the negative perceptions of students. Neutral responses may be an indication that students did not want to express an opinion on the matter and might have not felt very strong about the matter.

Narrative responses on open question about the advantages of cooperative learning as applied in this module

Students responded to the question of the most important advantages that CL offered them as student in this module by listing a number of positive aspects related to seven different themes. Some important quotes were listed under each theme.

- Technology use:
  - ‘The Google Docs helped a lot.’ (Student, gender undisclosed, date unknown)
  - ‘I could apply Google Docs and worked with it even in my other classes.’ (Student, gender undisclosed, date unknown)

  - ‘You can sit at home and do your work together.’ (Student, gender undisclosed, date unknown)
  - ‘I can work on the assignment as it fits into my schedule. I can work on my own time and therefore spend more time on the assignment [*sic*].’ (Student, gender undisclosed, date unknown)

- Help and assistance (promotive interaction):
  - ‘As student I learned from my fellow students.’ (Student, gender undisclosed, date unknown)
  - ‘The work was explained at a level that could be easily understood.’ (Student, gender undisclosed, date unknown)
  - ‘Everybody in the group could share ideas and insights.’ (Student, gender undisclosed, date unknown)
  - ‘The lecturer gives us the opportunity to fix our mistakes (throughout the progress of the report).’ (Student, gender undisclosed, date unknown)
  - ‘To be helped if it is incorrect.’ (Student, gender undisclosed, date unknown)
  - ‘There was always someone to help when I had trouble.’ (Student, gender undisclosed, date unknown)
- Interpersonal and small group skills (social skills):
  - ‘My interpersonal relations have improved.’ (Student, gender undisclosed, date unknown)
  - ‘[/] learn to work with others in a group.’ (Student, gender undisclosed, date unknown)
  - ‘It promotes communication in the group.’ (Student, gender undisclosed, date unknown)
  - ‘It improved social skills.’ (Student, gender undisclosed, date unknown)
  - ‘[/*t*] improved patience.’ (Student, gender undisclosed, date unknown)
  - ‘[/] learn to take other’s views and opinions into consideration.’ (Student, gender undisclosed, date unknown)
  - ‘Good social interaction.’ (Student, gender undisclosed, date unknown)

- Motivated to learning and discovery (individual accountability):
  - ‘To discover the work by myself assisted me to understand and remember the work better.’ (Student, gender undisclosed, date unknown)
  - ‘I was involved in seeking information and making sense of the work which resulted in me knowing what was going on from the beginning.’ (Student, gender undisclosed, date unknown)
  - ‘Everyone cooperated.’ (Student, gender undisclosed, date unknown)
  - ‘Learning is much easier.’ (Student, gender undisclosed, date unknown)
  - ‘We motivate each other.’ (Student, gender undisclosed, date unknown)
  - ‘I obtain lots of information on my own and use my own knowledge in the group.’ (Student, gender undisclosed, date unknown)
  - ‘Groups reduce workload.’ (Student, gender undisclosed, date unknown)
  - ‘Create independent, self-directed learners.’ (Student, gender undisclosed, date unknown)
- Cognitive advantages:
  - ‘Learners get to understand the work better.’ (Student, gender undisclosed, date unknown)
  - ‘It exposes us to new ideas and skills.’ (Student, gender undisclosed, date unknown)
  - ‘It assists in expansion of my knowledge and to receive more information.’ (Student, gender undisclosed, date unknown)
  - ‘My subject knowledge has improved.’ (Student, gender undisclosed, date unknown)
  - ‘Gain more insight about concepts.’ (Student, gender undisclosed, date unknown)
  - ‘Assignments are of a higher standard as a result of the collaboration.’ (Student, gender undisclosed, date unknown)

  - ‘It makes you think outside of the box.’ (Student, gender undisclosed, date unknown)
  - ‘It builds my knowledge.’ (Student, gender undisclosed, date unknown)
  - ‘[*It*] gives me new perspectives.’ (Student, gender undisclosed, date unknown)

- Positive interdependence:
  - ‘Everybody work [*sic*] together.’ (Student, gender undisclosed, date unknown)
  - ‘Learn from experience in the group.’ (Student, gender undisclosed, date unknown)
  - ‘It encourages the sense of belonging and team-building.’ (Student, gender undisclosed, date unknown)
  - ‘Work is being shared.’ (Student, gender undisclosed, date unknown)
  - ‘Learn to came [*sic*] to a conclusion.’ (Student, gender undisclosed, date unknown)

- Enjoyment:
  - ‘To work as a group improves the learning experience.’ (Student, gender undisclosed, date unknown)

Students responded to the question of general problems experienced with CL in this module. Important challenges that they experienced were listed and different themes were identified, which are provided with examples of some quotes obtained under each theme.

- Negative interdependence:
  - ‘If one student is lazy of [*sic*] negative, it has an influence on everybody.’ (Student, gender undisclosed, date unknown)
  - ‘Some group members answer the questions in full, which make it difficult to add anything in your own colour [*sic*].’ (Student, gender undisclosed, date unknown)
  - ‘Not everybody works equally hard.’ (Student, gender undisclosed, date unknown)

  - ‘Sometimes using it as social meetings.’ (Student, gender undisclosed, date unknown)
  - ‘Some out done [*sic*] their best and others could then only add to what was outstanding.’ (Student, gender undisclosed, date unknown)
  - ‘Some members work ahead of schedule, [*sic*] and complete all the work.’ (Student, gender undisclosed, date unknown)
  - ‘Some did more than others.’ (Student, gender undisclosed, date unknown)
  - ‘Not everyone can work at the same time resulted in those who work first take all the credit [*sic*].’ (Student, gender undisclosed, date unknown)
- Negative interpersonal and small group skills:
  - ‘When a group member is of the opinion that his/her view is correct and the others ignore and then later it was evident that it was incorrect [*sic*].’ (Student, gender undisclosed, date unknown)
  - ‘Differences in opinions resulted in some conflict.’ (Student, gender undisclosed, date unknown)
  - ‘Not everybody raised opinions.’ (Student, gender undisclosed, date unknown)
  - ‘It is difficult to communicate with everyone.’ (Student, gender undisclosed, date unknown)
- Negative individual accountability:
  - ‘Not everybody cooperates.’ (Student, gender undisclosed, date unknown)
  - ‘Not everybody performs their duty.’ (Student, gender undisclosed, date unknown)

In the last open question, students made recommendations to improve the CL experience in this module.

Themes that emerged from these narratives relate to the following:

- Individual accountability:
  - create opportunities that expect everyone to be prepared

  - regulate better who does what in the group
  - ensure and motivate students to fulfil their role allocated to them
  - to allocate work equally
  - better allocation of roles
  - that each learner responds to each question
  - assessment of each member's roles.
- Positive interdependence:
  - ensure everybody participates.
- Group and time management:
  - more time for every part of the assignment
  - more group gatherings in class
  - assess everybody individually.

It is evident from the students' responses that they could use technology to work within a CL environment, completing their tasks at a time and place suitable to them. They also indicated that they gained from the support and assistance of fellow students and the facilitator and it enhanced their communication and social skills. They were convinced that the CL-embedded online activity increased their motivation for learning and enhanced their SDL. Indication that the inclusion of the elements of CL could even be planned more carefully was obtained from a few students who complained that there were still students not doing their fair share of the work. Interesting enough, they also complained that some students quickly completed all the work, leaving them with nothing to do. They were afraid that the opportunity for them to contribute would be taken away from them when other members of the group quickly completed the assignment before they could join the group. The fact that one of the recommendations refers to the better allocation of roles might be an indication that even more planning and careful implementation of the different roles should be part of a next intervention to improve the role interdependence and ensure equal participation of all members of a group.

Conclusions and recommendations

The use of CL to support online PBL increases the social and teaching presences more than collaborative learning environments. (Importantly, both are still higher than the suggested norm for the CoI of online learning environments.) It is evident that the students were overwhelmingly positive about the implementation of CL with the online Google Docs environment, and it holds advantages not only for the social presence but also for SDL.

To increase cognitive presence with online multimodal environments, it is necessary to place even stronger emphasis on positive role interdependence, group processing and face-to-face promotive interaction. As no guidelines exist on how to include the five elements of CL in an online SDL learning environment, this research provides valuable guidelines; however, research should continue refining the structuring of the five elements of CL for further improvement of social, cognitive and teacher presences, optimising the CoI and SDL.

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Chapter 7

Situated and culturally appropriate self-directed multimodal learning

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Abstract

This chapter deals with situated and culturally appropriate self-directed multimodal learning in terms of distance education in a South African university. This approach has become relevant at this university as both contact and distance students are accommodated in the same degree programmes. In the South African university context, there is a need for decolonisation of the curriculum as contents were traditionally based on perspectives of the West and the Global North. Thus, it has become necessary to

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reconsider how HE could accommodate situated learning and be culturally appropriate in terms of dynamic sign-making processes. This qualitative research involved interviews with lecturers and a questionnaire with open-ended questions aimed at students. From the research it is evident that despite some good practices most of the learning materials and activities are not sufficiently situated or culturally appropriate. Students were divided, based on these issues. However, recommendations are made regarding how effectively content can be localised.

Keywords: Situated learning; Culturally appropriate learning; Self-directed learning; Self-directed multimodal learning; Instructional multimodality; Multilingualism; Multicultural education.

Introduction

The situatedness and cultural appropriateness of learning in HE should be considered within the broader sociopolitical context. In the South African university context, a need for decolonisation of the curriculum has been expressed (Le Grange 2016; Smith 1999), as contents were traditionally based on perspectives of the West and the Global North. Thus, it has become necessary to reconsider how HE could accommodate situated learning (Booth, Guinmard & Lloyd 2017:77; Catalano 2015; Kearney 2015:6–7; Lave & Wenger 2008; Priest, Saucier & Eiselein 2016:362) and be culturally appropriate (Hall 2011) for dynamic sign-making or multimodal processes (Kress 2010). In this context, to support culturally appropriate self-directed multimodal learning (cf. ch. 1), the dynamic nature of culture needs to be considered. Hofstede, Pedersen and Hofstede (2002:34) define culture as 'that which distinguishes one group of people from another' but also note that '[t]here are an infinite number of ways to form a culture, and no culture is objectively better or worse, superior or inferior, to another'. Against this background of the concept of culture, it is essential to consider that self-directed multimodal learning cannot be approached from a monocultural point of view.

With regard to multimodality, Jewitt (2003:37–38) emphasises that meaning-making is socially situated and that specific social, as well as historical forces can have an impact on learning. This aspect has links to Lave and Wenger's (2008:50–51) views on situated learning where 'the inherently socially negotiated character of meaning and the interested, concerned character of the thought and action of persons-in-activity' are emphasised as 'a theory of social practice emphasizes the relational interdependency of agent and world, activity, meaning, cognition, learning, and knowing'. Jewitt (2003) also observes:

> [*M*]ultimodality extends the concept of metafunctions beyond language (speech and writing) to all communicative modes. It asserts that through the cultural shaping of the affordances of modes in the work of semiosis distinct and different potentials for meaning become developed in all semiotic modes (speech, gesture, visual communication, music, and so on). (p. 39)

Hence, culture informs the way through which different modes are used in multimodal contexts.

Furthermore, increased Internet access in diverse educational contexts has led to a point where 'deficiencies in cultural-awareness can no longer remain unattended' (Mohammed & Mohan 2011:21), and this is specifically relevant to distance education students in the South African context. However, Mohammed and Mohan (2011:21) contend that 'developing culturally neutral content and tools is virtually impossible since cultural tendencies pervade every design'. Therefore, it is crucial to explore what can be considered as culturally appropriate in the context of self-directed multimodal learning.

A further impetus for this research is extending the scholarship on the role of the social context in SDL. In this regard, Brockett and Hiemstra (2019) observe:

> [*O*]ne of the most frequent criticisms of self-direction in learning has been an overemphasis on the individual, which is usually accompanied by a failure to consider the social context in which learning takes place. (p. 31)

They (Brockett & Hiemstra 2019) also observe that:

> [/]n order to truly understand the impact of self-direction, both as an instructional method and as a personality characteristic, it is crucial to recognize the social milieu in which such activity transpires. (p. 31)

Moreover, Merriam and Bierema (2014:73) note the importance of the context: the 'psychological, social, political, cultural, and economic environment'. In a study involving BL within the context of students from Sudan, Cronjé (2011) found:

> Hofstede's dimension of power distance explained students' lack of self-confidence and the fact that they had trouble taking initiative, preferring to let the apparently more powerful professor take the responsibility. (p. 602)

In this study, 'the constant challenge that the professors made to the students to take initiative and to take risks led students to rely on one another'. Hofstede et al. (2002:36) describe power distance as 'the degree of inequality between the people that is assumed to be a natural state of affairs'. If such a cultural context can have an impact on elements associated with SDL, then these issues must be considered throughout the learning process. This chapter focuses on ethnographically exploring the situated and culturally appropriate nature of current multimodal learning practices in terms of SDL at a selected institution.

The following main research question was posed for this project: what would situated and culturally appropriate self-directed multimodal learning at a university entail?

The following sub-questions emerged from the main research question and determine the nature of the research:

- From existing scholarship, what is the nature of situated learning within a context of self-directed multimodal learning?
- What does the theoretical background around culturally appropriate learning with specific focus on implementation in self-directed multimodal learning involve?
- What are students' perceptions regarding situated and culturally appropriate self-directed multimodal learning in terms of their own learning?

- What are lecturers' perceptions about situated and culturally appropriate self-directed multimodal learning in terms of their own teaching?

This research involved qualitative research to answer the above-stated questions. Data were collected by means of questionnaires that included open-ended questions completed by students studying through the distance mode of delivery (Appendix 1) and interviews with university lecturers (Appendix 2). This chapter aims to contribute towards understanding situated and culturally appropriate self-directed multimodal learning in distance education at institutional and, to some extent, instructional levels of multimodality (cf. ch. 1).

Literature overview

As 'the point of departure for understanding learning lies within the individual' (Brockett & Hiemstra 2019:27), the community and culture of individual lecturers and students need to be considered even in distance education contexts. The online educational environment associated with distance education implies, according to Merriam and Bierema (2014:75), SDL 'is almost assumed for this type of learning, which can leave some learners lost and frustrated'. To this end, the conceptual framework of this chapter is informed by scholarship on situated learning, culturally appropriate learning and multimodal SDL.

Situated self-directed multimodal learning

Situated learning places the focus on the context in which the learning would be applied (Catalano 2015:653) and on 'learning as participation in the social practices of communities' (Priest et al. 2016:361). The concept of situated learning is approached from what Lave and Wenger (2008) called *legitimate peripheral participation*, which means:

> [*T*]hat learners inevitably participate in communities of practitioners and that the mastery of knowledge and skill requires newcomers

> to move toward full participation in the sociocultural practices of a community. (p. 29)

It is, however, essential to note that situated learning 'is not itself an educational form, much less a pedagogical strategy or a teaching technique' but rather 'an analytical viewpoint on learning, a way of understanding learning' (Lave & Wenger 2008:40). In this chapter, situated self-directed multimodal learning is also considered as a way to approach learning and not as a strategy.

Situated learning does not only imply specific content but also a learning context. With that in mind, the following assertion by Priest et al. (2016:362; [*emphasis in the original*]) is relevant: '[s]ituated learning shifts the focus from learning *about* the social world to learning *in* and *through* it'.

Despite the prominence of the lecturer in the focus on apprenticeship, Lave and Wenger (2008) also recognised the importance of student-centredness. In this regard, they observed that it 'seems typical of apprenticeship that apprentices learn mostly in relation with other apprentices' (Lave & Wenger 2008:93). Furthermore, Lave and Wenger (2008) proposed a decentered view:

> To take a decentered view of master-apprentice relations leads to an understanding that mastery resides not in the master but in the organization of the community of practice of which the master is part: The master as the locus of authority (in several senses) is, after all, as much a product of the conventional, centered theory of learning as is the individual learner. Similarly, a decentered view of the master as pedagogue moves the focus of analysis away from teaching and onto the intricate structuring of a community's learning resources. (p. 94)

Therefore, the concept of apprenticeship has value in situated self-directed multimodal learning, especially student-centred learning with interdependence on peers and lecturers. Within situated learning, the importance of authentic and real-life situations is also evident (Booth et al. 2017:77; Catalano 2015:653).

The nature of situated learning should also be understood in the context of SDL. Candy (1991:312) describes SDL as a 'person-

situation variable; that is; it is not a quality that inheres in the person independent of the situation or in the situation independent of the person' and therefore the relevance for SDL is evident. Bolhuis (2003:331) also concurs in this regard, stating that SDL 'depends on domain-specific knowledge and may vary across communities of practice'. In addition, Bolhuis (2003:330) asserts that '[l]earning is context-bound, and involves hands-on manipulating, experiential learning and learning in social interaction in a socio-material situation or community of practice'. Therefore, according to Merriam and Bierema (2014:200), we should approach learning 'holistically and recognize ways of knowing beyond cognitive to include somatic, emotion, and spirituality' and 'recognize how learning is embedded in everyday life'. In addition, the concept of culturally appropriate learning is relevant. An important issue raised by Pérez-Sanagustín et al. (2015) is that, in order to:

> [*F*]oster students' self-directed learning, the teachers emphasized the point that it is important to provide a technological setting that is reliable and does not interfere in their learning process, but rather supports it. (p. 80)

With regard to SDL, Brockett and Hiemstra (2019:184) acknowledged that it is important that the 'cultural context is recognized and respected'. They also observed that '[t]here are cultural differences that must be understood in working with learners who may prefer to be self-directed' (Brockett & Hiemstra 2019:193). Criticism is also evident from the literature that, in SDL research, culture and context are sometimes ignored (Merriam & Bierema 2014:77, 194). Merriam and Bierema (2014:77) noted that '[e]ducators' sensitivity to learners from non-Western cultures is very important if we hope to effectively support and facilitate learning'. Furthermore, according to Gay (2018:112), a culturally relevant pedagogy refers to the need to 'make classroom instruction more consistent with the cultural orientations of ethnically diverse students'. This makes the issue of multiculturalism in education even more relevant in the South African context.

The concept of *culturally appropriate learning* also shares features with *culturally responsive learning* and *culturally relevant*

learning. The UNESCO Institute for Information Technologies in Education proposes in its document on ICTs and indigenous people (UNESCO 2011:7) that ICTs should be used 'to provide culturally responsive learning opportunities'. Furthermore, this document – although it specifically focuses on indigenous peoples – also recommends that 'ICTs may be used to provide local content through the development, translation, and adaptation of local content using diverse forms of digital and traditional media' and that 'the development of ICT-supported, culturally appropriate curriculum resources requires a blend of cultural, pedagogical, and technological expertise' (UNESCO 2011:8).

Finally, it is essential to consider how technology can be a means towards accommodating situated learning. Catalano (2015:653) investigated 'the efficacy of a situated learning environment for facilitating transfer during tasks requiring the evaluation of information in an online information literacy course'. In that study, 'where conditions for transfer were maximised based upon strategies expounded upon in the situated cognition literature, situated learning demonstrated a significant effect on the production of transfer of knowledge' (Catalano 2015:658).

Pérez-Sanagustín et al. (2015:70) described how previous research has shown that technology can be used to construct situated learning contexts through the creation of virtual equivalents or situated learning environments. Importantly, Yeoman and Wilson (2019:2092) contended that 'to say that learning is physically situated requires more than acknowledging that "context" matters' and, consequently, it requires 'a deep understanding of how materials participate in teaching–learning practice' and 'a commitment to designing for learning'. Therefore, drawing on the theoretical basis of multimodality is also useful as the focus in many publications of multimodality is specifically on how different modes or materials are used for the sake of meaning-making. Finally, the importance of an informed design process is also clear.

Conrad et al. (2017:1) stated that virtual worlds 'can be identified as a means to provide an "authentic context" in which a situated

learning approach can take place' and an 'advantage of virtual worlds is that they provide an experience of "reality" in an otherwise safe and controllable environment' despite the negative aspect that traceability might be made more possible if the environment is more realistic. Regarding creating virtual worlds, Conrad et al. (2017:8) observed that '[a]ppropriate context, for instance, in the setup of a virtual world that links various "local" virtual environments together, becomes a prerequisite to enhance this immersive learning'.

In addition to situated learning, in this chapter, the idea of self-directed multimodal learning being culturally appropriate is also pertinent.

Culturally appropriate self-directed multimodal learning

Learning being culturally appropriate implies recognising culture as an important variable in the educational context. Consequently, this chapter links up with the broader movement towards recognising different cultures in education. The concept of *multicultural education* is defined by Cushner, McClelland and Safford (2009:22) as 'a process of educational reform that assures that learners from all groups (racial, ethnic, socioeconomic, ability, gender, etc.) experience educational equality, success, and social mobility'. As multicultural education implies some type of reform, the following definition by Nieto (1996) is also relevant: multicultural education is regarded as:

> [*A*] process of comprehensive school reform and basic education for all students. It challenges and rejects racism and other forms of discrimination in schools and society and accepts and affirms the pluralism (ethnic, racial, linguistic, religious, economic, and gender, among others) that students, their communities, and teacher represent. (p. 307)

Therefore, multicultural education can be considered as a process that needs to be executed in such a manner that an institution as a whole is involved.

From the existing research on culturally appropriate learning, it was found that 'students appreciated the use of culture and were especially engaged when humour was involved' and in this regard, they employed '[s]ubtle, careful use of cultural semiotics, specifically familiar language and cultural names of objects and foods' (Mohammed & Mohan 2011:32). Al-Hunaiyyan, Al-Huwail and Al-Sharhan (2008:19–22) identified three distinct cultural elements that need to be considered when blending with eLearning: language issues; social, political, economic and religious issues; and technical issues. With this in mind, the focus moves to multimodal learning, which supports SDL.

The research for this chapter took place within the context of multimodal learning where distance education (cf. ch. 5) is delivered through blending eLearning and live lesson broadcasts where SDL needs to be accommodated. In this regard, this research ties in with the scholarship on BL and SDL (cf. ch. 2, ch. 4, ch. 6, ch. 9 & ch. 10). Multimodality is therefore approached in the sense of multimodal learning/teaching and delivery (cf. Olivier 2018:7) or instructional and institutional multimodality (cf. ch. 1). Furthermore, any such multimodal learning activity would also imply deriving and creating meaning. In this regard, Jewitt (2003) makes the following statement:

> Meaning making starts in production with the interests of the sign maker as they are configured in a specific social context and moment in time. Meaning making can be understood as the interaction between the socially situated interest of the sign maker and the potentials for meaning (what it is possible to mean) with the resources available to them and their realisation in specific representational and communicational acts (signs). (p. 39)

It is therefore evident that meaning is also inextricably linked with a specific social and chronological context. This aspect of meaning also supports the concept of situated learning.

Furthermore, self-directed multimodal learning builds on the theoretical background of SDL. Brockett and Hiemstra (2019:24) define SDL as 'a process in which a learner assumes primary

responsibility for planning, implementing, and evaluating the learning process', whilst the so-called learner self-direction itself 'centers on a learner's desire or preference for assuming responsibility for learning'. Similarly, Merriam and Bierema (2014:67) describe SDL as an instance when one 'intentionally sought the learning, planned your learning, took responsibility, controlled your learning, and evaluated the outcome'. Knowles (1975:9–10) emphasises the importance of 'setting a climate' of 'mutual respect' that is 'conducive to dialogue', once again emphasising the relevance of situatedness and culture. Important resources that need to be embraced in this context are culturally appropriate content and approaches. As Knowles (1975:18) states, in the SDL process, individuals must be able to 'identify human and material resources for learning', and both situated and culturally appropriate learning involve both human and material resources.

Multimodal learning (blending of learning modalities in instruction or delivery) also implies some form of instructional design. According to Mohammed and Mohan (2011:21), 'e-Learning content and online tools were considered to be more usable if they were designed without any culture-specific features'. Inherently, multimodal learning implies certain advantages of accommodating different cultures as 'it allows students from different cultures the ability to select the delivery format of their learning content, hence improving their interaction with the environment' (Al-Hunaiyyan et al. 2008:18). In addition, Al-Hunaiyyan et al. (2008:27) propose using cultural learning objects and this implies that LOs, which can be defined as 'reusable components in knowledge databases that provide flexibility in virtual learning environments for reusability, generativity, adaptability and scalability', are 'enriched by information about the target culture'.

With the aforementioned scholarly discourse in mind, this research explored situated and culturally appropriate self-directed multimodal learning at a selected university.

Research methodology

This chapter involved two distinct phases of empirical research with lecturers and students. Through these exploratory steps, a triangulated depiction was envisaged through which the nature of what situated and culturally appropriate self-directed multimodal learning involved and ideally would require, was investigated. In the following paragraphs, the relevant research paradigm, research approach, research method, method of sampling, research ethics, data collection strategy, description of the research context, as well as description of how the data analysis was conducted are discussed.

Research paradigm

The research was approached from an interpretivist paradigm (cf. Bakkabulindi 2015:22): qualitative data were used to understand reality from the experiences of lecturers and students. As such, the aim of this exploratory research was to 'investigate the interpretations of the situation made by the participants themselves, to understand their attitudes, behaviours and interactions' (Cohen, Manion & Morrison 2017:84).

Research approach

A qualitative research approach was followed as the aim was 'knowing more about one's practice, and indeed in *improving* one's practice, leads to asking researchable questions, some of which are best approached through a qualitative research design' (Merriam 2009:1; [*emphasis in the original*]). Hence, the need to extend knowledge regarding practices, and ultimately improving practices, drove this research, and qualitative research specifically lends itself to informing such a process. Furthermore, as a researcher, I am interested in 'understanding how people interpret their experiences, how they construct their worlds, and what meaning they attribute to their

experiences' (Merriam 2009:5). An essential aspect of this specific research is that it was conducted inductively (Merriam 2009:15) as no specific theory or hypothesis was tested, but conclusions were drawn from the data.

Research method

Because of the nature of the data, this project involved ethnographic research, and because of the research context, the research drew from the principles of digital ethnography (Pink et al. 2016). This approach was deemed suitable as the focus was on the way in which two specific groups act and interact with culture itself. In support of this decision, the following statement by Bateman, Wildfeuer and Hiipala (2017:144) can be considered: '[i]ncreasingly relevant as a means of obtaining information about multimodality, and particularly about multimodal practices, are methods drawing on ethnography'. The research was a 'descriptive, analytical and explanatory study of the culture (and its components), values, beliefs and practices of one or more groups' (Cohen et al. 2017:623). As noted before, this research employed two distinct phases: interviews with lecturers and questionnaires with open-ended questions completed by students.

Through interaction with lecturers and students, the practices regarding situated and culturally appropriate self-directed multimodal learning were explored. In this regard, generalisability was not the aim; however, comparability to and translatability in other contexts were considered. Cohen et al. (2017) observe the following in this regard:

> For comparability, the characteristics of the group that is being studied need to be made explicit so that readers can compare them with other similar or dissimilar groups. For translatability, the analytic categories used in the research as well as the characteristics of the groups are made explicit so that meaningful comparisons can be made to other groups and disciplines. (p. 625)

Sampling

In this research, the sample had to comprise lecturers and students who were involved in multimodal learning and, of course, they had to willingly participate in the research. A purposive sampling was used as the research participants were selected 'on the basis of their judgement of their typicality or possession of the particular characteristic(s) being sought' (Cohen et al. 2017:474). Where necessary, I also employed snowball sampling strategies (Cohen et al. 2017:478) in order to involve additional individuals who were knowledgeable about multimodal SDL. For this research, 855 first-year students from the Faculty of Education across different programmes presented through the distance education mode were approached and 65 (8%) students completed the anonymous online questionnaire. Furthermore, 107 distance education lecturers were approached and 10 (9%) lecturers consented to participate in the individual interviews.

Research ethics

Research ethics were adhered to throughout the research process. The whole research process, question schedules and related documentation were approved by the relevant faculty's research ethics committee, whereafter permission to conduct the research was requested from the institution's research data gatekeeper committee and the relevant dean. An independent person managed the recruitment of the participants. Open invitations were posed to all individuals who met the inclusion criteria. Written informed consent was obtained from all the participants. Confidentiality and privacy were ensured throughout the process: the questionnaires completed by students and the individual interviews with lecturers were kept anonymous, and the data contained no identifiable information that could disclose the identity of the participants. All participants were informed prior to the research that their participation was totally voluntary and that they were allowed to withdraw from the study at any point. In addition, the collected data will be kept secure for a

period of seven years, after which it would be destroyed. Finally, ethical conduct and research integrity were ensured through maintaining honesty, accountability, professional courtesy, as well as good stewardship of the research data and findings.

Data collection

The data collection involved (1) semi-structured interviews (Cohen et al. 2017:1057–1100; Merriam 2009:89; Tshabangu 2015:50) conducted face-to-face with lecturers and (2) questionnaires with open-ended questions (Bateman et al. 2017:145) completed by students. Open-ended questions were preferred because they 'invite an honest, personal comment from respondents' (Cohen et al. 2017:989) and they '[put] the responsibility for, and ownership of, the data much more firmly into respondents' hands' (Cohen et al. 2017:990). The questionnaires were facilitated by means of Google Forms.

Context

This research was conducted with lecturers and students at a university that provides HE through both contact and distance modes. This university comprises three different residential campuses in the towns of Potchefstroom, Vanderbijlpark and Mahikeng (cf. ch. 5), respectively, situated in the North West and Gauteng provinces of South Africa. In 2019, this university had a total of 68 593 students at undergraduate and postgraduate levels, of which 23 885 (34.8%) students studied through the distance mode (NWU 2019). In addition, the institution had 3890 staff members, of whom 1506 were involved in teaching and research (NWU 2019).

The focus of this research was on a faculty of education and, specifically, students and lecturers involved in distance education. Kearney (2015:1) presents a conceptual framework for 'beginning teacher induction as a situated learning process through an organisational socialization framework'. In addition, the research

conducted by Booth et al. (2017) also focused on novice teachers. Consequently, the idea of situated learning is highly relevant within a teacher training context.

Data analysis

The qualitative data in this project were analysed inductively (Cohen et al. 2017:1337; Saldaña 2011) by means of ATLAS.ti™. To this end, transcriptions of the interview responses and questionnaires with open-ended questions were used as data sources. Furthermore, codes, categories and themes were identified from the qualitative data. In order to ensure credibility and trustworthiness (Saldaña 2011) of the analysis, at least two cycles of coding were conducted. Internal validity or credibility (Merriam 2009:213) was ensured by corroborating the findings with the research participants through respondent validation. In addition, triangulation was done by comparing the findings of the lecturer interviews and student questionnaires. An audit trail was maintained through the use of a reflective journal. An audit trail, according to Merriam (2009:223), involves '[a]n audit trail in a qualitative study describes in detail how data were collected, how categories were derived, and how decisions were made throughout the inquiry'. It is also important to be cognisant of any researcher biases (Cohen et al. 2017:1344) throughout the data analysis process.

Results

The results of the empirical research are presented next by means of the identified codes and themes. Where responses are presented, they are presented verbatim.

Profile of the students

The first question that was posed to students related to their language profile. Clearly, even this abstracted sample shows the overall multilingual nature of the student population and also

their personal bi- and multilinguality. Because of the small number of lecturer responses and the fact that they might be identifiable if specific mother tongues are reported, the language distribution of the lecturers is not reported. However, it is important to note that they were all at least bilingual, with some being multilingual. An overview of findings on the students is presented in Table 7.1.

This spread of different languages is also in line with multilingualism at the institution (Olivier 2014; Verhoef & Venter 2008:386), as well as the wider institution's multilingualism as noted in the Higher Education Management Information System (HEMIS) reports by the South African Department of Higher Education and Training (DHET 2017) (see Table 7.2).

TABLE 7.1: Language profile of the student research participants.

Mother tongue	*N*	Additional language	*N*	Language profile	*N*
Afrikaans	32	English	55	Multilingual	32
Setswana	7	Afrikaans	4	Bilingual	31
English	6	Sesotho	1	Monolingual	2
isiZulu	5	isiZulu	2		
Sesotho	4	isiXhosa	1		
isiXhosa	4	None	2		
Sesotho sa Leboa	3				
Tshivenda	2				
isiNdebele	2				

TABLE 7.2: Language distribution at the North-West University in 2017.

Language	*N*
Afrikaans	17 611
Setswana	11 765
Other/unknown	11 195
isiZulu	7 741
isiXhosa	3 651
Sesotho	3 391
English	2 913
siSwati	1 612
Xitsonga	1 120
Tshivenda	766
isiNdebele	504
Sesotho sa Leboa	289

Source: Data collated from DHET (2017).

With regard to cultural affiliation, students provided specific languages, tribes, religions and more neutral descriptions like 'South African'. In addition, other responses included:

- 'All of them, I am a multilinguistic.' (Student, gender undisclosed, age undisclosed)
- 'I don't have any specific cultural affiliation group.' (Student, gender undisclosed, age undisclosed)
- 'None. Did not grow up in Southern Africa.' (Student, gender undisclosed, age undisclosed)

For some of the students, there did not seem to be a need to overtly identify with a specific culture, and, to an extent, multiculturality and exposure to other cultures support this approach. However, it is concerning that the third participant above did not even want to identify a specific culture as the person did not grow up in this region. To further investigate the concept of culture, the research participants were asked about the culture they associate with the university.

Culture associated with the university

The student participants noted that they regarded the institution as being diverse, multilingual, specifically South African, but also Afrikaans, Western/European, and even English. The following quotations (in the bulleted lists) illustrate some of these sentiments:

Multilingual:

- 'Multi-cultured'. (Student, gender undisclosed, age undisclosed)
- 'Multilingual'. (Student, gender undisclosed, age undisclosed)

Afrikaans:

- 'Afrikaner, I chose to study through NWU as it is one of the remaining universities still offering Afrikaans as studying medium [*sic*]. The modules are culture diverse and I do not find that any culture has been applied specifically to a single module'. (Student, gender undisclosed, age undisclosed)

- ‘Afrikaans, but also trying to be inclusive’. (Student, gender undisclosed, age undisclosed)
- ‘The cultural feeling I get when think about NWU is Afrikaans’. (Student, gender undisclosed, age undisclosed)

Western and European:

- ‘Western’. (Student, gender undisclosed, age undisclosed)
- ‘European culture, with a bit of South Africa in context with certain modules’. (Student, gender undisclosed, age undisclosed)

English:

- ‘English as it is the medium of instruction that I am comfortable with’. (Student, gender undisclosed, age undisclosed)

Despite some acknowledgement that multiculturalism and multilingualism can be associated with this institution, the respondents highlighted the prominent role of Afrikaans and English. Some students indicated that modules (the name for specific courses at this institution) were culturally diverse. Interestingly, the culture associated with this institution was also Western and European.

With regard to the lecturer participants, there was some overlap, but for them, the culture associated with the university related to diversity, inclusivity, academic culture and a neutral approach within the university. The following statements illustrate these issues:

Diversity:

- ‘I think the main element for me is the diversity of the North-West University. But there’s not, necessarily, a culture or a few cultures specifically that I think I can associate with NWU’. (Lecturer, gender undisclosed, age undisclosed)
- ‘We are so diverse here, but we have a common understanding’. (Lecturer, gender undisclosed, age undisclosed)
- ‘I would say that the culture of the North-West University is multicultural, and I don’t think it’s associated to a specific culture’. (Lecturer, gender undisclosed, age undisclosed)

Inclusivity:

- ‘I would say it’s a … a culture of inclusivity. They are really accommodating all the different cultures’. (Lecturer, gender undisclosed, age undisclosed)

Academic culture:

- ‘In my module, we have to expose the students to the academic culture. So, it’s not the English they use every day, but a more academic language and culture than they are used to’. (Lecturer, gender undisclosed, age undisclosed)
- ‘The first time I came here, I observed a learning culture; you can visually see it’. (Lecturer, gender undisclosed, age undisclosed)

Neutral approach to culture:

- ‘So, it’s more university-focussed and not specifically one group of people. Yes, it’s focused on our students but not on one culture like a tribal group or a people’. (Lecturer, gender undisclosed, age undisclosed)
- ‘I don’t feel there is any one culture you could link to the NWU or to my modules’. (Lecturer, gender undisclosed, age undisclosed)

The specific Afrikaans-English-Western-European cultural aspect noted by students was not evident from the lecturers’ views. This difference in the perceptions of lecturers and students would require further empirical research, but this conclusion could inform future approaches to learning in this context as the perceptions of students need to be addressed. An interesting aspect was the reference to the type of institutional or academic culture. From the responses, the importance of an institution’s own culture was also relevant. This aspect relates to Lave and Wenger’s (2008:40) statement that ‘schools themselves as social institutions and as places of learning constitute very specific contexts’.

Contextualised learning content

Towards supporting situated learning, it was important that learning is contextualised to the real-world experience of students, and ultimately the teaching context in which they are apprenticed. The students were divided on whether the content was related, sometimes related or not related at all, as was evident in their responses.

Related:

- 'Yes , [*sic*] geared towards my future career path with insightful content'. (Student, gender undisclosed, age undisclosed)
- 'Yes because it is relevent [*sic*] to our everyday life'. (Student, gender undisclosed, age undisclosed)

Sometimes related:

- 'Sometimes yes, at times it is a bit irrelevant and the lectures [*sic*] who give whiteboard lessons have a strong Afrikaans accent'. (Student, gender undisclosed, age undisclosed)

Not related:

- 'No i [*sic*] do feel some are useless modules'. (Student, gender undisclosed, age undisclosed)
- 'No, modules are not what I [*sic*] expected'. (Student, gender undisclosed, age undisclosed)

The students were not unanimous in their views; yet these views are significant, specifically the Afrikaans accent mentioned and the modules described as useless or not as expected. The lecturers were also divided on whether the learning content was related to the students' context.

Content related to the context:

- 'I would say to a certain degree, yes, but I think there is still a lot that I can do, and I'm trying to improve every year as I teach these modules'. (Lecturer, gender undisclosed, age undisclosed)

- ‘In some ways, yes, but in most ways, no’. (Lecturer, gender undisclosed, age undisclosed)

Content related to professions:

- ‘I think in the sense of preparing them for becoming a teacher, yes. I try to make the content very practical for the different teaching contexts that you can find as a teacher in South Africa’. (Lecturer, gender undisclosed, age undisclosed)
- ‘I would say “yes”, because my module is about teaching, teaching strategies and whatever, so how they teach in their classes, really, it talks to their real environment, and most of the time it’s just to help them be better teachers’. (Lecturer, gender undisclosed, age undisclosed)
- ‘[W]hen I explain my modules, and the content of the modules, it is not really linked to a cultural context. It’s linked to the working context of the students being educators’. (Lecturer, gender undisclosed, age undisclosed)

Content not related to the context:

- ‘Not yet. They… they still need to get used to the context’. (Lecturer, gender undisclosed, age undisclosed)
- ‘Not always, because we are really… The textbooks, for instance, that we are using, is not always South African relevant [*sic*]’. (Lecturer, gender undisclosed, age undisclosed)

Lecturers regarding students as effectively prepared for the context of being a teacher show some evidence towards supporting situated learning. In this regard, students are supported to become part of this community of practice. Lave and Wenger (2008:29) specifically linked situated learning to ‘the process by which newcomers become part of a community of practice’, and hence ‘learning is configured through the process of becoming a full participant in a sociocultural practice’. The quotations above also correspond to the view of learning by Priest et al. (2016:361), who considers it as ‘a socialization and identity shaping process in which learners gain knowledge and skills contextualized, and legitimized, by their communities’.

In a further question, the issue of the learning content being relevant to all students and not just a single or more generic idea of a student was raised. In this regard, the students made the following remarks.

Learning content relevant to all students:

- 'Yes, the lecturers always consider all the cultures'. (Student, gender undisclosed, age undisclosed)
- 'Yes, the content is accommodates [*sic*] all diverse learners and their learning needs so that implementation at the different classroom will be the same irrespective of cultural differences'. (Student, gender undisclosed, age undisclosed)
- 'Yes cause we live in a very diverse country so we need to understand the content that we are dealing with so that we as the future generation of teachers are able to adapt to any environment that we should find ourselves in. The content does not discriminate or show any means of racism and i'm proud to be a part of it [*sic*]'. (Student, gender undisclosed, age undisclosed)

Learning content not relevant to all students:

- 'No. Some students can not relate to the prescribed material as it excludes some students in terms of their culture, religion, dialect or sexuality'. (Student, gender undisclosed, age undisclosed)
- 'No, as it sometimes makes you question your cultural beliefs'. (Student, gender undisclosed, age undisclosed)
- 'No, not all modules content is appropriate for all students'. (Student, gender undisclosed, age undisclosed)
- 'No, it's only appropriate to promote the management's cultural orientation, not that of students involved'. (Student, gender undisclosed, age undisclosed)

Learning content relevant and sometimes not relevant to all students:

- 'Yes and No. I say this because yes the content being learned is appropriate to some cultures for example all cultures can

understand the content in life sciences and not be offended but NO because certain subjects introduce ideas like democracy, race and religion and I could see how some people get offended by the recurring idea of apartheid [*sic*]'. (Student, gender undisclosed, age undisclosed)

Learning content is neutral:

- 'Yes, the content is very neutral'. (Student, gender undisclosed, age undisclosed)
- 'Because the content is not culturally directed, rather it is suitable for every student as it is delivered in the common language of English'. (Student, gender undisclosed, age undisclosed)
- 'Learning content is neutral and doesn't focus on specific culture'. (Student, gender undisclosed, age undisclosed)
- 'I do believe that the content is non cultural specific [*sic*] at all, however it is directed neutrally across the board'. (Student, gender undisclosed, age undisclosed)

From these responses, some acknowledgement and accommodation of diversity and different cultures are clear. Yet, some believed that students are excluded and that the content may not be appropriate for some students. Furthermore, the perception also exists that, in some instances, content can be presented in a culturally neutral manner. This statement is contrary to the literature: Mohammed and Mohan (2011:21) noted that it is difficult for content to be neutral in terms of culture.

The lecturer responses were also recorded in this regard.

Learning content is appropriate but not to all:

- 'I think it is appropriate, but not for everyone on the same level'. (Lecturer, gender undisclosed, age undisclosed)

Learning content related to African scholars needed:

- 'We need to walk the extra mile for [*sic*] with our students. We need to get African theorists about, say, for instance, cognitive development say, for instance not only s ... specifically

using Piaget. Although they are the ground-breakers, the Piaget's and the Vygotsky's and people like that, but we have to go out and look for African theorists who worked on that to bring that in because I think that we might lose some of our students in that concept ... [*sic*]'. (Lecturer, gender undisclosed, age undisclosed)

Lecturers do not have enough knowledge:

- 'I don't think personally I know enough about each culture and the nuances of each culture to honestly say that my learning content will appeal to everyone and is culturally appropriate'. (Lecturer, gender undisclosed, age undisclosed)

Module content does not allow for content to be relevant to all students:

- 'I think ... when ... looking at research, that is, my module content, it's very difficult to .... to associate it with specific culture'. (Lecturer, gender undisclosed, age undisclosed)

The content provided is from a Western perspective:

- 'No, not at all. ... They are presented, compiled, thought out and written and made available to our students from a Western, South African Western perspective'. (Lecturer, gender undisclosed, age undisclosed)

Despite some appropriateness, the learning content cannot be regarded as relevant to all students; as African theorists are not included in the content, lecturers may not have sufficient knowledge about content and there is a perception that some modules cannot include anything on culture. Finally, one research participant acknowledged that the content itself and its presentation stem from a Western, or in this person's words, a 'South African Western perspective'. In order to further investigate the nature of situated and culturally appropriate learning in this context, it was necessary to find out to what extent both students and lecturers were and could be involved in determining content within the curriculum.

Student and lecturer involvement in determining content

As SDL requires students being able to determine their own resources, their involvement is implied in the content selection process (cf. 'Culturally appropriate self-directed multimodal learning'). Consequently, the role that students and even individual lecturers played in selecting content was explored. Within this focus, the students reacted as follows:

Students believe they have limited involvement in determining content:

- 'No choices'. (Student, gender undisclosed, age undisclosed)
- 'I don't think the choice is much, I have selected my two major modules for my degree but to find out the other modules to study I am not happy with and do not know how they were added [*sic*]'. (Student, gender undisclosed, age undisclosed)
- 'I cannot say I determine the learning content. It is what is taught [*sic*]'. (Student, gender undisclosed, age undisclosed)
- 'At the moment I don't have a choice in the content [*sic*] I'm learning now it was chosen for me, but I do enjoy what I'm learning'. (Student, gender undisclosed, age undisclosed)

Students have choices outside the classroom setting:

- 'I read the content and if I don't understand it I search for videos or articles relevant to the content'. (Student, gender undisclosed, age undisclosed)
- 'If I can apply the learning content to the context of my life, it is relevant'. (Student, gender undisclosed, age undisclosed)

Students have choices only in terms of qualification:

- 'You have to deside [*sic*] you want to study'. (Student, gender undisclosed, age undisclosed)

Clearly, according to students, on a broader level, they do not have any choice as to what learning content is included in their curricula. It is therefore an important area of future development within the process. However, the fact that students independently

select their own resources outside of the formal educational structure in order to reach specific outcomes, is quite positive. The question posed in this regard seems somewhat problematic as content choice can be interpreted at the level of finding information for an assessment up to the selection of a specific qualification and therefore student involvement in content is also a relative concept. The issue of involvement with content selection was also explored in the perceptions of lecturers.

According to lecturers, students have limited involvement in determining content:

- 'At this point and time, they don't explicitly have really ... they don't really contribute to what type of learning material we have in the module. I think that is something that could be looked into; what we give them is what they have'. (Lecturer, gender undisclosed, age undisclosed)
- 'I don't think our students have much of a choice'. (Lecturer, gender undisclosed, age undisclosed)
- 'I don't think they have a say. I mean, it's prescribed work. It's like in school. A child doesn't have a say in what he has to learn. It's a prescribed curriculum'. (Lecturer, gender undisclosed, age undisclosed)
- 'I don't think at this stage students really have a ... lot of choice in determining learning content, because the learning content is part of the programme development, and I don't think that, at this stage, students' opinions are sought after in programme development'. (Lecturer, gender undisclosed, age undisclosed)

Student involvement in content is limited to examples:

- 'Examples are, in fact, very open'. (Lecturer, gender undisclosed, age undisclosed)

Student involvement in content is limited to assessments:

- 'Within assignments, they can use whatever sources they want'. (Lecturer, gender undisclosed, age undisclosed)

Lecturers provide opportunities for students to influence the content selection:

- ‘I do give them freedom to also bring in other work and do their own research’. (Lecturer, gender undisclosed, age undisclosed)
- ‘We sometimes get that through feedbacks, and unfortunately, when you get your feedback, the student goes to the next lecturer for the next module’. (Lecturer, gender undisclosed, age undisclosed)
- ‘I don’t know if they have much … if I give them enough choices. It feels to me, I think I place the information there and decide on the content; I think the only choice they have is where I give three links to videos and they can decide if they want to watch one or two or all three’. (Lecturer, gender undisclosed, age undisclosed)

Most of the lecturer participants felt that the students were not involved in determining the content used in classes. Despite one expressing the feeling that students should not have a say in a prescribed curriculum, some indicated that it might be necessary. Reduced involvement by students was reported with respect to examples provided in the class, as well as resources consulted for the sake of assessments. To a lesser extent, there was evidence of lecturers creating opportunities to include student voices in determining content, but this was limited to contributing resources to the class, providing feedback and also offering choices within curated resources.

Finally, apart from student choices, it was also important to gauge the nature of lecturers’ involvement in selecting content. This is particularly appropriate in a context in which more than one lecturer is involved in modules presented at different sites of delivery and through different modes. Because of accreditation and quality concerns, alignment ensuring similar content, outcomes, assessments and experiences for students between lecturers, campuses and modes is a recurring issue in this context. The lecturer participants said the following in this regard.

Lecturers’ content choices are limited because of alignment:

- ‘I have a lot of freedom to choose the content that I would like to use … except that it has become a bit more restricted in the

past few years by incorporating other colleagues on other campuses'. (Lecturer, gender undisclosed, age undisclosed)
- 'I'm working in a team with other lecturers where we have to agree together [*sic*] what are we going to do, because all content that we give to our students … we want all our students to have a similar learning experience and this module is aligned with the on-campus module'. (Lecturer, gender undisclosed, age undisclosed)
- 'I don't have a choice. The on-campus lecturer compiles all the work and then it is forwarded to me and then I teach it'. (Lecturer, gender undisclosed, age undisclosed)
- '[T]he development of the modules also happens across campuses. So, everybody gives an input on the specific content that they want to include, or how we want to approach the content, what sources we want to use'. (Lecturer, gender undisclosed, age undisclosed)

Lecturers' content choices are bound by resources:

- 'But we are bound to the book we use …' (Lecturer, gender undisclosed, age undisclosed)

Lecturers' content choices are bound by outcomes:

- 'I don't have choices from the outcome perspective, the outcomes of the module, which means, even if I use the content, they must meet a certain outcome'. (Lecturer, gender undisclosed, age undisclosed)
- 'Unfortunately, the outcomes of these study guides have been written before my appointment, so it's … actually, I see it as guidelines, and I do feel I have some freedom in deciding which content I will include, with the outcomes guiding you, of course'. (Lecturer, gender undisclosed, age undisclosed)

Some lecturers believe they have a choice with regard to content:

- 'I can really choose what I want to do, and again, there's the responsibility lies on [*sic*] me to accommodate my students'. (Lecturer, gender undisclosed, age undisclosed)
- 'I think, as a lecturer, you have an opportunity to do that, because you develop your own module, and you also have an

> opportunity, if you didn't develop the module, of improving the module to suit you as a lecturer and the kind of students that you are serving'. (Lecturer, gender undisclosed, age undisclosed)

An important issue regarding making content more culturally appropriate was the fact that lecturers from different contexts had to align their classes. Consequently, lecturers felt that this process inhibited them from differentiating between the various student populations they had, as such a process would imply dissimilar learning experiences. Conversely, with regard to the compilation of content, this is either done by a single person, limiting the inputs; otherwise, the compilation is a collaborative exercise through which consensus might be the aim, hence eliminating or limiting individual context-specific preferences. The importance of alignment is highlighted in a report from the university (NWU Deputy Vice-Chancellor: Teaching and Learning 2018):

> [*T*]he alignment of our academic offering and of student support initiatives across campuses remains a critical strategic priority as we aim to provide comparable quality across all our campuses, aligning the desired NWU graduate attributes and student experiences across campuses, and promoting engagement and the sharing of resources to strengthen the quality of our teaching. (p. 5)

Alignment is set not to be abandoned because of the requirements of the Higher Education Qualifications Sub-Framework (HEQSF) from the South African Council for Higher Education so as to enable and ensure 'closer alignment of qualification standards across qualification types (e.g. Bachelor's degrees, Master's degrees, etc.) nationally, and within each institution' (NWU DVC: Teaching and Learning 2018:5). Consequently, ways will have to be explored to allow for facilitating situated and culturally appropriate learning whilst adhering to the requirements of the HEQSF and alignment in general.

In addition, content choices can also be bound or limited to selected textbooks or already determined learning outcomes that can only be changed through a lengthy administrative

process. Some lecturers, however, were in a position to determine the content of their own modules.

Furthermore, the research participants were also asked about how they thought learning could be made more situated or culturally appropriate.

Student and lecturer recommendations towards more situated and culturally appropriate learning content

Apart from some student research participants being satisfied with the status quo, some noted a number of measures that can be undertaken in support of more situated and culturally appropriate learning content. The student views are presented.

No changes are necessary:

- 'For me learning content is fine'. (Student, gender undisclosed, age undisclosed)
- 'No change is necessary. I feel all cultures are integrated well albeit heavily christian [*sic*]'. (Student, gender undisclosed, age undisclosed)
- 'I don't think some of the modules can be changed in a way to accommodate all cultures. Some learning content is what it is and if you have to change it, you will change the truth in the process'. (Student, gender undisclosed, age undisclosed)

Consultation with students is necessary:

- 'Ask the class if there is anything they are uncomfortable with or how they would like to take in the information'. (Student, gender undisclosed, age undisclosed)

More languages should be accommodated:

- 'Of course it would be wonderful if all learning content could be in the language of choice, but I believe that is difficult to execute'. (Student, gender undisclosed, age undisclosed)

- 'To be able to offer variety of other languages such as Zulu and many other more. The [*sic*] should be variety and choice for students'. (Student, gender undisclosed, age undisclosed)
- 'Language assignments are very difficult to understand. Pls consider that the languages that are forced on us are foreign'. (Student, gender undisclosed, age undisclosed)

Real-life examples should be included:

- 'When explaining the learning content, real-life [*sic*] examples of school environments should be given'. (Student, gender undisclosed, age undisclosed)

Specific issues related to distance students must be addressed:

- 'Learning content can be set in a way that is applicable to students that are short on time'. (Student, gender undisclosed, age undisclosed)
- 'More videos it is draining to read everything.. [*sic*] But watching videos stimulates your brain'. (Student, gender undisclosed, age undisclosed)

Modules should be culturally neutral:

- 'Make it culture neutral don't [*sic*] involve any cultures'. (Student, gender undisclosed, age undisclosed)
- 'I think focusing less on each individual culture and more on positive ethics and friendship. Culture is one of the biggest problems, it divides [*sic*]'. (Student, gender undisclosed, age undisclosed)

As noted earlier, some students did not think any changes were necessary. However, for other students, there was a need for broader consultation and the inclusion of more choices with regard to languages. In addition, and in line with the needs of situated learning, a need was expressed for the inclusion of real-life examples within the school context. Within the distance context, students indicated that content can be shorter, and more videos can be used; however, these issues are not directly concerned with situated and culturally appropriate learning. Finally, some participants also expressed the desire for modules

to not favour a specific culture as it could cause division if one particular culture is highlighted.

The lecturer participants were also asked about how learning could be changed to be more situated and culturally appropriate.

The lecturers required more information about the students:

- '[*W*]e need to know how do they relate [*sic*]; to what do they relate'. (Lecturer, gender undisclosed, age undisclosed)
- 'So, I think we need to start to communicate on their level and find out who they are, what is interesting to them'. (Lecturer, gender undisclosed, age undisclosed)
- 'I think we as lecturers need to be informed, who... about the students' profile'. (Lecturer, gender undisclosed, age undisclosed)

Portfolios with biographical information could be used:

- '[/]n my portfolios I really ... learn who my student ... students are ... sometimes, they put in a picture of the classroom and themselves and stuff like that so, in that sense, I get to know my students'. (Lecturer, gender undisclosed, age undisclosed)

More time for reflection is needed:

- '[/]f there could be more time for reflection about the, the content or the documents we are using from the students' point of view as well as the lecturers' point of view'. (Lecturer, gender undisclosed, age undisclosed)

Opportunities for student input should be created:

- 'I think sending out questionnaires to those students that are doing your module, drafting something, trying to find out, what are the concepts that they found more relevant to them, what do they suggest should be added or removed from the module, and make sure that you send it to all the provinces'. (Lecturer, gender undisclosed, age undisclosed)

More languages should be accommodated:

- 'The best scenario would be if we could translate all our study guides into the language of the reader. This includes all

languages in South Africa, as well as in Namibia, which is an impossible and unaffordable task'. (Lecturer, gender undisclosed, age undisclosed)

- 'I don't think the learning content can change by English, by language per se, because that will be asking for too much, from the lecturer, from the society, and it doesn't do them social justice for the future; so I don't think language is one of the ways, but I think the content can be changed if you have more culturally embedded examples'. (Lecturer, gender undisclosed, age undisclosed)

Appropriate examples should be used:

- '[*Y*]ou could look at your examples; maybe the way in which the content is structured could be adapted to be more culturally appropriate'. (Lecturer, gender undisclosed, age undisclosed)

The importance of African oral culture should be recognised:

- 'I have learned [*sic*] in certain African cultures the narrative method is also a very well-known way to convey information'. (Lecturer, gender undisclosed, age undisclosed)

The lecturers noted the importance of knowing more about their students in order to accommodate specific needs and contexts. A highly effective solution provided in this regard is the use of portfolios to obtain biographical information on students. Furthermore, lecturers indicated that, in order for learning to be more situated and culturally appropriate, more time is needed for reflection by students in order to get their inputs, and questionnaires could also be used in this regard. The lecturers also noted the importance of accommodating more languages, but reservations were also expressed in this regard. The use of more culturally appropriate examples was also raised. Finally, recognising the value of African oral culture, specifically the importance of narrative within the educational context, was underscored.

All the aforementioned issues and suggestions should be considered within a distance context where technology is becoming increasingly important. Therefore, the role of technology in situated and culturally appropriate learning content was also explored.

The role of technology in situated and culturally appropriate learning content

Three main issues were raised by the student participants with regard to technology: access, language and interactivity. Some responses on these issues are presented below.

Access to technology:

- 'I tend to think that changing all material and teaching to electronic and eLearning platforms hinders some students who do not have the necessary skills to use these platforms, and makes learning more of a challenge'. (Student, gender undisclosed, age undisclosed)
- 'I think that the educators need more training, and that the educators and schools need access to technological equipment – particularly in rural environments. Unfortunately, access to electricity and theft is a reality, and thus not as easy to implement as merely distributing'. (Student, gender undisclosed, age undisclosed)

Use of different languages through technology:

- 'To make sure learner material is available in as many different languages as sustainably possible, yet to be culturally neutral and not promote one culture above others'. (Student, gender undisclosed, age undisclosed)
- '[S]ome software must also give instruction in our vernacular languages, there must be a choice'. (Student, gender undisclosed, age undisclosed)

Interactivity:

- 'Maybe be more interactive, although the technology used now is pretty good, I just don't like doing videos for projects'. (Student, gender undisclosed, age undisclosed)

Although not necessarily specifically related to situated and culturally appropriate learning, the issue of access to technologies was raised. In this regard, certain cultures and contexts may be excluded from the discourse because of lack of access. Furthermore, it was noted that more languages could be used by means of technology. This sentiment concurs with the existing literature regarding the affordances of technology towards embracing multilingualism are evident (Olivier 2011). Finally, a need for more interactivity was also expressed. With regard to situated learning, interactivity could be quite useful towards simulating real-life experiences in a virtual environment. Some of the lecturers' views, as presented below, also concur with the sentiments expressed by the students.

Lecturers require training:

- 'I think that myself and my colleagues needs [*sic*] proper training'. (Lecturer, gender undisclosed, age undisclosed)
- '[*T*]he students and the lecturers need to be trained how to use all the technological stuff'. (Lecturer, gender undisclosed, age undisclosed)

Access to technology:

- '[*I*]t depends on the technology, and ... the students' ability to ... to use that technology, because I still get students who tell me: 'I don't have Internet', or 'I don't have a computer. I have to go to Internet café, and then I don't have money'. For them to be able to access Internet and whatever, they have to drive, or they have to get a transport to go there, spend about R400,00 and when they get there, there's no electricity'. (Lecturer, gender undisclosed, age undisclosed)
- 'But, what we picked up with the CDs [compact discs], they called me, it was in my textbook that CD, and the one that we

did, they called me, it doesn't play. What do you mean ma'am, it doesn't play? They put it in, they want to listen to it like it's a music thing, and I said no, you put it into a laptop, you will read, you will see. Oh, now I understand, I don't have a laptop, I don't have a computer at home. Don't you have it at school? No, our school doesn't have electricity'. (Lecturer, gender undisclosed, age undisclosed)

Affordances of different communicative modalities though technology:

- '[*Y*]ou don't get their interaction and when you are in whiteboard, trying to talk to them, they don't … So, one day I was thinking, how can I involve the students? And then I thought, okay, let me ask them to write on the whiteboard if they want to ask something or if they want to answer a question that I've asked. They started participating because now they are not saying it, they are so afraid that they'll say something wrong and the others will laugh'. (Lecturer, gender undisclosed, age undisclosed)

Including culturally appropriate visual content:

- '[*I*]f you put on a computer and you see the Lesotho huts there and you see pictures and things that represent you, so much so that you don't have to think that there's no form of knowledge there and equality is not represented'. (Lecturer, gender undisclosed, age undisclosed)

Technology cannot contribute:

- 'I'm not really sure if … [*sic*] learning technology or the learning through technology can really be changed to be culturally appropriate'. (Lecturer, gender undisclosed, age undisclosed)

The lecturers felt that in order to use technology for more situated and culturally appropriate learning, they would need more training and that they were not sufficiently prepared at that stage. They also highlighted the needs regarding access to technology and importantly also students' ability to use technologies effectively. A number of challenges with regard to cost and even digital literacy were also evident. The use of different modalities for the sake of

communication has immense potential and, in this case, it was by means of writing on an IWB rather than students being exposed through having to speak. With regard to the design of technology interfaces, it was important that culturally appropriate visual content is included. One participant, however, was not convinced that technology could be beneficial in this regard.

On the surface, the importance of technology might not be evident; however, even Lave and Wenger (2008) noted the significant role technology could play in situated learning contexts. Student teachers should not only be apprenticed into the content and process of the teaching profession, but the tools and resources, which include technology, are also part of the equation. Lave and Wenger (2008:101) stated that in order to become a participant in a community of practice, students would be required to be '... engaging with the technologies of everyday practice, as well as participating in the social relations, production processes, and other activities of communities of practice'. Importantly, 'the understanding to be gained from engagement with technology can be 'extremely varied depending on the form of participation enabled by its use' (Lave & Wenger 2008:101) – therefore, different levels of competency in learning technologies could play a role in engagement and the further use of technologies after graduation. Within the teacher/training context, Booth et al. (2017:89) also remarked that '[o]ne of the fears novice teachers have is their lack of proficiency with technology'.

The final aspect explored, was how students could take responsibility towards ensuring the situatedness and cultural appropriateness of their own learning.

Ensuring the situatedness and cultural appropriateness of students' own learning

As this chapter also focuses on the SDL aspect of learning, it was imperative to explore the nature of students' own role in the situatedness and cultural appropriateness of their own learning. The student responses in this regard were as follows.

Students are satisfied with their current practices:

- ‘I don’t feel that the way I experience learning is out of my context, so I don’t need to make it more appropriate to my context’. (Student, gender undisclosed, age undisclosed)
- ‘My learning thus far has been appropriate. Perhaps down the line and further into my studies, I would feel differently’. (Student, gender undisclosed, age undisclosed)

Implementing specific strategies:

- ‘The only way one can make own learning appropriate is by viewing from own cultural context because during learning process no effort is made to ensure the learning content is transferred to one’s culture’. (Student, gender undisclosed, age undisclosed)
- ‘Take time to learn about students. Get to know your students. Use culturally responsive language. Students who are from diverse backgrounds use different languages. Bring in diverse Guest Speakers. Deliver diverse forms of content. Gamify learning. Utilise different forms of technology. Present real-world problems. [*sic*]’. (Student, gender undisclosed, age undisclosed)
- ‘It is possible to make my learning more appropriate to my context because I can take the information provided and apply it directly [to] my work and study situation’. (Student, gender undisclosed, age undisclosed)

Accommodating different languages:

- ‘To have more knowledge of an African language. Unfortunately teachers are limited in their language use of other languages, yet classrooms are linguistically diverse’. (Student, gender undisclosed, age undisclosed)
- ‘I translate everything to Afrikaans. Because it is easier to learn and understand. I have been speaking afrikaans [*sic*] for 18 years it is very unrealistic to expect a student to understand everything in English and must learn in English’. (Student, gender undisclosed, age undisclosed)

Some students indicated that they were content with their current learning practices and that they were at the time satisfied with the state of situatedness and cultural appropriateness with regard to their learning. A number of highly valuable strategies about situatedness and cultural appropriateness of learning were offered by some student participants: students acknowledging their own culture, lecturers getting to know students, bringing in diverse guest speakers and content, utilising gamification, using different technologies, as well as including real-world problems and information related to students' contexts. Finally, the issue of accommodating different languages was also raised.

The lecturer views in this context are presented below.

Contact makes accommodation easier:

- 'You see a group of students; you get an idea of who they are. But I often … or I feel that our distance students often gets [*sic*] lost. They feel alone'. (Lecturer, gender undisclosed, age undisclosed)

Students having an understanding of content:

- '[*I*]f they have a clear understanding of the content that they have learnt, they can easily apply it to any contexts that they are faced with'. (Lecturer, gender undisclosed, age undisclosed)

Assessment becomes a barrier:

- 'You cannot teach content when you have to deal with a culturally inclusive society which is subjectively interpreted and then you have an assessment method which is objectively and positivistic in its sense and then you expect transformation in society [*sic*]'. (Lecturer, gender undisclosed, age undisclosed)

Accommodating different cultures might imply segregation:

- '[*E*]ven if we look at the culture and solving it, is so diversified and trying to be inclusive of all those cultures creates cultural identity of each, which in itself is segregating'. (Lecturer, gender undisclosed, age undisclosed)

Creating opportunities:

- ‘I often think we, as lecturers, need to give them the responsibility but also kind of the permission and make them aware that they may do it to adjust their learning’. (Lecturer, gender undisclosed, age undisclosed)

Establishing learning communities:

- ‘If students establish learning communities within the same cultural group, it could also be more cultural appropriate where they share with each other, you know, the value of this specific module or specific content in their own cultural [*sic*] appropriate environment’. (Lecturer, gender undisclosed, age undisclosed)

From the first response, it is clear that this lecturer felt that possibly tailoring classes to a specific context is lost because one does not physically interact with students. Therefore, the challenge remains how, in such a distance context, technology can be used to compensate for this limitation in such interactions. Another lecturer noted that situatedness and cultural appropriateness could be supported if students understood the content, as they would be able to apply it to what has been learnt in their contexts.

In the third quotation, an interesting point was raised: assessments might not be made sensitive or attuned to different cultural values. This calls for a rethinking of assessments and a possible adaptive learning approach (cf. ch. 3) regarding culture. However, if learning or specific activities are handled along cultural lines, a sense of segregation may be created, which is another hindrance. Within the historical context of South Africa, such an approach could have serious negative effects.

Finally, the lecturers admitted that opportunities towards supporting situatedness and cultural appropriateness must be created. This can be achieved by giving students the responsibility, as well as creating circumstances for this to happen. Furthermore,

it is suggested that learning communities are established. Priest et al. (2016) also supported the notion of using learning communities. Priest et al. (2016:369) found that 'learning communities offer a situated, social place, people, and processes for student learning and development'. These learning communities can ultimately lead to communities of practice (Priest et al. 2016):

> [*W*]hen they are designed as not just a form of learning, but a process of learning in which academic content is made meaningful through the shared practices and relationship of the community. (p. 370)

Discussion

In this section, a synthesis of the main findings from the qualitative analysis is discussed. From the responses, a variety of views were clear, with some contradiction but also clear trends. The student research population was diverse, which is in line with the broader demography of the university.

The students and lecturers regarded the university as being multilingual, multicultural and diverse. However, the students recognised the strong presence of Afrikaans in the distance mode of delivery, as well as Western and European influences and the importance of English as a medium of instruction. For the lecturers, it was important to note the specific institutional culture as being diverse, inclusive, academic and even neutral with regard to disciplines.

Both students and lecturers had varied opinions as to whether the learning content related to the students' context. Yet the students criticised the use of a strong Afrikaans accent and modules not being what they would regard as useful, or as expected. A significant issue raised by the lecturers was that they were convinced that the content related to the teaching profession, although content such as textbooks was not always relevant to South Africa.

Furthermore, the research also probed whether learning content was relevant to all students. In this regard, the students

and lecturers did not agree. Despite some attempts to accommodate different cultures, some participants admitted that certain students might not be able to relate to or find the content appropriate. Interestingly, some considered the content in certain modules as neutral. The lecturers went further to explore reasons why not all students could be accommodated, and in this context, the inclusion of more African scholars was suggested. Moreover, lecturers need to be informed better about culture: the nature of different modules might not allow for associating with a specific culture. The prominence of Western perspectives was also raised.

The extent to which students and lecturers played a role in selecting content was also considered. The students believed that they did not really have any opportunity to determine the content used in their modules. They recognised the role they could play outside of formal learning and in their choices of qualifications. The lecturers agreed with the students' views and noted some opportunities in assessments and examples used in the class, as well as limited attempts made to include student voices in this context.

The nature of lecturer choices with regard to content was also reported. Lecturers believed that they had limited opportunities because of institutional demands for alignment, certain textbooks used and outcomes being set. It seems encouraging that some lecturers believed they had some choice in this matter.

The students and lecturers made specific recommendations for more situated and culturally appropriate learning content. The students noted that wider consultation with students is needed and that more languages should be accommodated in the learning content. Moreover, real-life examples should be used to explain the learning content. Time and an increased use of videos should also be considered for the distance mode. Furthermore, some students preferred that modules should be structured not only to be culturally specific but rather be neutral.

Lecturers, on the other hand, felt that they needed to know more about the students in order for learning to be more situated and culturally appropriate. In this regard, the use of portfolios with biographical information and providing more time for reflection were advised. The lecturers also noted that opportunities for student inputs had to be created and more languages could be accommodated in the modules. Finally, the lecturers also emphasised that more culturally appropriate examples could be used and that the African oral culture can be considered within the learning context.

The role of technology in situated and culturally appropriate learning content was also addressed. For the students, the main issues were having access to technology, using different languages through technology and increasing interactivity. For the lecturers, their own training, student access to technology, the affordances of IWBs and using culturally appropriate visual content were noted. Conversely, it was noted by one lecturer that learning technology might not be useful in situated and culturally appropriate learning.

With regard to SDL, ensuring the situatedness and cultural appropriateness of students' own learning was also approached. Some students indicated that they were satisfied by their current practices, whilst others indicated that certain strategies could be used, such as acknowledging own cultures, embracing other voices and content and even using technology, as well as accommodating different languages. The lecturers noted that they could support the situatedness and cultural appropriateness of students' own learning by having more contact with students, students having an understanding of content and avoiding that assessment becomes a barrier. Finally, some lecturers also stated that care should be taken in ensuring that accommodating different cultures does not cause segregation in classes and that specific opportunities are created towards supporting students' roles in situatedness and cultural appropriateness of their own learning.

Recommendations

Situated learning needs to be planned and designed carefully as Catalano (2015:654) observed, '[b]ecause online classes can remove the learner further from real-world environments, careful design of instruction is necessary in order to create an effective curriculum'. In a similar vein, in their research with first-year students functioning in learning communities, Priest et al. (2016:370) also determined that 'to be successful, the experience of community must be emphasized in [the] design and delivery of such programmes' and '[c]reating the structure of common courses does not automatically foster community; the experience of community is negotiated through social relationships'.

Lecturers can also support situated learning through various actions. In this regard, Catalano (2015) is of the opinion that:

> [*E*]xplicitly teaching for transfer, teaching metacognitive skills, providing authentic activities, constructive feedback, as well as monitoring and prompting active participation, can aid the instructor in applying the situated learning techniques to create an effective learning environment, whether online or in face-to-face courses. (p. 654)

Therefore, within a multimodal learning environment, these aspects can be built in through the LMS or even other online platforms.

Based on the findings of the empirical investigation, the following suggestions are made:

- Increased inclusion of content that is not Western and Eurocentric is needed.
- More opportunities must be created for students to choose and add content.
- Real-life examples can be included in content.
- Lecturers need more information about students (e.g. through portfolios).
- Students must have opportunities for reflection.
- More languages should be accommodated.

- The importance of oral culture for some students must be acknowledged.
- Access to and training for technology use is important.
- Culturally appropriate visual content can be included in content.
- Assessment should allow for the inclusion of culturally appropriate content.
- Acknowledgement of different cultures should not imply segregation.

Conclusion

This chapter explored situated and culturally appropriate self-directed multimodal learning in a specific South African HEI. The main research question posed for this research related to what situated and culturally appropriate self-directed multimodal learning at a university would entail.

The nature of situated learning within the context of self-directed multimodal learning was discussed from existing scholarship. Situated learning emphasises the context within which whatever is learnt will be applied. This process implies student-centredness and a process of apprenticeship. Clear links with theoretical aspects of SDL were also evident. Some affordances of technology and situated learning were also noted.

The theoretical background of culturally appropriate learning, with specific focus on implementation in self-directed multimodal learning, was also explored. In this regard, accommodating different cultures and multicultural education was highly relevant. It was also explained how this study drew on multimodal learning and the broader concept of multimodality.

A qualitative approach was followed to explore students' and lecturers' perceptions of situated and culturally appropriate self-directed multimodal learning. The research methodology was unpacked, and the data that emerged from the questionnaires

and interviews were discussed. It was found that situated and culturally appropriate self-directed multimodal learning was acknowledged, but that both of these aspects were not adequately addressed in the current context of students and lecturers. Some good practices can be built upon, and technology has a role to play in this regard.

Some limitations of this research could also be identified. The findings of this research are not only limited to one institution but also to selected lecturers and students who opted to participate in the research. However, generalising the findings was not envisaged for this research. Moreover, it was clear that, even though definitions were provided – for example, of *culture* – the participants had different ideas about what the concepts implied. Where possible, clarification was provided, or additional questions were asked, but care was taken not to lead the participants. A further limitation was that students were not approached for interviews as the lecturer interviews provided rich data. When this project was conceived, the analysis of online learning and teaching resources was also included as an additional data source; however, because of the limited number of resources made available by the lecturer participants, this aspect was omitted from this chapter.

In conclusion, it is admirable that diversity is acknowledged but it can be extended. However, there is a perception that knowledge could be regarded as neutral and content is related to the teaching profession and not to other aspects of culture. Lecturers do not know how to include culturally appropriate content in their learning content and some lecturers do not believe that students should have choices with regard to content. Lecturers sometimes have limited choice in selecting content because of alignment, outcomes and prescribed resources. Language and multilingualism in education are associated with culturally appropriate learning. Some limited affordances are envisaged with regard to using technology, which would require further research.

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APPENDIX 1: Questions excerpt – Interview schedule for lecturers:

1. Explain your language profile (in other words, which language do you identify as your mother tongue, which other languages do you use and how language features in your teaching).
2. Describe the cultural affiliation you may identify with (if any).
3. Describe the culture you associate with the university and your modules. Please explain and be specific about your modules. (Keep in mind that this is only for comparative purposes and that specific modules will not be identified or reported in the research).
4. Do you feel that learning content in your modules is related (or situated) to students' own context? Please explain and be specific about your modules. (Keep in mind that this is only for comparative purposes and that specific modules and lecturers will not be identified or reported in the research).
5. Would you describe learning content from your modules as being culturally appropriate for all students? Please explain and be specific about the type and format of the content.
6. Content choices:
   a. Describe the nature of the choices you have in determining relevant learning content.
   b. Describe the nature of the choices your students have in determining relevant learning content.
7. In your view, how could learning content be changed to be more situated and culturally appropriate?
8. In your view, how could learning through technology in general be changed to be more situated and culturally appropriate?
9. Comment on the possibilities students have in ensuring the situatedness and cultural appropriateness of their own learning. In other words, describe whether you feel students can make their learning more appropriate to their context, and explain why you say so.
10. Any other comments?

APPENDIX 2: Questions excerpt – Questionnaire for students:

1. Explain your language profile (in other words, which language do you identify as your mother tongue, which other languages do you use and how language features in your learning in general and specifically at the university).
2. Describe the cultural affiliation you may identify with (if any).
3. Describe the culture you associate with the university and your modules. Please explain and be specific about your modules. (Keep in mind that this is only for comparative purposes and that specific modules and lecturers will not be identified or reported in the research.)
4. Do you feel that learning content in your modules are related (or situated) to your own context? Please explain and be specific about your modules. (Keep in mind that this is only for comparative purposes and that specific modules and lecturers will not be identified or reported in the research.)
5. Would you describe learning content from the university being culturally appropriate for all students? Please explain and be specific about the type and format of the content.
6. Describe the nature of the choices you have in determining relevant learning content.
7. In your view, how could learning content be changed to be more situated and culturally appropriate?
8. In your view, how could learning through technology in general be changed to be more situated and culturally appropriate?
9. Comment on the possibilities you as an individual have in ensuring the situatedness and cultural appropriateness of your own learning. In other words, describe whether you feel you can make your learning more appropriate to your context, and explain why you say so.
10. Any other comments?

Chapter 8

Scaffolding teachers' critical reflection in a South African distance learning programme through a design-based study

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Abstract

Critical reflection informs praxis, enabling teachers to combine action and reflection in transforming practice. Supporting teachers to develop as critical reflective professionals in a distance learning professional development programme (DL PDP) is essential to equip teachers to turn around the current

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poor education standards in South Africa. A reflective journal was therefore included, as part of a work-integrated learning (WIL) portfolio in the Diploma in Grade R Teaching, offered via distance learning by a South African university. A reflective format aimed at scaffolding the development of teachers' reflective skills in the journaling process. To investigate how the reflective format supports critical reflection and how the design should be revised to improve the reflective format for increased support, a two-cycle DBR process was conducted. Based on the analysis of the qualitative data collected from the implementation of the initial reflective format implemented in the first cycle, the reflective format was revised before implementation in the second cycle. Data consisting of student teacher reflective journal inscriptions, collected in each cycle, were deductively coded, using an existing four-level reflective coding scheme. Code frequencies on each level for the two cycles were compared and interpreted to conclude regarding the way the revised reflective format supported on increasingly higher levels with critical reflection as the highest level. The study's findings confirm the need and value of a more detailed reflective format to scaffold critical reflection by student teachers in this specific teacher education programme. Suggestions are made for follow-up research to further strengthen critical reflection by teachers in support of praxis.

Keywords: Critical reflection; Distance learning; Institutional multimodality; Reflective journals; Work-integrated learning; Distance learning professional development programmes; Transformative learning.

Introduction and background

The South African government is commissioning HEIs for the professional development of underqualified practising Grade R teachers through distance learning professional development programmes (DL PDPs). This initiative aims not only to compensate for shortages in qualified Grade R teachers, but also

to provide all South African learners with access to quality learning readiness programmes as promised by the government (Republic of South Africa 2015; The South African Presidency 2019). Distance learning professional development programmes are, however, often critiqued for not making a difference in the professional competence of teachers or the quality of teaching practice (Steyn 2008; The Centre for Development and Enterprise 2014). Quality teacher preparation is especially important where DL PDPs are employed to qualify under- or unqualified Grade R teachers, who will have the responsibility to redress unequal access to quality learning readiness programmes.

The government acknowledges that, despite the initiative to provide access to Grade R education to especially disadvantaged learners, substandard education in these classrooms is still hampering the envisioned impact of Grade R education on later academic performance (Republic of South Africa 2015). Although no recent studies on the quality of Grade R education could be identified, concern has been expressed in the past regarding Grade R teachers' preparedness to transform the standards of education through quality learning readiness programmes (Drew 2010; Excell & Linington 2011; Janse van Rensburg 2015).

Transformation in the quality of teaching is subject to teachers' critical reflection on their own practice (Mezirow 1997), including critical reflection on the implications of theory for practice and the necessary actions needed to improve teaching and learning outcomes (Brookfield 2017). In this sense, practice is rather regarded as praxis which requires one to continuously and critically reflect on and re-evaluate one's own knowledge and actions through experience learning (Beaudin & Quick 1995; Carr & Kemmis 1986; Freire 1970) and to ground teacher decisions and actions in this critical reflection (Brookfield, 2017; Hatton & Smith 1994; Schön 1987). The design of DL PDPs – which is aimed at transforming the standard of Grade R education in South Africa – therefore needs to be reviewed to determine how best to support praxis by guiding teachers in combining theory and practice through critical reflection on whether such programmes

are to make a difference in the quality of South Africa's education standards.

Tait (2000) discerns between systemic, affective and cognitive support to students in ODL programmes. Providing systemic support – including dissemination of course material, whether in hard copy or electronically – is relatively attainable in distance education. Providing affective and cognitive support in a DL PDP is, however, hampered by the physical distance between the faculty and the student. Especially in middle- to lower-income countries, this distance hampers support for the development of a critical reflective approach to practice (Adler & Reed 2002), and consequently the praxis of these teachers. In high-income countries, technology such as learning managements systems is employed to provide cognitive and affective support in distance learning programmes (Sánchez-Elvira Paniagua & Simpson 2018; Tait 2000, 2003). However, in South Africa, where a large part of the student population enrolled in DL PDPs are from lower-income groups, living and working in rural areas, it cannot be assumed that all students have equal access to the Internet or are technologically literate. Higher education institutions offering these DL PDPs should, therefore, explore and evaluate strategies to provide cognitive support, such as the development of critical reflective competence as a higher-order cognitive skill, especially where these teachers are to be equipped as agents of change. Related literature confirms the value of journals for the fostering of critical reflection on own practice (Boud 2001; Grant 2004; Genc 2010; Maarof 2007; Moon 2006), as well as for supporting praxis (Arnold et al. 2012; Freire 1970; Ghaye et al. 2008; Groundwater-Smith, Mitchell & Mockler 2016).

This chapter focuses on the way the design of a reflective format supports critical reflection in a reflective teacher journal that forms part of the 3-year Diploma in Grade R Teaching delivered via distance learning by a South African HEI. With the focus on distance learning, this chapter also contributes to the scholarship around institutional multimodality (cf. ch. 1).

The work-integrated learning component of the distance learning programme

The aim of the journal is to mediate critical reflection on practice in support of praxis. The reflective journal forms part of a comprehensive WIL portfolio, whereby teachers provide evidence of knowledge gained 'in-practice' and 'of-practice' (Cochran-Smith & Lytle 1999), as well as evidence of their applied competence during each of the 15 days practical per semester of the 3-year programme. Apart from evidence of lesson observations and lesson presentations, teachers also need to provide authentic proof of the reflective and integrated implementation of specific practical tasks in the Grade R classroom. In order to plan and implement the particular practical tasks designed for each semester, the student teacher is enforced to reflectively draw from the theoretical content that forms part of the semester's curriculum. This strategy is explicitly aimed at bridging the divide between theory and practice through reflective journaling.

Apart from reflective journaling, mentoring is also employed in this DL PDP to support collaborative reflection. Mentoring is an acknowledged strategy to guide novice teachers or student teachers during their practical training in the reflective application of knowledge into practice (Darling-Hammond et al. 2017; Ingersoll & Strong 2011; Irby et al. 2017). Where economies of scale allow a large number of practising unqualified teachers to enrol in a DL PDP, the role of a mentor to guide learning in practice is indispensable. Faculties offering these programmes often do not have the capacity to provide this kind of support to student teachers during their practice-based learning. Therefore, in the DL PDP investigated, a mentor, who is also a qualified teacher at the school where the teacher is implementing the WIL component, is assigned to each student teacher in collaboration with the school principals. Ottesen (2007) emphasises the role of mentoring in praxis, whereby student teachers are not merely

guided to reflect on aspects of their practices, but also in acting on these reflections. As this guided active reflection happens within a shared setting, mentoring in school context provides the opportunity for collaborative reflection on alternative or accountable actions relevant to the specific classroom context. Ottesen (2007:34) further highlights that such a collaborative reflection shifts the goal 'from knowing how to teach to understanding teaching'. According to Zachary (2002:28), mentoring entails a 'process-oriented relationship involving knowledge acquisition, application, and critical reflection' rather than knowledge transfer. Therefore, the roles of the mentor include modelling good practice, supporting and formatively assessing the implementation of practical tasks, and reflecting with student teachers on their learning *in* and *from* practice. It was anticipated that this collaborative reflection with the mentor on aspects of practice, together with the implementation of the practical tasks, would culminate and resonate in the reflective journal, thereby supporting teachers in developing a critical reflective stance towards practice.

The problem

Not all teachers have an innate propensity to reflect critically on their learning from practice and thus may need support to develop this competence (Moon 2006). Moon also warns that too much support may jeopardise the authenticity of a teacher's deep critical reflection on practice. Although measuring praxis as outcome of the reflective journal was not the aim of this study, a belief is held that where teachers develop the propensity to continuously and critically reflect on all they do, they would be more likely to reflect on the way theory informs practice (Brookfield 2017). To support the teachers' critical reflective competence in this DL PDP, a scaffold in the form of a reflective format was designed to guide their journaling. It was, however, crucial to determine how much support teachers need

in order to encourage critical reflection in their journals without compromising the authenticity of their reflections. A DBR process was therefore implemented to help find the balance on the level of support to be provided to the teachers by means of the reflective format so as to secure the advancement of praxis through their reflective journals.

The two cycles of the DBR, respectively, aimed to answer the following questions:

- How does a reflective format support teachers to critically reflect on their own learning from practice?
- How should the reflective format be revised to improve support for critical reflection by teachers on their own learning from practice?

Conceptual and theoretical framework

The role of critical reflection as a motivator for change is grounded in theories of Dewey (1933) and Freire (1970), and more specifically those of Mezirow (1990, 1997), with the focus on the transformation of practice towards a 'frame of reference that is more inclusive, discriminating, self-reflective, and integrative of experience' (Mezirow 1997:5). The undeniable poor standard of education debilitating the progress of learners in South African schools, motivated the focus on Mezirow's perspective transformation theory, whereby teachers' views of practice change when critical reflection is at the core of their SDL through experience and rational dialogue. In this DL PDP, the reflective journal is viewed as a vehicle to mediate rational dialogue through their daily written reflections on their own learning *in* and *from* practice with the anticipation that this rational dialogue would cultivate a critical reflective stance towards practice.

Reflection and transformative learning in support of improved practice

Considering critique on the current poor standard of education in South Africa, it is essential that all teacher education programmes, including the Diploma in Grade R Teaching, empower teachers as critical reflective professionals. This is especially crucial when teachers, who have been practising as unqualified Grade R practitioners, are now enrolled in DL PDPs to attain an accredited qualification. These in-service teachers who are continuing their professional development are often set in their ways with little or no knowledge of appropriate pedagogy to optimally support the learning readiness of diverse 5- or 6-year-olds. To break down own presumptions and to change one's actions accordingly, require critical reflection on one's practice and the necessary self-directed approach to one's own professional learning to transform ineffective practice when necessary (Brookfield 2017). Such a transformation also implies a renewed vision of practice and the ultimate goal of one's teaching.

To lift South Africa's education standards to a satisfactory level, further requires that transformation should be sustainable and ongoing to ensure that practice is continuously renewed to keep up with the learning needs of learners, curriculum demands and challenges of the 21st century. Barth et al. (2007) argue that, to equip students for sustainable competence in practice, HEIs should support:

> [*P*]ersonal development that enables individuals to cope with complex situations, to be able to act and to decide reflectively, to take responsibility, to consider ethical criteria whilst acting and to be able to envision consequences. (p. 428)

The findings of these authors showed that three aspects of learning should be in place to ensure sustainable competence, namely, support for critical reflection on one's actions, self-reliance and self-directedness, and learning in multiple contexts that

include situations in which acquired knowledge can be put into action (Barth et al. 2007:426).

The radical transformative learning theory of Freire (2000) accentuates the combination of reflection and action to transform oppression into independence. In a democratic country, it is assumed that people and education are free from oppression. However, South Africans are still oppressed by poor education standards that are often blamed for the 'ineffectiveness of in-service teacher training initiatives and in-service teacher education programmes' (Spaull 2013:54), teachers not taking charge of the quality of teaching and learning in their classrooms. To truly transform Grade R practice and consequently improve the standards affecting the country's education, Grade R teachers should have a critical reflective approach to theory and practice and develop as independent professionals who could take responsibility for the quality of education in their classrooms and schools. Teachers who develop the habit of constantly reflecting on their practice and who are able to identify their own assumptions that inform their actions, would be able to make more knowledgeable decisions to meet the specific learning needs of their diverse learners (Brookfield 2017). Shulman and Shulman (2004) place critical reflection on one's own practice at the core of teacher learning, with a direct influence on teachers' understanding, motivation and practice with the potential to instil a new vision of practice.

Investigations with a focus on transformative learning are mostly grounded in theories of Freire (1970) and Mezirow (1990, 1997, 2003), as well as the views of Boyd and colleagues (Boyd & Fales 1983; Boyd & Myers 1988). Freire (1998, 2000) puts emphasis on transformative learning for radical social transformation, whilst Boyd (1989, ed. 1991) focused more on transformative education supporting individuation through self-responsibility and understanding the 'inner-self'. Mezirow specifically focuses on the role of reflective assessment of own presumptions by adult learners

in transformative learning and defines transformative learning as (Mezirow 1991, 2000, cited in Mezirow 2003):

> [*L*]earning that transforms problematic frames of reference – sets of fixed assumptions and expectations (habits of mind, meaning perspectives, mindsets) – to make them more inclusive, discriminating, open, reflective, and emotionally able to change. (p. 58)

Freire (2000:51) also places reflection at the core of teacher learning to transform education with his famous definition of praxis as 'reflection and action upon the world in order to transform it'. Both these definitions strongly connect with Dewey's (1933:43) emphasis on persistent scrutiny of one's own beliefs, looking back at experiences and how these experiences could be influencing a person's future actions. Dewey warns that teachers need to be vigilant of misconceptions that may lead to flawed assumptions of practice and that teachers should have the courage to change these beliefs when necessary.

Freire (2000) opposes the 'banking' approach to education, requiring students to store knowledge delivered to them without developing the necessary critical consciousness to act as agents of change. He argues that students should rather be supported to apply inquiry learning through taking a critical reflective stance towards the reality in which they exist. Teachers and students should also be aware that 'this reality is not static but in the process of transformation' (Freire 2000:83). Freire (2000:104) emphasises that this critical reflective stance implies simultaneous reflection on both theory and practice relevant to a specific education context, without losing sight of the broader context in which their own reality exists as 'an interacting constituent element of the whole'. Hatton and Smith (1995) also highlight this role of context in critical reflection whereby a teacher should consider the 'multiple historical and sociopolitical contexts' that play a role in practice, implying that teachers should be cognisant that the same actions and explanations may not be relevant in all teaching contexts.

Reflection (and specifically critical reflection) is a paramount teacher competence in the 21st century. Bolstad and Gilbert (2012) refer to the role of 'critical and creative thinking' in overcoming the challenges of the 21st-century learning environment, such as complexity, fluidity, unpredictability and uncertainty. Meeting these challenges will require teachers to adapt to fast-changing knowledge and technology. Sellars (2012:461) emphasises that the quality of educational change is determined by the 'teachers' individual capacities for reflective practice and the development of self-knowledge'. Higher education institutions thus have the responsibility to support student teachers in developing reflective skills and a consciousness about their role as transformers of education – especially when a country is looking into education to improve poor socioeconomic circumstances.

Both Freire and Mezirow emphasised the role of discourse in transformative learning. This is also advocated by Habermas (1970, 1974). The distance between the teacher educator and the teacher learner in a DL PDP hampers mediation of learning through discourse. Motivated by the literature, designers of the programme under investigation explored teacher journaling to mediate a critical reflective discourse intending to foster transformative learning and, consequently, to improve teaching practice by these teachers as output.

Critical reflection through journaling

In Moon's (2003:6) list of the purposes of journaling, the role of reflection is given prominence, such as developing 'critical thinking skills' or a 'questioning attitude' and 'to encourage metacognition'. Papaleontiou-Louca (2008:1–2) defines *metacognition* as 'thoughts about thoughts, knowledge about knowledge or reflections about actions'. Moon (2003) also lists increased ability in reflection and thinking, enhanced reflective practice, and fostering reflective and creative communication amongst the benefits of a journal.

The value of journaling in supporting understanding, as highlighted by Moon, is also echoed by Genc (2010), who found that, whilst journaling holds value for improved understanding of content knowledge, it also improves teachers' understanding of their own beliefs about teaching and learning.

Hatton and Smith (1995) define *dialogic reflection* in written text as demonstrating:

> [*A*] 'stepping back' from the events/actions leading to a different level of mulling about, discourse with self and exploring the experience, events, and actions using qualities of judgements and possible alternatives for explaining and hypothesising. (p. 48)

This definition of Hatton and Smith links to Mezirow's theory of transformative learning through discourse and strengthens the surmise that a reflective journal has the potential to support the kind of reflection by teachers essential to motivate an alternative approach to practice when necessary.

Although there is strong support in the literature for the use of journaling to support reflection (Boud 2001; Dana & Yendol-Hoppey 2009; Maarof 2007; Moon 2006; Rees 2017), Moon (2003) warns that mere reflection on one's own practice through journaling will not guarantee critical reflection or the transformation of practice. Hatton and Smith (1995) also caution that a particular construction of text should be evident in order to adhere to the requirements of dialectic reflection. Moon (2003) explains that a journal is not merely keeping a diary of events, or recording experiences, but rather a vehicle for reflection and an instrument providing opportunity for developing reflective skills, as well as for learning from the process of reflection. Likewise, Lizzio and Wilson (2007:279) argue that deep critical reflection is necessary to actuate change. Grounded in Mezirow's (2003) theory of transformative learning, to support transformation, journaling would have to elicit critical reflection on own assumptions. In the context of this study, critical self-reflection is viewed as a means to not only refine own practice (Bulger, Mohr &

Walls 2002) and deepen understanding of the elements of practice, but also to transform own practice through critical communicative discourse (Mezirow 2003), in which the dialogue and critical self-reflection are mediated by a teacher reflective journal.

Motivated by the literature on the value of journaling in supporting critical reflection through dialectic dialogue, the inclusion of journaling, as part of the DL PDP, is based on the assumption that a critical reflective approach to learning *from* and *in* practice serves as backbone for praxis by linking theory to practice (Freire 1970). Understandably, not all teachers enrolling for the DL PDP operate on the exact same level with regard to critical reflective competence. Ensuring that reflection is indeed applied on a critical reflective level, elicits questions as how best to support critical reflective journaling by teachers who are operating on different reflective competence levels. This dilemma reminds us of Vygotsky's (1978) mediated approach to teaching within a learner's zone of proximal development (ZPD). Applied to the context of teacher learning, a 'more experienced other' provides scaffolding or support to mediate the learning process within a teacher's ZPD, with specific reference to the competence level on which the teacher is able to operate autonomously and a proximal level that the teacher might only achieve through scaffolding.

Warford (2011:252) supports a Vygotskian approach to teacher education with emphasis on situated learning that is 'a fundamentally dialogic, emergent process'. Warford's model – which he calls the zone of proximal teacher development (ZPTD) – suggests journaling as a tool to promote teachers' critical reflection on own practice and beliefs. The ZPTD promotes the mediating role of teacher educators in providing 'just enough assistance' to student teachers to master learning goals and highlights the role of ongoing inner dialogues with consideration of prior teaching experiences, theory and local practices. This view supports Mezirow's (1998:188) idea of 'rational discourse' as

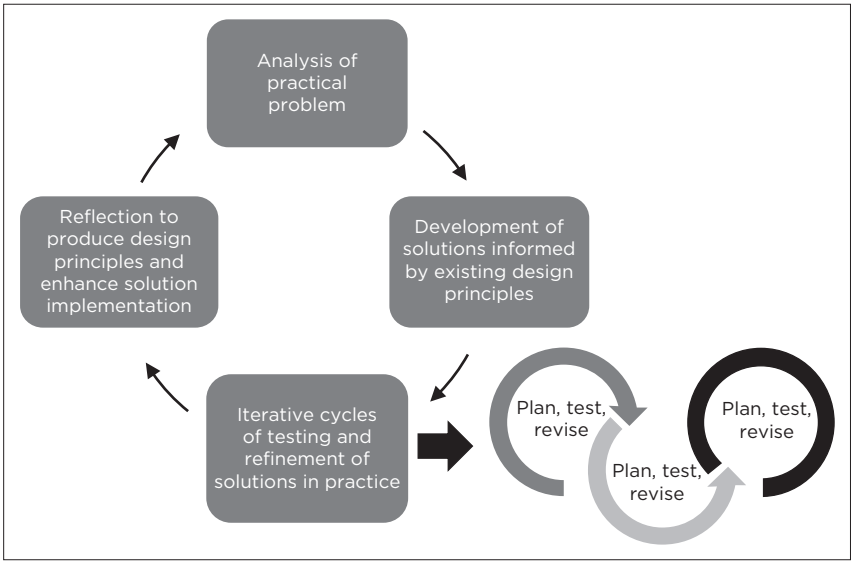
a means to support critical reflection. Reflective journaling thus has the potential to mediate inner dialogue and to serve as a scaffold for the development of a critical reflective stance towards practice. Staying within the teachers' ZPD as critical reflective teachers, is thus crucial if their journals are to serve as instrument to develop as self-directed professional teachers who are able to improve the learning readiness of their learners.

In a DL PDP in which large numbers of practising teachers are enrolled, it is not possible for the teacher educator to determine the ZPTD of all student teachers or to support each student teacher on his or her own individual competence levels. Other mechanisms therefore need to be explored to fulfil this scaffolding role. In the practical component of the DL PDP, a reflective format was designed as scaffold. However, the way this scaffold matches the ZPTD of the large student population could only be determined, once implemented. Based on the ZPTD of Warford (2011) and Moon's (2006) recommendation that scaffolding of critical reflection should challenge teachers to reflect on a progressively deeper critical level without taking away from the authenticity of their self-reflection, an initial basic reflective scaffold set out to support critical reflection, whilst still leaving room for the teachers to consciously and critically reflect on their own practice. A learning scaffold serves a temporary purpose and should eventually be revised or removed, depending on the way the learner has mastered the learning goal (Wood et al. 1976). Programme developers, therefore, need to continuously evaluate the way in which such a scaffold supports learning to make decisions on how to revise the scaffold, or judge if the scaffold has become redundant.

Research design

A DBR approach was viewed as the best method to evaluate and adapt the scaffold to a level that would ensure meaningful support for the development of the critical reflective competence of these student teachers. Design-based research is commonly

used to explore solutions to real problems, whilst design principles emerging from the investigation, as well as the investigation process, are documented to enable future researchers to replicate the study with the aim of further refining the design principles (Amiel & Reeves 2008). These design principles then inform future decisions for programme design. This research design provided a suitable method to investigate the way in which the reflective format supports critical reflection through journaling and to adapt the format accordingly to match the student teachers' ZPD with regard to critical reflective competence. The implemented DBR was based on the model suggested by Amiel and Reeves (2008:34), which consists of four phases, namely, (1) analysis of the problem, (2) development of a solution, (3) testing of the solution in practice through iterative cycles of planning, testing and refinement, and (4) reflection on the findings to refine design principles (see Figure 8.1).



Source: Adapted from Amiel and Reeves (2008).

FIGURE 8.1: The design-based research process.

In this study, two iterative cycles were implemented in phase 3. It is acknowledged that various cycles may need to be implemented before design principles that best address the problem can be reported. However, the distance learning delivery mode (cf. ch. 5) in a newly industrialised country (Gulati 2008) challenged the implementation of more than two cycles, especially when an electronic LMS is not yet employed to support students who receive their study material in hard copy once per year. The turnaround time for the implementation of revised support mechanisms and measuring the effect thereof, therefore, require a generous timeframe. Funding and time constraints only allowed for the implementation of two cycles with suggestions for the improvement of the format in a possible third cycle to be implemented and tested in future studies.

After the analysis of the problem – namely, the need to support student teachers to reflect on a critically reflective level in their journals – a solution was developed in the form of a reflective format, aiming to guide student teacher reflection. The testing of the solution in practice happened through two iterative cycles of planning, testing and refinement. Findings on the first cycle, implemented in the first year of the 2-year project, informed the revising of the reflective format to improve the support for student teachers' critical reflection. The revised reflective format was then implemented and tested in a second cycle in the second year of the project. Reflection on the findings of these two cycles and the possible effects of the revised format on student teachers' critical reflective competence, informed suggestions for design principles to enhance the solutions.

Although the DBR followed a qualitative approach to the coding of journal inscriptions, based on inductive and deductive reasoning when interpreting the text, quantification of the codes was used to make sense of the way the reflective format scaffolds meaningful critical reflection in each of the two cycles. Quantification of written text is used to investigate reflective writing (Chen, Lumpe & Bishop 2013; Kember 1999;

Ullmann et al. 2012). Maxwell (2010) warns that the use of numbers when working with qualitative data is contentious, but admits that incorporating numbers in the analysis of qualitative data holds value for:

> [*G*]eneralization within the setting or collection of individuals studied, establishing that the themes or findings identified are in fact characteristic of this setting or set of individuals as a whole. (p. 478)

Generalisability was not the aim of the study but rather to investigate and improve a specific reflective format implemented in a particular setting. As the aim of the DBR was to investigate the value of the design of the reflective format as a scaffold to support this specific student teacher population to reflect on a more critical reflective level, the quantification of codes helped to determine if the level on which the teachers were reflecting on their learning from practice increased as a result of the revised format. It was also anticipated that the findings would give an indication of the way the format matches the student teachers' ZPTD with regard to critical reflective competence in order to adapt the format accordingly.

Data consisted of the anonymised journal inscriptions of first-year enrolments in two consecutive years, namely, 2015 (first cycle) and 2016 (second cycle). Collecting data from journal inscriptions of teachers enrolled in a distance learning programme excludes the use of the same population for this cycle. Only journals of teachers who gave written consent that their reflections may be used for research purposes were included in a combined qualitative data set. ATLAS.ti™ (version 7.5.10), an electronic data analysis software program, was used for the coding of journal inscriptions. Data saturation was used to determine the sample size (Francis et al. 2010).

A four-category scale suggested by Kember et al. (2008) for assessing the level of reflection in written text (see Table 8.1) was deemed to be appropriate for coding themes in each of the two cycles of the DBR, starting on the *habitual level* on which little or

TABLE 8.1: Reflective level coding scheme.

Reflective level	Coding cues
Habitual action	• The answer shows no evidence of the student attempting to reach an understanding of the concept or theory which underpins the topic. • Material has been placed into an essay without the student thinking seriously about it, trying to interpret the material, or forming a view. • Largely reproduction, with or without adaptation, of the work of others.
Understanding	• Evidence of understanding a concept or topic. • Material is confined to theory. • Reliance upon what was in the textbook or the lecture notes. • Theory is not related to personal experiences, real-life applications or practical situations.
Reflection	• Theory is applied to practical situations. • Situations encountered in practice will be considered and successfully discussed in relationship to what has been taught. • There will be personal insights going beyond book theory.
Critical reflection	• Evidence of a change in perspective over a fundamental belief of the understanding of a key concept or phenomenon. • Critical reflection is unlikely to occur frequently. Additional coding cue: consideration of ethical, political or moral concerns for classroom practice (Brookfield 2007; Farrell 2015; Sparks-Langer et al. 1990; Valli 1997)

Source: Kember et al. (2008:379).

no real reflection is evident, followed by levels with increasingly more evidence of reflection, namely, the levels of *understanding* and *reflection* and, ultimately, the highest level, namely, *critical reflection*. Kember et al.'s (2008:379) coding cues were used to guide the identification of text related to each of the four codes. Educationists such as Brookfield (2017), Farrell (2015) and Sparks-Langer et al. (1990) concur that teachers who have a critical reflective approach to practice would also consider the implications of ethical, political or moral concerns for their classroom practice. Therefore, reflection on these issues in the teachers' reflective journals was added as criteria (coding cues) for critical reflection – the highest level of reflection.

Implementation of the reflective format in cycle 1

Following the guidelines of Moon (2006), the reflective scaffold implemented in the first cycle (reported by Kruger, 2019) provided simple prompts in an attempt not to be too prescriptive. Teachers were asked to provide possible reasons for their journal inscriptions on each of the following prompts that aimed to guide student teacher reflections (see Table 8.2).

With more than 1000 student teachers enrolled in 2015 for the Diploma in Grade R Teaching offered by the HEI, ample data were available in the form of student teacher reflective journals. The aim of the study and the option to participate by allowing their journals to be used anonymously as data, were explained to student teachers in the study guide. Student teachers were asked to sign an informed consent form included in the study guide, should they be willing to allow their journals to be included in the study.

After formal assessment of the portfolios as evidence of WIL, the reflective journals of all first-year student teachers who included a signed consent form in their journals were removed from the portfolios as data. As suggested by Francis et al.

TABLE 8.2: Prompts that guided reflection in the first cycle (Kruger 2019).

Prompt	Envisioned focus of reflection prompt
What to do	What aspects of my teaching were successful?
What not to do	What aspects of my teaching need to be revised? What did not work as planned?
Today the following experiences changed the way I view Grade R education	Transformative thinking; reflection that may lead to a new vision of teaching and practice
Today I received the following support and feedback from my mentor	Collaborative reflection with the mentor
Barriers experienced and plan of action to overcome the barriers	Reflection on challenges and possible solutions

Source: Kruger (2019).

(2010:1229), coding of reflective journals continued until data saturation was evident and a clear pattern emerged from the data. These authors suggest the use of data saturation to determine sample size in studies 'where conceptual categories are pre-established by existing theory'. After coding of an initial sample of 10 journals, the coding frequency was compared for emerging patterns after which a stopping criterion of four was used to check for changes in the pattern.

The authenticity and objectivity of the coding by the researcher as the primary coder were strengthened through an independent intercoder. The two coders discussed the descriptions of each level of reflection as suggested by Kember et al. (2008) (Table 8.1) and reached an agreement on the interpretations of each. It was agreed to use text chunks of any size for coding, as long as that chunk represented a single code (Zhang & Wildemuth 2009). After coding 10 journals, the code frequencies of the two coding sets for each of the four reflective levels were compared to determine the constancy in interpretations of the journal inscription. Although similar patterns already emerged from the two coding sets, possible reasons for differences in coding were discussed to ensure both coders had the same understanding of the coding cues. Both coders continued to individually code the same journal inscriptions, stopping to check for any change in the initial pattern of code occurrences in the two coding sets.

Results after the first cycle

Although differences in the two coding sets – where coding was done by two different individuals with different backgrounds and prior experiences – were to be expected, a perpetual pattern with regard to code frequency for the four reflection levels (Table 8.1) became clear after the coding of 26 journals (Table 8.3).

Analyses of code frequency after the first cycle revealed the lowest frequency of journal inscriptions to be linked to *critical*

TABLE 8.3: First cycle: Code frequencies for the four reflective levels.

Text linked to each reflective level (first cycle)		
Reflective levels (Kember et al. 2008)	**Main coder (M)**	**Inter coder (I)**
1. Habitual action	410	430
2. Understanding	890	750
3. Reflection	681	722
4. Critical reflection	198	73
Total	**2179**	**1975**

Source: Kruger (2019).

reflection. This low frequency suggests that the reflective format did not support student teachers to reflect more frequently on a critical reflective level and that a revised reflective format should find ways to strengthen critical reflective skills. However, the relative high frequency of codes linked to *reflection* and *understanding* in relation to the lower frequency for the code *habitual action,* may well be an indication of the value of the reflective format in raising reflection to higher levels than a mere non-reflective level with little attempt to understand a concept or underlying theory (Kember et al. 2008).

The analysis of data further showed a poor proficiency in English as the language of teaching and learning, which could have contributed to the low number of journal texts linked to critical reflection. The poor proficiency in English can be attributed to the socio-historical background of the country. In South Africa, there are 11 official languages. Although student teachers have a choice between seven African languages and English when registering for the language-specific components of the programme (with a focus on different areas of the Grade R language curriculum and pedagogy), English is the only medium used to convey programme content in generic modules that include the WIL components, and student teachers use English when providing evidence of outcomes attained. Teachers enrolling for this DL PDP often live and work in rural areas where one dominant (local) African language is spoken with little

exposure to English as language of communication. The impact of language diversity in teacher education and teacher competence is confirmed in the literature (Mbali 2017; Nel & Müller 2010; Van der Merwe 2018). Distance learning professional development programmes are often the only means for under- or unqualified teachers from all 11 language groups of South Africa to attain an accredited qualification. Studying and reflecting in English, which is mostly not the native language of the majority of teachers, may therefore hamper the development and assessment of critical reflective skills in the South African teacher education context.

Implementation of the revised reflective format in cycle 2

Based on the findings of the first cycle, it was decided that a stronger support is needed with specific focus on reflective vocabulary. A vocabulary aid to support reflective writing, suggested by Hampton (2008), was identified as a meaningful solution. These words and phrases provide reflective text options in English, with a focus on the description, interpretation, analysis and synthesis of learning from experiences. These reflective vocabulary prompts were used in a revised scaffold implemented in the second DBR cycle. It was anticipated that suggesting more reflective text options in the revised scaffold would provide student teachers with possible lacking vocabulary, whilst simultaneously developing the teachers' reflective writing and critical reflective skills. The use of the vocabulary aid was optional, ensuring that the ZPTD of all teachers was acknowledged.

Results after cycle 2

After implementing the revised scaffold, the same sampling and coding process as implemented in cycle 1 was repeated.

The same number of journals were chosen randomly. The code frequencies of the two cycles, based on the coding of the main coder, were compared to look for patterns on the level of teachers' reflection in the two cycles (Table 8.4).

It was anticipated that a change in code frequency between the two cycles could be an indication of the way the revised reflective scaffold supports deeper critical reflection or not. Comparison of the code frequencies of the first and second cycles evidently demonstrates a shift in code frequency that is graphically represented in Figure 8.2.

Although the levels of *understanding* and *reflection* still showed the highest code frequencies, journal inscriptions linked to *reflection* and *critical reflection* showed a significant increase, whilst links to *habitual action* decreased in relation to the other reflective levels. It should be noted, however, that the quantification of qualitative data as collected in the two cycles merely provides a basis for the interpretation of the possible value of the revised reflective format on teachers' reflective levels and cannot be regarded as an accurate measuring of teachers' reflective competency as a result of the reflective format. Nevertheless, the percentages of codes linked to each level of reflection in relation to the total number of text, coded in each cycle, reflect a clear shift to higher levels of reflection by the teachers in the second cycle (Figure 8.2).

TABLE 8.4: Comparison of code frequencies of the two cycles.

Coding by main coder per reflective level in each cycle		
Reflective levels (Kember et al. 2008)	**First cycle (simple scaffold)**	**Second cycle (Stronger scaffold – Hampton 2008)**
1. Habitual action	410	359
2. Understanding	890	693
3. Reflection	681	1422
4. Critical reflection	198	643
Total	**2179**	**3177**

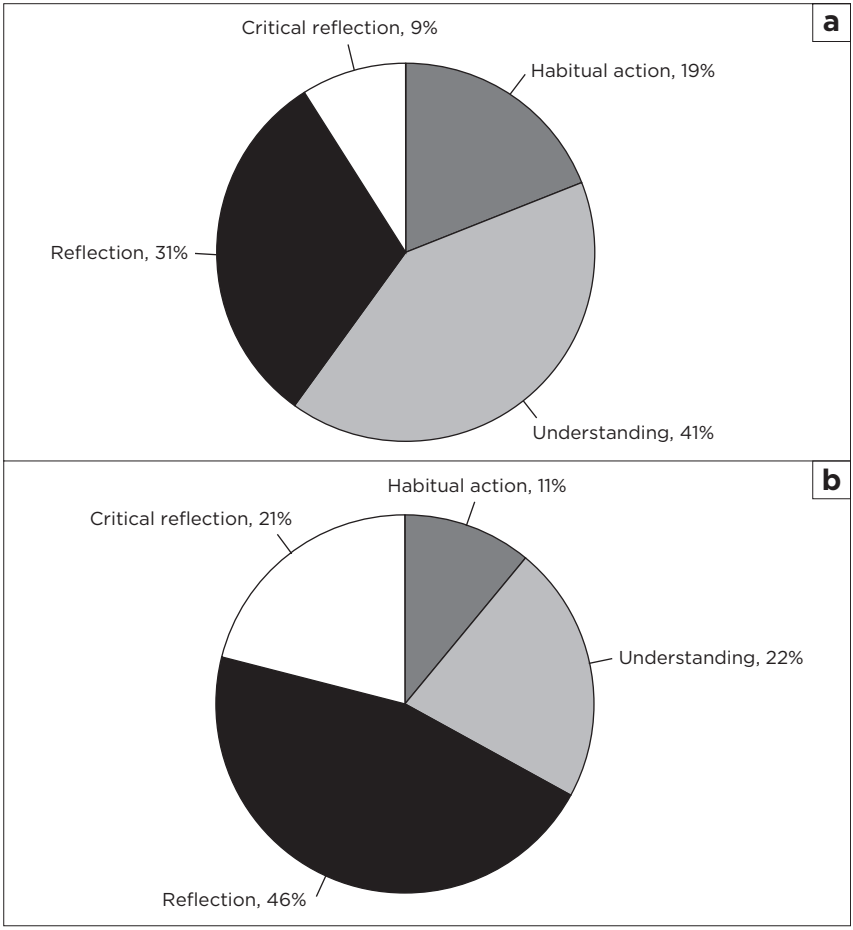


FIGURE 8.2: (a & b) Percentages of codes linked to each reflective level per cycle.

Discussion of findings

After the first cycle, in which a simple reflective format with basic prompts guided the reflection in student teachers' journals, it became apparent that a low percentage of journal inscriptions were on a critical reflective level. The reflective format was then

revised to determine if a stronger scaffold in the form of a more comprehensive vocabulary aid supports reflection on a more critical level. The relevant lower number of codes linked to *habitual action* – the lowest level of reflection on the scale suggested by Kember et al. (2008) (Table 8.1) – that was evident in both cycles suggests the value of journaling to support meaningful reflection on practice by student teachers. Although the aim is to support teachers to reflect on increasingly higher levels, Peltier (2005) is of the opinion that reflections on this superficial level may already be an indication of a person's awareness of a learning experience and should be regarded as a valuable first step towards critical reflection.

The relative higher percentages of quotations linked to the next two levels in both cycles, namely *understanding* and *reflection*, hold meaning for the value of the reflective format in light of the criteria that guided the coding of text (Table 8.1). The role of these two constructs in learning is highlighted by Mezirow (1990), as well as Shulman and Shulman (2004). Whilst Shulman and Shulman (2004:259) state teacher *understanding* and *reflection* as two of the five individual capacities necessary for 'accomplished teacher development', Mezirow (1990) also underlines the important role of these two features in transformative learning.

Whilst Shulman and Shulman (2004:264) emphasise the need of critical reflection to be at the 'heart of learning', they acknowledge the value of *reflection* as a 'central conjecture' of their model and the key to teacher learning and development. From this central position, reflection informs teachers' understanding, practice, motivation and professional vision of practice. Furthermore, reflection not only helps teachers to learn from practice through continuous evaluation, reviewing and criticising their own practice and that of others, but also supports metacognitive reflection whereby teachers gain an in-depth understanding of their own learning processes (Shulman & Shulman 2004). The value of understanding and reflection in

teacher learning through journaling is emphasised by Moon (2010) as follows:

> Journal writing encourages reflection and reflection is associated with deep approaches to learning, or with deep learning. In deep learning, the intention of the learner is to develop a personal understanding of the material and to relate it to what is already known. The freedom of journal writing can support the learner's attempt to understand. (n.p.)

Although the ultimate aim is to support teachers to think on a critical reflective level, the value of journal inscriptions on the levels of *understanding* and *reflection* should, therefore, not be underestimated. Mezirow (1990) emphasises that the realisation of one's inadequate understandings, through reflection, can serve as a motivation for deeper learning and understanding. Grounded in the aforementioned literature, an awareness of own shortcomings through reflection holds potential to direct the search for new knowledge, consequently promoting meaningful knowledge construction and deeper understanding. In addition, deep understanding strengthens the teacher's competence to apply knowledge in other contexts when necessary in a self-directed manner (Brookfied 2017) and to make informed decisions 'in action' for best practice (Schön 1991).

The following student's journal inscriptions (cycle 2) were linked to the level of *understanding.* Although this inscription showed evidence of comprehension of the value of teacher collaboration, the thought was not being related to authentic practical experience:

> **[Vocabulary aid]**: **For me, the most meaningful idea was …** 'that collaborative skills enable me to work productively with my colleagues sharing materials, experiences and ideas. The meaningful thing is to support one another and lending a helping hand'. (Student, gender undisclosed, date unknown)

> **[Vocabulary aid]**: **Having analysed …** 'Through Grade R teaching and learning I realised that I could learn a lot from somebody else, and I now know that you are never too old to learn'. (Student, gender undisclosed, date unknown)

> **[Vocabulary aid]**: **This skill will be useful for me as a practitioner:** 'because it is important to communicate and have a good relationship with your colleagues'. (Student, gender undisclosed, date unknown)

The above journal inscriptions furthermore confirm the value of the vocabulary aids in supporting metacognitive reflection where the student teacher reflected on the way collaborative learning can enhance one's own learning.

An inscription typically linked to the code *reflection* demonstrates the ability to link learnt knowledge to a real-life experience in practice (cycle 2):

> **[Vocabulary aid]: Today the most useful/important aspect was ...** 'to see the [*mentor*] teacher keeping to a strict routine; when children took too long during art she ended the lesson positively and said we can continue this activity tomorrow as an extra activity'. (Student, gender undisclosed, date unknown)

This inscription adheres to Kember et al.'s (2008:379) coding cue for *reflection*, namely, that theory is applied to practical situations and the situation encountered in practice was clearly 'considered and successfully discussed in relationship to what has been taught' (Table 8.1). These and other journal inscriptions confirm the value of thinking and writing about own learning, even if this learning is not being rationalised or explicitly linked to a transformation of own assumptions. These reflections furthermore support the deeper understanding of practice and praxis, whereby teachers reflect on the implications of theory for their practices. The shift in percentage of quotations to the *reflection* level in the second cycle (31% – 46%) serves as impetus that a stronger reflective scaffold is needed in the context of this specific DL PDP.

The literature concurs that *critical reflection* in written text should not be expected often and takes time to develop (Bell et al. 2011; Chen et al. 2013; Moon 2006; Ward & McCotter 2004). Various factors could also have contributed to the relative low

percentage of reflection on this highest level in both the cycles. One of the reasons could be attributed to participants' lack of academic literateness as the WIL component forms part of the first-year curriculum of the 3-year diploma. This diploma, geared towards under- or unqualified practising teachers, which serves as entry-level qualification on the National Qualification Framework, is often the first encounter of these teachers with studies at a HEI. Therefore, the journal was the first encounter of many of these students with reflective writing. Furthermore, as stated before, the requirement to reflect in English, as the language of teaching and learning, could have hampered meaningful reflection by non-English speakers. The majority of teachers, enrolled for the DL PDP, are from African cultural groups and reflecting in English, which in most instances is their second or third language, may have prevented these teachers to reflect on a deeper level. However, evidence of *critical reflection* emerged in both cycles, although not often, with a significant increase in the implementation of the stronger scaffold in the second cycle (9% – 21%).

Critical reflection, which is trademarked by a change in perspective, could have played a role in the following teacher's new awareness of her responsibility to a more socially just practice through accommodating learner diversity and utilising their strengths:

> **[Vocabulary aid] For me, the most important experience was …** 'that not all the learners are artistic, some are better doing music, some are better at dancing'. (Student, gender undisclosed, date unknown)

> **[Vocabulary aid] Having experienced this …** 'I now think that we underestimate the children we are working with; they are capable of doing so much more than we think'. (Student, gender undisclosed, date unknown)

> **[Vocabulary aid] This understanding is important to me as a practitioner …** 'because I can help the child to work harder on what he/she is good at doing'. (Student, gender undisclosed, date unknown)

In line with the literature as discussed earlier (Farrell 2015; Mezirow 1997; Sparks-Langer & Colton 1991; Valli 1997), inscriptions referring to an awareness of ethical or moral principles, as motive for a change in teacher's actions, were also linked to the highest level of reflection, as demonstrated in the following quotation:

> **[Vocabulary aid] Previously, I did not realise …** 'all it takes to be a good teacher. I have learnt to make an effort to learn about the values, traditions and expectations for the different cultural groups in the classroom'. (Student, gender undisclosed, date unknown)

Mezirow (1997:7) underscores that 'thinking as an autonomous and responsible agent is essential for full citizenship in democracy and for moral decision-making in situations of rapid change'. Empowering student teachers as critical reflective and autonomous teachers, thus holds potential to motivate a moral-driven teaching practice, based on an anticipation to meet the learning needs of diverse learners.

Conclusion and recommendations

The aim of journaling in this DL PDP was to scaffold the critical reflective competence of Grade R student teachers enrolled in a DL PDP, with specific focus on critical reflection on own learning from and in practice. As all students are on different levels of development regarding reflective competence, it was also important to accommodate the ZPTD with regard to critical reflective competence of the majority of the student teacher population. Grounded in the literature (Brookfield 2017; Boyd & Myers 1988; Mezirow 2003), the critical reflective competence of teachers is regarded as crucial in the transformation of substandard education. It was anticipated that journaling, in conjunction with the practical implementation of theory in the form of practical tasks under the guidance of an experienced mentor, would stimulate a critical reflective approach to practice and enhance critical reflective skills. A DBR process investigated

the way in which the design of a reflective format supports reflection on a critical reflective level.

The study findings suggest that the specific student teacher population requires stronger scaffolding to support higher levels of reflection. Various factors may contribute to this need for support, such as poor competence of the teachers in the language of teaching and learning, a lack of critical reflective knowledge and skills, and inexperience in journaling. The stronger scaffold in the form of a reflective format that provided a richer reflective text in English as the language of teaching and learning lifted the level of student teacher reflections to a more critical level. It is acknowledged that the more detailed prompts could have influenced the authenticity of teachers' reflections. However, this reflective learning experience and student teachers' use of a reflective vocabulary and terms could serve to prepare them for following reflective journals in their second and third years of the programme. Removing the reflective scaffold in a following cycle could show if vocabulary prompts equipped student teachers with the necessary English vocabulary to reflect autonomously and meaningfully on their own in the language of teaching and learning.

Students enrolled in DL programmes often feel isolated, and based on the literature confirming the value of collaborative reflection by teachers (Brookfield 2017; Shulman & Shulman 2004), further investigation in follow-up cycles could incorporate shared reflection by teachers – either in groups or in pairs – to improve the critical reflection in a DL PDP. Investigations into the role of mentors in supporting critical reflection through collaborative reflection with student teachers may also be valuable in terms of this context of institutional multimodality.

Supporting the development of a reflective vocabulary in English prior to the journaling may also promote the student teachers' critical reflective competence. Providing translations of the reflective prompts in all 11 official languages of South Africa could ensure that teachers from all cultural groups can relate to the English terms.

When student teachers are empowered as professionals who can continuously learn from their own practices as self-directed teacher learners, through critical reflection, they would be better equipped to act as agents of change to transform the current poor educational standards. If DL PDPs are to play a role in the transformation of education through preparing Grade R teachers as autonomous and reflective agents of change, education practice would benefit from more research to explore and evaluate strategies that support the development of critical reflective skills in these programmes.

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Chapter 9

Optimising the Community of Inquiry principles of online self-directed learning environments

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Abstract

Effective online learning is associated with collaborative CoIs, described by research as the ultimate learning environment for HE. The CoI framework is a reliable measuring instrument to measure the quality of the online part of learning by assessing three important presences, namely social, cognitive and teaching presences. The pedagogical principles of a CoI mould well with

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PBL as a teaching and learning strategy to promote SDL. This chapter reports on third-year geography student teachers' perceptions and feedback over 4 years (*N* = 166) to help improve the design of online PBL managed in a LMS. Both quantitative and qualitative results indicate that students held positive views of these designs, and that changing the Wiki on the LMS to Google Docs to create an interactive collaborative working space, wherein all group members can work simultaneously, optimised not only the teaching presence but also the social presence, which ultimately lifts the online cognitive presence above the expected norms.

Keywords: Blended learning; Instructional multimodality; Problem-based learning; Community of inquiry; Online learning; Self-directed learning.

Introduction and problem statement

The rapid increase of online learning is urging universities and colleges to ensure that their online courses and modules are as close as possible equivalent in quality to their traditional classes. Most importantly, this is carried out in multimodal contexts to ensure that the higher-order learning activities are achievable online with the best applicable self-directed teaching and learning strategies. In an attempt to fulfil the required needs of 21st-century learning, as well as fostering self-directed, lifelong learning skills, applicable technology applications and ICTs as tools for learning, should continuously be accustomed and evaluated to optimise learning gain. When taking a large number of annual student enrolments for online courses in account, it is of paramount importance that online designs integrating technology applications are based on a sound theoretical framework so as to produce high-quality learning outcomes (Serdyukov 2017).

Higher education institutions, in general, are progressively integrating technologies in online multimodal teaching and learning environments to improve students' online teaching and

learning experiences (Hamid et al. 2015; Lee 2014; Morueta et al. 2016). According to Morueta et al. (2016):

> [*M*]ost of these online [*modules*] are being developed within a learning management system (LMS) software application. Within this context, [*discussion forums*] and [*collaboration spaces*] allow high levels of student-[*to*]-student and student-[*to-educator*] interaction, which support teaching and learning models suitable for higher education. (p. 122)

Moreover, research has shown (with online PBL in mind) that asynchronous and, more so, synchronous online discussion, is ideal for learning in online environments because students can collaborate and communicate with their co-students, share and construct knowledge and 'solve problems, all of which require and foster a higher level of thinking' (e.g. De Wever et al. 2010). By applying a SDL strategy such as PBL in a BL (cf. ch. 2, ch. 4, ch. 6 & ch. 10) context, matches the above research and the following question may also be asked: *What does this hold as possible advantages for students' self-directedness?*

It is essential to strive for an online design providing ample opportunity for preferably simultaneous online collaboration and communication among students, otherwise research did indicate that students can develop feelings of isolation and disconnectedness (Ali & Smith 2015). Therefore, researchers and practitioners must optimise the role of a social presence in online learning in an attempt to overcome these issues.

Although many technologies exist nowadays that allow student's online communication and collaboration within teaching and learning environments, some issues still do exist, of which 'free riding' – in which one person did all the work and the rest did not necessarily have the same learning experience – is the most important issue (Scager et al. 2016).

Garrison's (2009, 2015, 2016) CoI model (cf. ch. 2 & ch. 6) has been used widely in literature on online learning. He identified a cognitive presence, a social presence and a teaching presence as important elements of an effective online learning experiences.

Cognitively, students must be able to think creatively and subsequently construct their own meaning through their interaction with co-students and the facilitator in the online learning environment. Socially, students need to communicate and collaborate, clarify concepts, ask for help and assistance, and feel free to contribute to discussions, all in an online learning environment. Teaching presence necessitates that the facilitator regularly provides guidance and feedback throughout the learning activity (Garrison 2009). Lehman and Conceição (2010:4) claim that 'with the online learning discourse, regarding social presence, the focus is on creating engagement, a rich environment for learner interaction, and a sense of community, which together result in an enhance[d] social presence', subsequently leading to a higher cognitive presence if supported by continuous teaching presence.

The main purpose of this study was to determine, through design-based principles applied over 4 years, whether the final online PBL design presented in 2017 was an effective and quality online teaching and learning environment. Therefore, this study is related to instructional multimodality. For this research, third-year geography students shared their perspectives on whether the presences of the CoI framework (teaching, social and cognitive presences) were sufficient and according to the desired standards.

The following four research questions guided the study:

- Is the course design of the three presences in the CoI framework adequate to support online PBL?
- How can the course design of online PBL be improved to enhance the presences mentioned in the CoI framework?
- Is the social presence of the online PBL activity sufficient to support the collaboration between students?
- Can improvement of the collaboration between students in online PBL increase the social presence and, consequently, cognitive presence in the CoI framework?

Conceptual and theoretical framework

The CoI model of Garrison, Anderson and Archer (2000) situated in the social constructivism of Vygotsky (1978) provides a meaningful framework for the evaluation of online course development (Rapchak 2017). The most important underpinning point of departure for the research is the common emphasis on the learner in the centre of learning, and creating meaningful learning experiences for them.

Technology-supported learning environments

Online technologies' SDL activities, such as PBL, need to be conducted by anyone at any time everywhere, synchronously and asynchronously on any device (Hazwanie et al. 2017). With online PBL environment, all discussions take place electronically, using a combination of applicable technology applications and tools, both asynchronously and synchronously, for example text-based chats, discussion forums or emails etc. Hazwanie et al. 2017 suggests that online PBL designs, tools such as Wikis, Google Docs and Google Hangouts offer ways to students in different locations to collaboratively create reports and presentations on the same document. The production of high-quality, higher-order thinking reports or presentations on their approach and solution to the set problem is a common element of PBL activities. According to Ó Broin and Raftery (2011), 'One useful feature is the ability to add comments and automatically include a timestamp and the commenter's name'. In this regard, Google Docs, in comparison to Wiki tool on the LMS, holds more advantages for students working collaboratively in an online environment in solving the stated problems. Google Docs provides a virtual environment in which students can interact simultaneously, solving problems together and communicate

with the members of their group, as well as with the facilitator (Reynolds 2016):

> Important advantages of Google Docs include the following highlights applicable to this study: [*A*] box at the bottom right-hand side that shows when another person is editing the document at the same time; Google Docs allows multiple users to collaborate and edit the document simultaneously. A very handy revision history is readily available that archives each saved version, which can be easily accessed, reviewed and allows for comparisons between versions with the advantage that changes made to the document are highlighted and colour-coded to indicate who has made the changes. (pp. 5–6)

Online problem-based learning

The online PBL process should be anchored by means of an ill-structured and authentic real-world problem that has more than one solution. Students are organised into groups of four to eight, working collaboratively (Chernobilsky, Nagarajan & Hmelo-Silver 2005). The students continuously discuss goals, necessary supportive theory and solutions to the problem on the online learning platform, in this instance Wiki tool or Google Docs. These learning objectives are conceptualised into different learning tasks, and the group members have to do an independent investigation of the stated learning objectives in their own time, but share their findings in the collaborative online space. They must consult different resources, throughout, such as textbooks, internet articles and field studies. The students continuously share and work together with new information on the problem (Lam 2009). After discussing and analysing the problem, the group members formulate multiple solutions to the stated problem (Tick 2007).

The Community of Inquiry framework

Community of Inquiry (cf. ch. 2 & ch. 6), according to Cho, Kim and Choi (2017), is one the most researched and commonly used

frameworks for online learning, research and pedagogy to assess students' online learning experiences. Community of Inquiry emphasises the importance of *collaboration* amongst online participants (which includes the lecturer, tutor and students) to ensure effective online learning. In the CoI framework, the lecturer ensures quality course design to optimal support students' cognitive development, as well as facilitates collaboration between group members and facilitation from the instructor to the students. Moreover, according to Cho et al. (2017):

> [*E*]ach student's commitment to a positive learning community is another important factor for success with the CoI framework. In online learning, students play a more demanding role and take more responsibility for their learning compared to face-to-face settings. (p. 10)

The CoI framework is used, because it seems to be the most commonly used and most appropriate for analysing online learning environments in HE (Garrison et al. 2000). Research validates this framework as a dependable instrument that could be used to measure the quality of online learning, as well as to determine whether higher-order learning could take place. It focuses on three highly important presences that contribute to the quality of course design (Shea et al. 2005; Swan, Garrison & Richardson 2009; Szeto 2015). Designing an online learning environment that fosters effective, quality teaching, social and cognitive presences will allow students to engage in SDL skills such as critical inquiry and the problem-solving necessary to engage in higher-order online activities (according to Bloom's taxonomy; Rapchak 2017).

For the purpose of this study, it is necessary to contextualise and define the CoI framework in more depth. The CoI views cooperation amongst the participants as essential for meaningful knowledge construction (Garrison, Cleveland-Innes & Fung 2010). Students' collaborative engagement in interactions with the instructor, or tutors, and with peers could help them to develop the relevant knowledge and skills (Garrison, Anderson &

Archer 2001). The three presences forming the CoI framework, namely a social presence, cognitive presence and teaching presence, will now be summarised briefly (Cho et al. 2017; Morueta et al. 2016).

Teaching presence

Teaching presence refers to 'the design, facilitation, and direction of cognitive and social processes for the purpose of realising personally meaningful and educationally worthwhile learning outcomes' (Anderson et al. 2001:5). It plays a key role in 'nurturing, supporting and sustaining the social and cognitive presences of online learning environments' (Akyol & Garrison 2011; Garrison et al. 2010). According to Morueta et al. (2016), this presence has the following two basic functions:

> (1) [*T*]he design of the educational experience; and (2) facilitation among the instructor and the students. It is the responsibility of the instructor to design and integrate both cognitive and social presence for educational purposes through scaffolding, modelling or coaching. (p. 124)

Social presence

As social presence is at the heart of facilitating an up-to-standard online learning environment, more emphasis is placed on the detail of what a social presence entails. Dewey (1955:5) 'reasons that learning results from experiences that are contextually based and socially situated'. According to Garrison and Arbaugh (2007:159): 'Of the three presences, social presence has been studied the most extensively in both online and face-to-face settings'.

According to Garrison (2009), *social presence* refers specifically to:

> [*T*]he ability of participants to identify with the community (e.g. course of study), communicate purposefully in a trusting environment, and develop interpersonal relationships by way of projecting their individual personalities. (p. 352)

Furthermore, it 'emphasises participants' communication skills in relation to other members and contributes to the creation of a cooperative learning environment' (Akyol & Garrison 2011:184).

Agreeing with Morueta et al. (2016), a social presence can be separated into three major important categories:

> [*A*]ffective, interactive, and cohesive – and reflects a supportive context for emotional expression, open communication, and group cohesion for the resolution of the respective tasks. Social presence – an important factor critical to face-to-face teaching – is a challenge for instructors to facilitate in online learning environments. (p. 123)

Furthermore, Morueta et al. (2016) submit:

> For higher-order learning tasks in collaborative learning environments, a higher or interactive social presence is essential. Research generally indicates that, by increasing the level of requirement of the task (in Bloom's taxonomy), it also increases the frequency and quality of online social interaction. Research proof that social presence has a high correlational relationship with online cognitive presence, especially in a self-directed online learning environment. In an online learning environment, learning outcomes are highly dependent on group cohesion. Importantly, teaching presence has a direct influence on the social and cognitive presences of online learning environments. (pp. 123–124)

☐ Cognitive presence

Cognitive presence refers to 'the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse in a critical community of inquiry' (Garrison et al. 2001:11). By expressing a cognitive presence, students can perform higher-order learning and be able to develop meaningful knowledge. Furthermore, a cognitive presence can, according to Morueta et al. (2016), be divided into four phases with specific descriptions for each phase:

> (1) [*A*] triggering event (an issue is identified for inquiry); (2) exploration (exploring the issue through discussion and critical reflection); (3) integration (constructing meaning from the ideas

> developed through exploration); and (4) resolution (applying new knowledge into a real-world context). (p. 122)

To summarise, a social presence represents the ability to successfully connect and collaborate with group members of an online community of learners at a more personal level. A cognitive presence refers to scaffolding from lower- to higher-order learning, and is important in the construction of meaning and deep learning through collaborative inquiry. It is seen as the most important presence in online learning activities because of the representation of higher-order learning and metacognition. A teaching presence refers to the online communication between participants whilst learning, and the continuous assessment in conjunction with interactive online facilitation that structures and constructs the educational process. It is the balanced and purposeful overlapping of these three elements that produces the core of a CoI in which collaborative constructivist teaching and learning experiences could be accomplished (Garrison 2006). According to Annand (2011:42), '[t]he framework, therefore, suggests that online learning experiences should continuously advance in the interaction between these presences'. Thus, the CoI is a recursive framework in that the three presences support each other and that it also could maximise students' online learning experiences. 'The three presences ultimately promote social, intellectual and cognitive interaction, communication and collaboration among participants and study materials in online learning situations to successfully achieve the learning outcomes' (Annand 2011:42).

As was mentioned in Chapter 6, PBL is seen as a higher-order learning activity, and it can also foster SDL skills in students. Therefore, it is necessary to ensure a proper design according to the CoI framework principles. In order to perform higher-order learning tasks online, the following guidelines apply according to Morueta et al. (2016):

- ‘A strong teaching presence is necessary, which entails continuous guidance, structure, and support to students’.
- ‘It is the responsibility of the facilitator to design, scaffold, model and coach properly before and during the online activity. Regarding social presence, the frequency of group members’ involvement will increase as the level of the task (according to Bloom’s taxonomy) increases’.
- In support of this, Richardson and Ice (2010) found that ‘a discussion based on real cases can stimulate more critical thinking than other types of tasks, such as a theoretical study or debate’. (p. 123)

Research objectives

To implement effective online PBL as a higher-order learning activity in a collaborative learning environment, it is important to increase both the social and cognitive presences of students, as the teaching presence is naturally present when using an LMS. A higher social presence can increase the cognitive presence of students. It is, therefore, important to determine whether collaborative online PBL is possible in online learning environments, and whether a social presence is sufficient to contribute to a higher cognitive presence (i.e. ultimately contributes to effective online collaborative PBL). Therefore, the main purpose of this study was to determine whether this final online PBL design was an effective and quality online teaching and learning environment according to the third-year geography students’ perspectives, and whether the presences of CoI framework (teaching, social and cognitive presences) are sufficient and according to the desired standards.

The main objectives of this research were as follows:

- to determine whether the course design of the three presences of the CoI framework are adequate to support online PBL
- to report on how the course design of online PBL be improved to enhance the presences of the CoI framework

- to determine whether the social presence of the online PBL activity is sufficient to support the collaboration between students
- to determine whether the improvement of collaboration between students in online PBL could increase the social presence and, consequently, the cognitive presence in the CoI framework.

Research methodology

Design-based research was implemented over a 4-year period, using a cross-sectional case study as part of developmental research. Both quantitative and qualitative data (QUAN–QUAL) were used for this research (Leedy & Ormrod 2001).

Study context

In this study, the third-year BEd geography student groups of 2014–2017 were introduced to an online PBL design where students worked collaboratively in groups. Students had to take responsibility to manage their own work and learning process. This correlates with the SDL *Teaching and learning strategy – 2016–2020* of the NWU (2016), which encourages 'active learning' to enable students to develop the knowledge, skills and personal qualities that would prepare them for the current and the future world of work, as well as for life in the 21st-century society.

Two third-year BEd geography modules, GEOE311 (Urban & Population Geography) and GEOE321 (Climatology), were selected for the implementation of the 6-week (3 weeks per module) online PBL activities over four years from 2014 to 2017. The respective lecturers for the modules developed a geography problem based on one of the outcomes of the course work.

The lecturers served as online facilitators with two assistants, who mainly checked the technical aspects of the PBL process

and online progress. The students had to complete the integrated PBL activities online in the Wikis tool of the university's LMS called *eFundi*. The students were divided into online groups of more or less six to complete the PBL activities on the Wiki tool. Two responsible lecturers for the geography modules acted as both facilitator and tutor during the two 3-week (6 weeks combined) online PBL activities.

In preparation, the geography students received information and orientation regarding the principles of the PBL process, as well as the online facilitation and work procedures on eFundi (and Google Docs in 2017) during the first contact session. Students of all 4-year groups did PBL activities in their first 2 years in a face-to-face environment.

The two problems selected were as follows:

- GEOE311 (Population & Urban Geography), Theme: Poor health in low-income urban areas: As beginner geography teachers in a school situated in a low-income informal settlement in Ikageng, Potchefstroom, you become aware that the geography learners in your class are absent on a regular basis. In discussions with the principal, teachers, as well as the clinic sisters at the nearby medical clinic, the poor health conditions in the low-income dwelling areas are highlighted as the main reason. The government body of the school ask you to provide possible solutions to the poor health problems of learners and residents in the area' (Golightly 2018:465).
- GEOE321 (Climatology), Theme: Climate change in South Africa: 'Global warming and modern climate change are considered a serious problem worldwide and, according to scientists, this threatens the future existence of man on earth. In South Africa there is great concern about the impact that climate change (global warming) will have on our country's people and environment. The Department of Agriculture Conservation and Environmental Affairs requests a report from the geography students with reference to the presence of climate change in South Africa, as well as possible measures

which the South African government could implement to, firstly, help manage this problem and, secondly, to combat it drastically. The Department also wishes to know what can be done by individuals and households to make a meaningful contribution' (Golightly 2018:465).

Course design in the Community of Inquiry framework

Besides the preparation of students regarding the PBL process and the work process on the LMS, the courses were designed with the principles of the CoI framework in mind. Because the researchers were cautious of failure of the online PBL activity, we ensured a good teaching presence throughout. As a teaching presence, a class site was created in eFundi and it utilised the following tools, which were available on the LMS, namely: *Announcements* (to ensure students keep up with the schedule provided in Box 9.1); *Resources* (for filing the basic course work study material); *Assignments*; *Calendar* (for the deadlines and works schedule); and *emails* and *messages* (both for further communication with students). During the 6 weeks, the lecturer commented on the PBL report students were working on. For the 2017 year groups, the lecturers also made use of the *comments thread* on Google Docs.

As a social presence, a group site was created for each group on the LMS, eFundi, with the following tools activated: *Announcements* (if the lecturer wanted to make an announcement to a particular group); *Resources* (for the group to upload their working documents); *Discussion*; emails and messages (for communication between group members only); and the *Wiki* (for the 2014–2016 year groups to collaboratively complete their PBL report). For the 2017 group, the LMS Wiki was replaced by Google Docs, whereon students could work simultaneously by embedding a Google Docs document for each group separately.

BOX 9.1: Example of a work schedule to ensure a strong teaching, social and cognitive presence, and goal interdependence within a CL environment.

Deadline schedule for progressing through the PBL activity
23 August to 17 September (3½ weeks)

1. **By Friday, 23 August**: Do research and plan your PBL activity.

2. **By Monday, 27 August** by 18:00 (after scheduled class time):

In Google Docs, upload one single sentence to demarcate the problem to solve. Upload the learning outcomes or objectives needed to successfully complete the activity. We will give feedback with comments in Google Docs.

Do research to collect the necessary information to answer to all possible outcomes that need to be achieved.

3. **By Thursday, 30 August:** Broad structure and outlay of the report. Insert basic definitions and start with the draft report. Keep a bibliography updated at the end of the report. Ensure that all group members work equally on Google Docs. Upload all your work documents and resources under 'Resources' on your group eFundi site (not the class site). We will give feedback. Complete assessment rubric on a continuous basis. Complete the assessment rubric and upload under 'Resources' on the group eFundi site.

4. **By Monday, 03 September:** Report should be 60% – 75% completed. All group members should have contributed equally on a daily basis or according to this schedule. Bibliography should be updated. We will give feedback. Start building your PowerPoint presentations under PBL slides on your group eFundi site so that it could be monitored and evaluated continuously. Complete your self-assessment rubric as far as possible and upload on your group eFundi site under 'Resources'.

5. **By Thursday, 06 September:** Report should be 90% completed. Bibliography should be updated. Ensure throughout, resources used uploaded on your eFundi group sites under 'Resources'. Your PowerPoint (of eight slides for a 5-min presentation) should be 80%+ completed. We will give final feedback (if necessary) on report. We will also give initial feedback on PowerPoint Presentation. MAKE USE OF LOTS OF GRAPHS, MAPS AND DIAGRAMS IN YOUR PP-SLIDES.

6. **By Monday, 10 September:** Report should be completed by end of the day. Draft final PowerPoint presentations should be finalised for final feedback from lecturers.

7. **By Thursday, 13 September:** Finalised report available on Google Docs. PowerPoint presentation should be finalised by the end of the day and ready to present on Monday. PowerPoint will be assessed by the end of the day. Presentations should be a summary of eight slides presented in 5 min.

8. **By Monday, 17 September:** Possible PowerPoint presentations in class. Class starts at normal time 07:30.

PBL, problem-based learning.

The lecturers ensured a cognitive presence throughout the PBL activity by guiding students towards the learning goal by asking critical questions and ensuring that students consulted the correct sources in their research about the problem. Therefore, each group had to keep a reference list up-to-date and insert in-text references.

A strict deadline schedule was provided by the lecturer and was closely monitored to ensure a good teaching presence. This schedule is presented in Box 9.1 and was adapted according to the dates of each year (2014–2017). The online PBL activity was aligned with the third-year geography module outcomes and dealt with the topics 'Poor health in low-income urban areas' and 'Climate change' (see section 'Study context' above).

Participants

The participants comprised full-time undergraduate BEd geography student teachers of 2014 (n = 35), 2015 (n = 26), 2016 (n = 52) and 2017 (n = 53) in two of the third-year geography modules of a South African university. A total of 166 students completed the CoI questionnaire over 4 years (from 2014 to 2017).

Data collection and analysis

Quantitative data: The third-year geography student teachers of 2014–2017 were asked to complete a questionnaire at the end of the completion of two third-year modules as part of this explorative case study (cf. Leedy & Ormrod 2001), namely, the CoI questionnaire. 'The CoI was measured with the modified CoI questionnaire, consisting of social presence, cognitive presence, and teaching presence' (Arbaugh et al. 2008). Arbaugh et al. (2008) further state:

> The five-point Likert scale of the CoI questionnaire, which contains 34 items, was adapted to fit the research context, where 1 = 'strongly disagree' and 5 = 'strongly agree'. The overall reliability of the CoI

> scale was greater than 0.90, and the Cronbach alpha values for the teaching, social, and cognitive presences were 0.94, 0.91, and 0.95 respectively, suggesting a high internal consistency of the CoI scale. Descriptive statistics were used to examine the participants' responses to the three elements: teaching presence (items 1 to 13), social presence (items 14 to 22), and cognitive presence (items 23 to 34). (p. 134)

Moreover, Arbaugh et al. (2008) add:

> The items of the questionnaire were used as closely relevant to the current study, so we could accurately measure the participants' perceptions of online PBL. For social presence, an example item was 'I felt comfortable conversing through the online medium'. An example item for a cognitive presence was '[*t*]he topics stimulated my interest in the course', and for a teaching presence, an example item was '[*t*]he instructor provided clear instructions on how to participate in course learning activities'. In this study, item reliability was evaluated as $\alpha = 0.82$ for social presence, $\alpha = 0.90$ for cognitive presence, and $\alpha = 0.94$ for teaching presence. (p. 134)

☐ Qualitative data

Attached to the CoI questionnaire, two open-ended questions were included at the end of the questionnaire. The open-ended questions focused on the student teachers' perceptions on how the online activity could be improved, and their perceptions regarding the use of the LMS, eFundi, the Wiki on the LMS and the Google Docs.

In the open-ended questions, the participants were encouraged to elaborate in detail on their experiences.

The qualitative analysis, first of all, consists of coding the data, then dividing the texts into small units (phrases, sentences and paragraphs) and, lastly, assigning a label to each unit (cf. Creswell & Plano Clark 2007). The qualitative data are enriched and sometimes clarify and provide better understanding of the quantitative findings in order to answer the research questions in the best manner.

Ethical considerations

This research was approved by the relevant research ethics committee of the university and complied with all the ethical regulations of the university and adhered to the university's gatekeeper requirements. An independent person facilitated the data collection procedure. The participants provided written informed consent that the information could be used for this research. Students participated voluntarily and could leave as participant anytime.

Results and discussions

Evaluation of the Community of Inquiry elements of the online problem-based learning environment

Table 9.1 presents a breakdown of the mean scores of different sub-sections of the three elements (presences) of the CoI framework, based on the students' experience of an online collaborative learning environment in 2014, 2015, 2016 and 2017 respectively. The three interdependent elements, teaching presence, social presence and cognitive presence, should be, respectively, 4.18, 3.98 and 4.14, which is regarded as an acceptable and effective online collaborative learning environment (Arbaugh et al. 2008). These norms were designed by Arbaugh et al. (2008) and can be summarised as follows:

- This article reports on the multi-institutional development and validation of an instrument that attempts to operationalise the CoI framework of Garrison et al. (2000).
- The 34-item CoI framework survey instrument was administered at four institutions in the Summer of 2007. Participating institutions were located in the USA and Canada. Participants in the study were enrolled in graduate-level courses in either

> Education or Business. The participant group comprised 287 students who volunteered to complete the survey, yielding a response rate of 43%. (p. 135)

This led to a guideline or standard as to what the value of CoI framework elements (a teaching presence, social presence and cognitive presence) for online teaching and learning designs should be as perceived by its students:

- Norm/guideline (Arbaugh et al. 2008).
- Likert Scale (1 = strongly disagree, 5 = strongly agree).
- Teaching presence = 4.18 (83.5%).
- Social presence = 3.98 (79.5%), 4% lower than the teaching presence (…overall some items do not factor out 'as cleanly' and this may be because of vagueness in how they are worded).
- Cognitive presence = 4.14 (82.75%), 0.75% lower than the teaching presence, but 3.25% higher than the social presence.

The results of the 2014, 2015 and 2016 year groups (using the Wiki on the LMS) were compared with the 2017 group, for whom the Wiki on the LMS was substituted with Google Docs in order for students to work interactively and communicatively at the same time on the same document (see Table 9.1, Figure 9.1 and Figure 9.2).

Table 9.1 and Figure 9.1 and Figure 9.2 compare the results of the perceptions of 2014, 2015 and 2016 students (who used the standard Wiki tool on the LMS for online collaboration) with the 2017 students (who used Google Docs for their online collaboration). For the purpose of this comparison, the averages of the three years of 2014, 2015 and 2016, which all used the same PBL design (the Wiki as online collaboration tool on the LMS), were calculated. Figure 9.2 also depicts the suggested mean scores of the three elements (teaching presence, social presence and cognitive presence) of CoI framework.

TABLE 9.1: Summary of the evaluated scores of a teaching presence, social presence and cognitive presence of the CoI framework evaluation, as perceived by the third-year geography student teachers (2014–2017).

Evaluated Scores	**2014** ***n*** **= 35**	**2015** ***n*** **= 26**	**2016** ***n*** **= 52**	**2017** ***n*** **= 53**	**Avg. 2014**	**Avg. 2015**	**Avg. 2016**	**Avg. 2017**	***SD**	
Teaching presence (averages)					4.13	4.34	4.08	4.29	0.84	0.59
• Design and organisation	4.29	4.47	4.19	4.37					0.75	
• Facilitating discourse	4.11	4.31	3.90	4.14					0.88	
• Direct instruction	4.01	4.25	4.09	4.30					0.87	
Social presence (averages)					3.90	3.84	3.57	4.13	0.85	0.61
• Affective expression	3.84	3.82	3.63	4.09					0.85	
• Open communication	3.94	3.92	3.53	4.12					0.89	
• Group collusion	3.91	3.71	3.55	4.19					0.82	
Cognitive presence (averages)					4.01	3.97	3.71	4.18	0.88	0.60
• Triggering event	3.83	3.79	3.45	3.92					0.91	
• Exploration phase	4.17	4.06	3.78	4.23					0.70	
• Integration phase	4.03	3.96	3.74	4.25					0.83	
• Resolution phase	4.01	4.08	3.85	4.17					0.84	
Total: (4.13)†					**4.02**	**4.05**	**3.80**	**4.20**		

†, average total for the years 2014 to 2017.
SD, standard deviation.

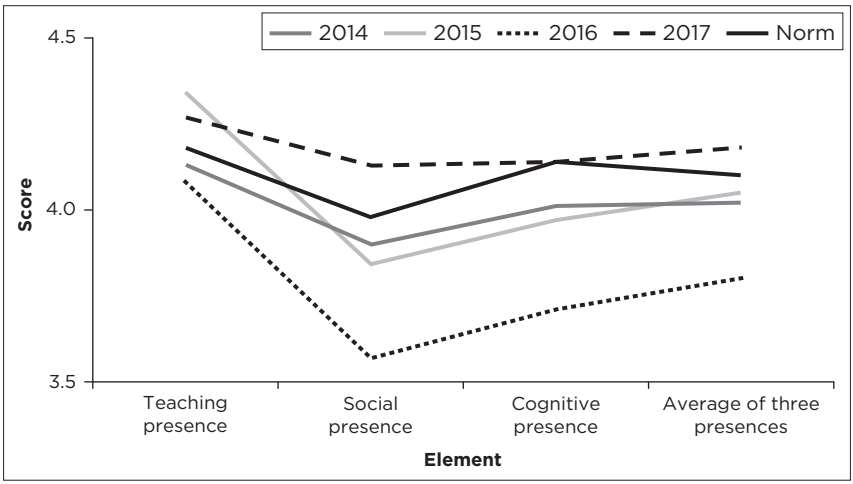

FIGURE 9.1: Summary and comparison of the evaluated scores of the three elements (teaching presence, social presence and cognitive presence) of the CoI framework evaluation as perceived by the third-year geography student teachers for 2014–2017.

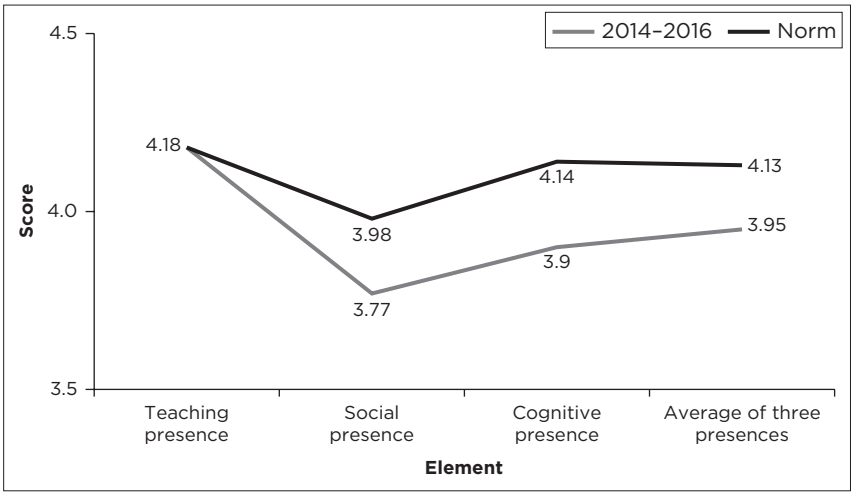

FIGURE 9.2: Summary and comparison of the evaluated scores of the three elements (a teaching presence, social presence and cognitive presence) of the CoI framework evaluation as perceived by the third-year geography student teachers for 2014–2016 compared to the norm.

It is clearly observed from Figure 9.1 and Figure 9.2 that the PBL design, using Google Docs as online collaboration tool in 2017, resulted in a better than the suggested norm of the averages of three presences. Only the teaching presence met the suggested mean score of 4.18 for the 2014, 2015 and 2016 PBL design (without Google Docs); both the social presence and cognitive presence were below the suggested mean and thus not up to standard for an online design.

Changes made to the online problem-based learning designs from 2014 to 2017

2014 Design: When the results of the CoI questionnaire were seen, only the teaching presence (4.13) was close to the norm of 4.18, mainly because the tools of the LMS were used, which were built to support the lecturer in managing the learning process. The social presence was 3.90, further below the norm (3.98). As a result of the low social presence, the cognitive presence was also lower (4.04) than the norm of 4.14. Most of the students complained in their open-ended questions that not all students worked together, or were pulling their weight. It was easy to sense that the collaborative environment should be improved to encourage student interaction and communication. Students were also complaining about the effectiveness of the Wiki tool platform on the LMS, wherein they had to co-write their collaborative report, but could not do so at the same time and had to wait for one another's input.

2015 Design: As a result of the feedback from the 2014 students, the lecturers made an extra effort to encourage the students to ensure good continuous collaboration between group members throughout the duration of PBL activity. This fact was also emphasised at the initial training workshop. When the results were seen, all achieved was to score a much higher teaching presence (4.34) than the norm of 4.18. But still the social presence score of 3.84 was lower than the norm, and, in

this instance, lower than the 2014 score, again with the same complaints from students that group cohesion, collaboration and communication were lacking and that some members were still not pulling their weight, despite continuous encouragement from the lecturer. This also resulted in an equally lower cognitive presence with a score of 3.97. From the open-ended questionnaires, it was evident that the Wiki tool in the LMS (named eFundi) proved to be ineffective for online simultaneous collaboration.

2016 Design: Again, from the feedback we tried to improve the social presence by continuously encouraging the students to work effectively in their groups. In the year 2016, the lowest teaching presence at 4.08 was received, along with the lowest social presence at 3.57 and the lowest cognitive presence at 3.71. It was evident from students' feedback that the online collaboration platform had to be changed because the social presence, as created in the LMS, was not sufficient.

2017 Design: We replaced the Wiki on the LMS with Google Docs by embedding it into the place of the Wiki tool in the vertical toolbar of the eFundi LMS. The feedback from the students was overwhelmingly positive and for the first time, the presence of all three elements of CoI framework scored above the norm scores, as Google Docs also allows for teacher involvement via the comment and suggesting/editing functionalities, which can also be viewed by all group members simultaneously. These functionalities also allow for higher-order teaching and learning to take place, as well as using innovative SDL strategies, such as PBL, CL etc., to optimise the cognitive presence. The teaching presence increased to 4.29. The social presence was 4.13, above the norm of 3.98 for the first time. As indicated in literature, by increasing social presence, it also automatically increased the cognitive presence for the first time with 4.18 above the norm of 4.14. This final design proved to be better than the suggested norm for the presence of all elements of the CoI framework in an online learning environment.

In order to compare the results of the 3 year groups (2014, 2015 and 2016), who used the Wiki on the LMS, with the 2017-year group, who replaced the Wiki by embedding Google Docs in the LMS, the difference in the results is obvious (see Table 9.2 in conjunction with Figure 9.1 and Figure 9.2).

It is evident from Table 9.2 that the final design with Google Docs (in 2017) of the online PBL activity of these two geography modules not only complied with the recommended average scores for acceptable and effective online collaborative activities according to the CoI framework as perceived by the students, but was even slightly better, with 4.29 for the teaching presence, 4.13 for the social presence and 4.18 for the cognitive presence respectively (Van der Westhuizen 2017). According to Morueta et al. (2016), increasing the social presence with more effective platforms, such as the communication thread, on Google Docs

TABLE 9.2: Summary of the evaluated scores of the presence of the three elements in the CoI framework evaluation, as perceived by the third-year geography student teachers for 2014 (*n* = 35), 2015 (*n* = 26), 2016 (*n* = 52) and 2017 (*n* = 59) respectively.

Presence of elements	Mean suggested score	Mean online problem based learning	Mean	Difference (%)
Teaching	4.18	2014 Wiki on LMS	4.13	−1.2
		2015 Wiki on LMS	4.34	+3.83
		2016 Wiki on LMS	4.08	−2.0
		2017 Google Docs in LMS	**4.29**	**+1.8**
Social	3.98	2014 Wiki on LMS	3.90	−2.01
		2015 Wiki on LMS	3.84	−3.52
		2016 Wiki on LMS	3.57	−8.2
		2017 Google Docs in LMS	**4.13**	**+3.0**
Cognitive	4.14	2014 Wiki on LMS	4.01	−3.14
		2015 Wiki on LMS	3.97	−4.11
		2016 Wiki on LMS	3.71	−8.6
		2017 Google Docs on LMS	**4.18**	**+0.4**

Source: Van der Westhuizen (2017), adapted from Arbaugh et al. (2008).
Bold indicates Google Docs intervention in the LMS.
LMS, learning management system.

supported online collaboration and interaction. It was found from the data provided in Table 9.1 and Table 9.2 and the feedback from students that the Wiki on the Sakai LMS did not allow for simultaneous collaboration by group members when writing their reports – only one member at a time is allowed access on the Wiki, and therefore not synchronously. It is for this reason that the Wiki tool of the university was replaced by embedding Google Docs in the LMS, which immediately allows for more effective, simultaneous, collaboration resulting in better measurements according to the CoI framework.

Conclusion

The geography student teacher group of 2017 that used Google Docs to complete their PBL reports online perceived the design as sufficient, especially was very positive feedback received regarding the collaboration ability. Compared with 2014–2016 results, when the Wiki on the LMS was used for activity collaboration, which clearly resulted in a below standard social presence, and sub-sequentially also the cognitive presence. This study indicates that the sudden improvement in 2017 was because of the replacement of Wiki on the LMS with Google Docs. In Google Docs, it was possible for students to work simultaneously (synchronously), as well as asynchronously on their group's PBL report by collaborating directly on the allocated Google Docs site. This resulted in positive perceptions, connectedness and effective continual communication amongst the students, thus greater cohesion and a feeling of belonging. The teaching presence could also be optimised through comments, suggesting and editing functionalities, whilst all group participants can be present online. Thus, the 2017 design with Google Docs resulted in a higher than the norm teaching presence, because the lecturer could give spot-specific feedback. Their online collaboration on Google Docs thus increased the effectiveness of online PBL activity and completing the higher-order learning activity with success.

This study also proves that if the social presence is of good quality, it would increase cognitive presence above the required norm. The supportive online collaborative application of Google Docs (the design for 2017) had, therefore, a positive impact on the presence of all three elements of CoI framework.

Chapter 10

Blending and cooperating in the computer literacy classroom: An opportunity to develop self-directed learning skills

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Abstract

In the 21st century, computer literacy, as well as creativity, collaboration, critical thinking and communication – all skills of a self-directed learner – have become a necessity. Teachers (and pre-service teachers) must cope with the constantly changing era we live in and therefore need skills to effectively cope in the 21st century. In this chapter, we argue that a computer literacy module can be used to develop pre-service teachers' SDL skills by using blended and CL as teaching and learning strategies. Self-directed learners take responsibility (with or without the help of others) for their own learning and, in doing so, develop into lifelong learners. This investigation (in which a quasi-experimental design was utilised) showed that a computer literacy module holds the potential to enhance pre-service teachers' SDL skills, thereby equipping them with more than just computer literacy.

Keywords: Computer literacy; Digital literacy; Self-directed learning skills; Blended learning; Instructional multimodality; Cooperative learning; 21st-century skills.

Introduction

In this chapter, we argue that a computer literacy module can be used to develop pre-service teachers' SDL skills by using blended- and cooperative teaching and learning strategies. Hence, this chapter focuses on instructional multimodality (cf. ch. 1) in which BL is highly relevant. Self-directed learners take responsibility (with or without the help of others) for their own learning (Knowles 1975) and, in doing so, develop into lifelong learners (Guglielmino 1977). In light of this, we posit that an investigation is needed regarding a context (computer literacy) where SDL can be developed.

This chapter comprises several sections to elucidate the investigation. First, a discussion on the problem that guided the investigation is provided, followed by an in-depth review

of the scholarship, informing the investigation. Lastly, the research design and findings are discussed.

Problem statement

Being digitally literate is a crucial skill that is required today because of the advancements in technology and the Internet (Morris 2018). Knowing about, understanding and using information, technologies have, therefore, become important for life in modern society (Fraillon, Schulz & Ainley 2013). So it is important to develop computer literacy in educational settings (Ainley 2018). Apart from developing computer literacy, students need to become more self-directed in order to cope with the rapidly changing advancements in computer technology. In this chapter, we report on the investigation into how a computer literacy module can be used to develop pre-service teachers' SDL skills. This investigation specifically focused on using blended and CL as teaching and learning strategies to determine if these strategies could be used to develop pre-service teachers' SDL skills in a computer literacy module.

Literature review

In order to address the aim of this investigation, four main concepts are clarified: computer literacy (associated with digital literacy); SDL; CL and BL. Before addressing computer literacy, it is important to note that it has even greater value in the 21st century. We thus first contextualise this concept within the 21st century by discussing what 21st-century skills entail.

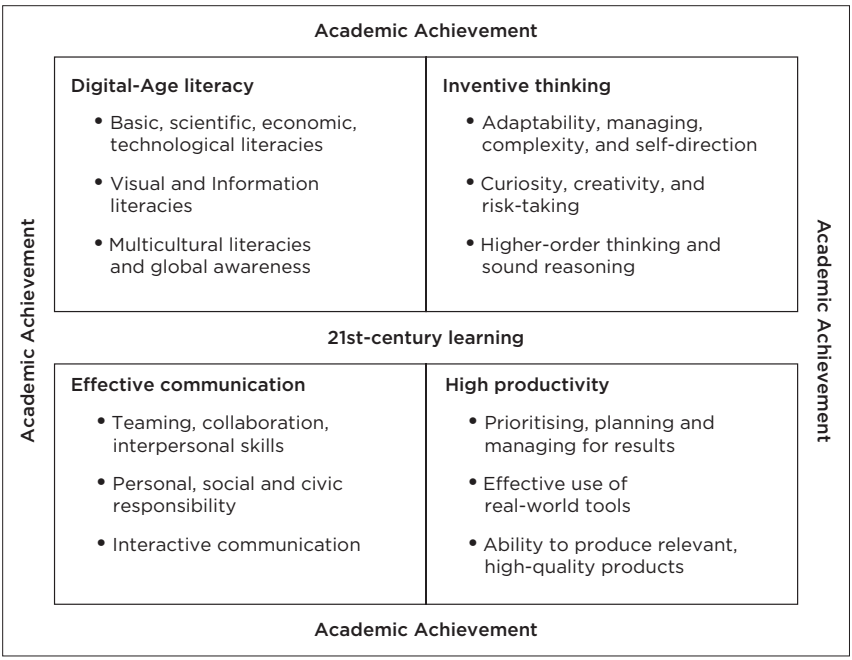
Overview of 21st-century skills

Because of the rapid rate of change in the world (Urbani et al. 2017), it is important for people to re-skill and update their competencies in order to adapt to the expectations of the 21st-century workplace and life (Mawas & Muntean 2018). In order to

fulfil the latter option, a person must commit to be a lifelong learner, as it is an ongoing process. *Lifelong learning* is defined as a learning activity, continuously undertaken by a person to improve knowledge, skills and competencies (Commission of the European Communities 2001). *Digital literacy* is deemed as a key component of and contributor to lifelong learning (Omosekejimi et al. 2018). Apart from digital skills promoting lifelong learning, SDL also promotes lifelong learning skills (Boyer, Edmondson & Fleming 2013). We accept the list of skills that were identified by the North Central Regional Educational Laboratory (NCREL) and Metiri (2003) as essential skills for the 21st century – this list includes digital literacy and SDL.

In the body of scholarship, various articles have been published on key skills for the 21st century (Center for Curriculum Redesign [CCR] 2015; NEA 2010). Although there are numerous discussions on this topic, it seems that, so far, there has been little agreement about what the skills actually are (Lamb, Maire & Doecke 2017). Some authors only focus on the four Cs, namely: critical thinking and problem-solving, communication, collaboration and creativity and innovation. Lamb et al., however, indicate that the following skills have received attention: critical thinking, creativity, metacognition, problem-solving, collaboration, motivation, self-efficacy, conscientiousness and grit or perseverance. According to McCoog (2008), learners must also, amongst other skills, possess self-direction as a skill. The NCREL identified the following skills as essential for the 21st century and refer to these skills as the *enGauge 21st century skills* (NCREL & Metiri 2003). These skills are divided into four sections, as illustrated in Figure 10.1.

Both McCoog (2008) and NCREL and Metiri (2003) agree that self-direction is an essential 21st-century skill. The following paragraphs briefly focus on the four main 21st-century skills as indicated by NCREL and Metiri. This is done to contextualise computer literacy as a 21st-century skill and indicate how this skill links to SDL (a necessity for effective lifelong learning).



Source: Adapted from NCREL and Metiri (2003:n.p.)

FIGURE 10.1: enGauge 21st-century skills.

North Central Regional Educational Laboratory and Metiri envisage digital literacy as an ability. Individuals with this ability can use digital technology, communication equipment and/or networks to access, manage, consolidate, evaluate and create information in the knowledge society. The following components are linked to digital literacy: basic literacy, scientific literacy, economic literacy, multicultural and global awareness (Soh, Osman & Arsad 2012). One could assume that, without these components, it would not be possible to be digitally literate. According to Tabusum, Saleem and Batcha (2014), digital literacy is a requirement for people of all ages because it helps them to reach their full potential in school, contribute to employability and contributes to the ability to be able to actively engage in the

digital world. This statement might confirm why digital literacy is also listed as an essential 21st-century skill.

Inventive thinking skills is the umbrella description for adaptability and managing complexity, self-direction, curiosity, creativity, risk-taking, higher-order thinking and sound reasoning. *Adaptability* and *managing* refer to the handling of multiple goals, tasks and inputs, whilst understanding and adhering to time constraints, resources and systems. *Self-direction* refers to the following: firstly, students' ability to set goals related to learning and the planning required in order to achieve those goals; secondly, students' independent managing of time and their effort and finally, the independent assessment of the quality of learning or any products that result from the learning experience. Students' desire to learn more about something denotes curiosity and is seen as an essential component for lifelong learning. *Creativity* involves acts of bringing something new and original into existence. This 'something new' could be personal or cultural. *Risk-taking* refers to students' capacity to think about a problem or challenge, share the thinking with others and listen to the feedback. The application of cognitive processes – for example, analysing, comparing inferencing and interpretation in various situations – is referred to as higher-order thinking and sound reasoning. Higher-order thinking and sound reasoning make it possible for students to solve problems in their everyday life (Soh et al. 2012).

Effective communication, teamwork and collaboration are essential, but they are not the only skills one must have. Individuals also need interpersonal skills and show personal, social, and civic responsibility, as well as interactive communication skills. Teamwork and collaboration skills make it possible for individuals to work effectively together in a group. *Interpersonal skills*, on the other hand, refer to the skills you have to take other persons' considerations into account. Typical examples of such skills include the ability to understand the feelings, motivations, habits and aspirations of others. These skills help one to interact and

work easily with others and can also provide motivation to others. Interactive communication is one way of visual communication and refers to the use of a combination of text and/or voice (Soh et al. 2012).

High productivity refers to prioritising, planning and managing for results, the effective use of real-world tools and the ability to produce relevant and high-quality products. A student who can manage time and resources effectively, can solve problems effectively and possesses strong leadership skills, will be able to prioritise, plan and manage the results. Students who have mastered the use of the latest and newest technology will be able to use real-world tools effectively in various situations (Soh et al. 2012).

Although 21st-century skills 21st century have many facets, of which the main one is digital and computer literacy. Digital literacy is discussed next.

Digital literacy as overarching computer literacy

Computer literacy forms part of digital literacy, which is listed as one of the 21st-century skills (NCREL & Metiri 2003) and also links to employability and lifelong learning (Poynton 2005).

There are a number of definitions, in the body of scholarship, of digital literacy and computer literacy. Some authors see digital literacy as an ability (Law et al. 2018; Matli & Ngoepe 2020), some see it as a set of competencies (Leaning 2019) and some see it as a set of skills (UNESCO 2011).

The Digital Literacy Global Framework defines digital literacy as 'the ability to access, manage, understand, integrate, communicate, evaluate and create information safely and appropriately through digital technologies for employment, decent jobs and entrepreneurship'. *Digital literacy* includes competences that are referred to as *computer literacy*,

Information and Communications Technologies (ICT) literacy, *information literacy*, and *media literacy* (Law et al. 2018). According to Leaning (2019), digital literacy refers to a broad set of competencies, which include the use of digital media, computers and ICTs. The competent use of ICTs can be linked to the various forms of literacy, namely computer literacy, Internet literacy, media literacy and information literacy (Leaning 2019). Spires, Paul and Kerkhoff (2018) further define digital literacy as any number of digital reading and writing techniques across multiple media forms, including words, texts, visual displays, motion graphics, audio, video and multimodal forms.

The UNESCO refers to digital literacy as an umbrella concept and a life skill. Under the umbrella concept of *digital literacy*, ICT literacy, technological literacy (previously called computer literacy) and information literacy are listed (UNESCO 2011). According to UNESCO, digital literacy is not only a set of basic skills that is required to work with digital media, information processing and the retrieval of information, but is also seen as a wide range of professional computing skills that enables individuals to participate in social networks during the creation and sharing of knowledge (UNESCO 2011). The most important components of digital literacy are assessing, managing, evaluating, integrating and creating communication information individually or collaboratively in a networked, computer-supported and web-based environment for learning, working or leisure. These components are not only important for future computer users but are also common for ICT professionals (UNESCO 2011).

For this investigation, digital literacy involves knowledge, dispositions and skills that support the creation and sharing of knowledge. It also includes computer literacy as a subsection. In this investigation, computer literacy included both practical and theoretical components (all of which are included in the module that was used for this research).

Computer literacy

Colleges and universities have a responsibility to prepare students for professional positions across all disciplines. To do so, it is necessary to develop computer literacy, because this skill is required for employability and lifelong learning (Poynton 2005). According to Corbel and Gruba (2004), computer literacy is seen as an essential 21st-century skill and a necessity for students because it:

- lays the foundations for developing a critical understanding of the Information Age
- helps students to effectively use digital technology, both in classroom and workplace settings, improving attitudes and reducing frustration
- shapes a proactive view with respect to the undeniable role of technology in our current society
- assists 'technophobics' to overcome fears of increasing computerisation of all aspects of daily life
- develops solid skills among students so that we can collectively pursue more creative uses of computers in the syllabus
- extends personal enjoyment owing to keeping in touch by regular email exchange, for instance, provides 'realia' for all those terms related to hardware, software, the Internet, and, in general, the whole online culture. (pp. 5–6)

Although computer literacy is a non-negotiable skill needed in the 21st century, defining this concept in the 21st century is less clear. Just like digital literacy, it seems that there is no clear and precise definition for *computer literacy* (Childers 2003; Florini 1983). It also seems that the term *computer literacy* has faded from library literature and is replaced with terms such as *digital literacy*, *computer skills*, *Internet literacy*, *informatics* and *computer proficiency*. Irrespective of what *computer literacy* is called in the 21st century, this skill has great merit and needs to be clarified and emphasised to accept a 'new' name for it (Childers 2003).

Computer literacy is multifaceted and dynamic, and the conceptualisation of this concept could be influenced by three paradigms, namely: (1) computer literacy as the mastery of a technique, (2) computer literacy as an awareness in context and (3) computer literacy as access to tools (Ruthven 1984). When someone deems computer literacy as knowledge of how a computer works, and a technical skill in making use of it as mastery of the technique, it refers to the *mastery of technique paradigm* (Ruthven 1984). Someone who considers computer literacy as an awareness of computer technology in its social and economic context, uses the *computer literacy as awareness in context paradigm* to conceptualise computer literacy (Ruthven 1984). The last paradigm that could be used to define computer literacy, according to Ruthven, is the *computer literacy as access to tools paradigm*. When defining computer literacy from this paradigm, computer literacy is seen as an ability to make use of the computer as a tool of communication, information handling, learning and enquiring, as well as having access to tools (Ruthven 1984).

In order to define *computer literacy*, Anderson, Klassen and Johnson (1981) are of the opinion that one must distinguish it from computer science. They define *computer literacy* as the computer knowledge and skills the average citizen needs. This means that computer users must not only be able to operate a computer but must also know how to operate it productively. Tsai (2002) gives the following definition of computer literacy: 'the basic knowledge, skills, and attitudes needed by all citizens to be able to deal with computer technology in their daily life'. Closely knit to Tsai's definition, Fraillon et al. (2013) define computer literacy as 'the individual's ability to use computers to investigate, create, and communicate in order to participate effectively at home, at school, in the workplace, and in society'. According to Son, Robb and Charismiadji (2011), computer literacy is 'the ability to use computers at an adequate level for creation, communication and collaboration in a literate society'.

Although the above definitions are all related in some way or another, the paradigms, as described earlier, influence one's definition of computer literacy. In order to select an applicable definition for computer literacy (for this investigation), the above-mentioned paradigms were considered.

In the computer literacy module that forms part of this investigation, students must learn skills to use the computer and specific software (including applications software), as well as skills to communicate via email. They further learn to manage, consolidate and evaluate information in class, or on their own, in order to submit typed assignments electronically or in hard copy. In the context of this investigation, there is continuous interplay between all three paradigms; therefore, we cannot highlight one single paradigm.

In order to optimise the students' learning experience when teaching computer literacy, it is important to determine which learning approach suits the students best, what learning styles are evident in the group and what the attitudes and interest of the students are (Pardede 2013).

As noted in the section on 21st-century skills, digital literacy, computer literacy and SDL all form integral parts of skills required in the 21st century. If students are to become lifelong learners who can keep up with whatever changes the digital and computer world throws constantly, being self-directed and taking responsibility for their own learning becomes non-negotiable.

Self-directed learning

Self-directed learning is also linked to 21st-century skills (Jaleel & Anuroofa 2017). Learning stimulated by SDL is linked to lifelong and (sometimes) independent learning (Örs 2018). Although sometimes seen as an independent learning activity, Knowles (1975:18) makes in his pioneer work already the case that a self-directed learner engages in learning 'with or without' the help of others – a clear indication that SDL is much more than just independent learning.

In this chapter, SDL is viewed from a collaborative constructivist perspective, as we accept that self-directed learners construct their own knowledge; however, we also indicate that it is best done in a collaborative effort. Following a collaborative constructive perspective means the individual has the responsibility to construct meaning of the knowledge, whilst including the participation of others in the confirmation of worthwhile knowledge – meaningfulness and worthwhileness reflect the cognitive and social perspectives of an educational experience. One could, therefore, assume that meaning and knowledge are personally and socially constructed (Garrison 1997).

Importance and value of self-directed learning

Learning how to learn is seen as one of the most fundamental skills of lifelong learning (Tekkol & Demirel 2018), which is deemed as an essential skill in the 21st century. As individuals are increasingly being challenged to take more responsibility for their own learning and development in the work organisation (Ellinger 2004), it is important that learners develop the skills to help them adapt to an ever-changing world. Individuals need to be able to select the required information and determine appropriate strategies in order to select such information from the ever-increasing accumulation of information and, therefore, they must know how to direct their learning process (Örs 2018). Learners who set their minds on being lifelong learners are aware of their own learning needs and are able to decide how they wish to obtain that knowledge – characteristics particular to self-directed learners. Self-directed learners understand the nature of knowledge, instead of just memorising it (Tekkol & Demirel 2018).

Three reasons can be given as to why SDL should be valued in the 21st century as per Knowles (1975). First, there is convincing evidence that people who take the initiative (proactive learners), learn more and learn better, whilst those who sit at the feet of

teachers, passively waiting to be taught (reactive learners), learn less (Knowles 1975:14). Furthermore, individuals who learn more purposefully and are motivated may better retain and make use of what they have learnt, as opposed to learners who are only reactive to outside stimuli (Knowles 1975). Second, SDL is aligned with our natural processes of psychological development. One of the characteristics of psychological development is the ability to take increasing responsibility for our lives and to become increasingly self-directed as we mature (Knowles 1975). Third, many of the new developments in education put responsibility on learners to take a good deal of initiative in self-initiated learning in order to be successful (Knowles 1975).

It seems as if proactive learners might be labelled as self-directed learners because they show initiative and take responsibility for their learning. Being a proactive learner is valuable because such a learner takes initiative during learning, resulting in his or her learning experience being wider and even better than that of reactive learners. As proactive learners enter learning opportunities more purposefully and with greater motivation, they often make use of the information and remember information they have learnt better and longer than reactive learners. Reactive learners normally wait passively to be taught by the teacher (Knowles 1975).

Developments in education put extreme pressure on learners to take responsibility for their own learning (Knowles 1975). If students have not mastered the skill of being able to control their own learning process, they might experience feelings of anxiety and failure (Knowles 1975). These feelings could have a negative effect on their self-esteem (Ntemsia et al. 2017). Another value of SDL is that it could have a positive influence on the self-esteem of the learner.

It is clear from the preceding arguments that SDL is of great importance in the 21st century. However, a clear definition of SDL is still needed. The following section focuses on defining SDL.

Defining self-directed learning

Although there are various definitions for *SDL*, there is no universal definition (Ellinger 2004) for this concept, although the definition of Knowles (1975) is the most popular one in the literature. Before SDL is discussed, it is necessary to briefly explain the difference between SDL, self-management learning and SRL, because these terms are sometimes used interchangeably in the body of scholarship.

Some researchers see SDL as a process, some see it as an ability and others see it as an approach. A fourth group of researchers regards it as encompassing all three these aspects. However, according to Knowles (1975), SDL is:

> [*A*] process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes. (p. 18)

Long (1991:15) in Long and Associates (2000) agrees with Knowles that SDL is a process and defines SDL as 'a personally directed purposive mental process usually accompanied and supported by behavioural activities involved in the identification and searching out of information'.

Initially the focus of SDL was on the management of the learning process, and little attention was paid to the learning process itself, which involves the cognitive and motivational dimensions of learning (Garrison 1997). In addressing this concern, a model was developed in which external management, internal monitoring and motivational issues – which relate to learning in an educational context – were proposed.

Garrison differs from Knowles' and Long's definition of SDL. He sees SDL as (Garrison 1997):

> [*A*]n approach where learners are motivated to assume personal responsibility and collaborative control of the cognitive (self-monitoring) and contextual (self-management) processes in

> constructing and confirming meaningful and worthwhile learning outcomes. (p. 18)

Although SDL is defined differently by different scholars, self-management learning and SRL are often related and even equated to SDL. *Self-management learning* is defined as 'the ability of learners to work together in groups, to solve real-life problems, which enables them to set their worn goals, as well as assume responsibility' (Hurley & Cunningham cited in Nnaemeka, Ismail & Chukwunemerem 2018:24). *Self-regulated learning* is seen as neither a skill nor an ability, but as a 'self-directive process through which learners transform their mental abilities into task-related skills in diverse areas of functioning, such as academia, sport, music, and health' (Zimmerman 2001:13855). One could assume that SRL refers to how students become masters of their own learning process (Zimmerman 2001). Students can use specific strategies to reach academic goals based on their 'self-efficacy perceptions' (Zimmerman 1989, 2001). Zimmerman (1989:329) defined *self-regulated learners* as 'learners who are metacognitive, motivationally and behaviourally active participants in their own learning process'.

Considering the above definitions, it seems that certain aspects might contribute to the interchangeable use of the three concepts. All three concepts place learners at the centre of their own learning; however, the concepts differ with regard to the execution of the learning process. In this chapter, the authors see SDL, self-management learning and SRL as three different concepts and accept Knowles' fundamental definition of SDL. Therefore, we further discuss SDL as noted by scholars who also agree with Knowles on what SDL entails.

Conceptualisations of self-directed learning

Self-directed learning could be viewed from a sociological, pedagogical and psychological dimension (Long as cited in Garrison 1997) of learner control, or from an algorithmic, conative, semiotic or economic dimension (Bouchard 2009; De Waard,

Hulme & Sharples 2015). It seems that when the focus of SDL, or learner control, is on independent task management, it links to the sociological dimension of learner control. When the focus is on the application of SDL in educational contexts, it links to the pedagogical dimension of learner control. The focus is on what the learners do when they learn (Bouchard; Long cited in Garrison 1997). Bouchard links his algorithmic dimension of learner control to Long's pedagogical dimension. For Bouchard, this dimension points to the importance of the learner being able carry on complex teaching tasks, such as formulating goals and finding appropriate resources. The psychological dimension of learner control of Long (cited in Garrison 1997) links to the conative dimension of Bouchard and includes various possible reasons why an individual is learning; for example, 'their drive, impulses, initiative' (Bouchard 2009).

According to Long (cited in Garrison 1997), the problem with the focus on the above two dimensions, without focusing on the psychological dimension as well, is that SDL is then defined in terms of external control and facilitation, rather than the internal cognitive process and learning. By implication, this means that the focus is on teaching and not learning (Long cited in Garrison 1997). When reflecting on the concept of *SDL*, the 'self-directed' part links to social issues and the 'learning' part links to cognitive issues (Garrison 1997).

Malison and Thammakoranonta (2018) identified the following dimensions of SDL in self-directed learners:

1. learning with intention
2. open-mindedness
3. characteristics of self-discipline
4. characteristics of self-management
5. desire to learn.

On the other hand, Garrison (1997:18) only identified self-management, self-monitoring (SM) and motivation in his *comprehensive model*. Self-management represents the

sociological and pedagogical dimensions of Long (cited in Garrison 1997).

Self-directed learning instruments

Many instruments have been developed to understand SDL. These include the SDLRS; Oddi Continuing Learning Inventory (OCLI); Self-Directed Learning Perception Scale (SDLPS) and the PRO-SDLS. The SDLRS, developed by Lucy Guglielmino in 1977, is the most-used SDL instrument (Hiemstra 2003). Other SDL instruments often used include Cheng et al.'s (2010) Self-directed Learning Instrument (SDLI) and Williamson's (2007) Self-Rating Scale of Self-Directed Learning (SRSSDL). Both these instruments have been used in the South African context and proved valid in various contexts (Breed & Bailey 2016). In this investigation, Cheng et al.'s SDLI questionnaire was used because of its succinctness.

Self-directed learning models and perspectives

Several models have been developed to describe the process of SDL (Ellinger 2004). According to Nnaemeka et al. (2018), one could see SDL as a linear, interactive or instructional model. When one sees self-direction from a linear model perspective, it means that one thinks that learners move through various stages, or apply different steps whilst learning. Knowles defines SDL as a process, and lists that the following steps should be applied by a teacher in order to enhance SDL in the learning process (Knowles 1975):

> (a) [*C*]limate setting, (b) diagnosing learning needs, (c) formulating learning goals, (d) identifying human and material resources for learning, (e) choosing and implementing appropriate learning strategies, and (f) evaluating learning outcomes. (p. 34)

Individuals who see SDL from this perspective are of the opinion that learners can become self-directed and that their self-directed abilities could improve progressively (Nnaemeka et al. 2018).

Based on the steps listed by Knowles in the discussion of this model, it seems as if he has a linear model perspective of SDL (Ellinger 2004).

Seeing SDL as an interactive model, means that your focus is on the interaction that occurs during learning. The focus here is on the characteristics of the learners and the instructional process (Nnaemeka et al. 2018). Finally, if one thinks of SDL as an instructional model, you will be an advocate of a teaching or instruction method: your focus is on understanding how to instruct learners in order to support them whilst they are learning (Nnaemeka et al. 2018).

In this chapter, the authors accept Knowles' (1975) (most-cited) definition of SDL that follows a linear model perspective of SDL.

Contributors and hindrances of self-directed learning

Students' SDL could be facilitated or hindered by age, gender (Tekkol & Demirel 2018) and previous experience (Örs 2018). According to Ellinger (2004), Knowles supports the assumption that age facilitates SDL. He (Knowles 1975:15) claims that 'adult learners become increasingly self-directed as they mature'.

According to Knowles (1985), learning is psychologically described as a process of need-meeting and goal-setting by learners. By implication, this means that learners are motivated (intrinsically) to engage in learning to the extent that they feel a need to learn something new in order to achieve a personal goal that links to the learning of that content. Furthermore, they will invest energy in making use of relevant and available resources that link to their learning needs and goals (Knowles 1985). It seems that the role of the learner at school is to be dependent – a passive participant of transmitted content. Because of this perception of the learner and the way teaching and learning sometimes take place in schools, the perception of 'teach me' sticks with students, even when they are adults who want to be

seen by others as being self-directed (Knowles 1985). To be seen as a self-directed learner, a learner must have certain characteristics or competencies. In the following paragraphs, the most familiar SDL characteristics, which are indicated in the literature, are listed.

☐ Profile of a self-directed learner

Students who learn in a self-directed way have characteristics like self-regulation skills. Such students can exhibit control over their own learning, define learning targets correctly and evaluate their own learning process (Örs 2018). According to Kaufman (cf. Tekkol & Demirel 2018:2), the following characteristics could be linked to self-directed learners:

- clear goal-setting for themselves
- ability to shape the learning process with their goals and plans
- monitoring their own learning process
- evaluating the outcomes of their own learning
- they are autonomous learners
- self-motivated
- open to learning
- curious
- willing to learn
- value learning
- have self-control.

Knowles (1975) does not refer to characteristics but to competencies or abilities. He (Knowles 1975) lists the following competencies for SDL:

- enter into a close respectful and learning-friendly relationship with learners
- establish an environment that is physically and psychologically comfortable, open to interaction, based on cooperation, open and secure
- take responsibility for determining their own learning needs
- setting goals

- planning, implementing and evaluating learning activities
- helping learners to self-direct their learning
- being a facilitator and source
- effectively using small group processes
- evaluating learning processes and outcomes. (p. 61)

Teaching strategies to enhance self-directed learning: Whose responsibility is it?

Just as colleges and universities have a responsibility to prepare students for professional positions across all disciplines (Poynton 2005), it is also a major challenge for HEIs to help their students become lifelong and self-directed learners (Van Woezik, Reuzel & Koksma 2019). To help students become lifelong and self-directed learners, there is a need that lecturers use suitable learning methods for the teaching and learning of students (Van Woezik et al. 2019). In order to enhance SDL readiness, teachers should choose teaching methods that encourage SDL. According to Örs (2018), teachers who follow a student-centred approach to teaching and learning could contribute to SDL readiness. The teaching methods discussed in the following sections could link to a student-centred teaching and learning approach.

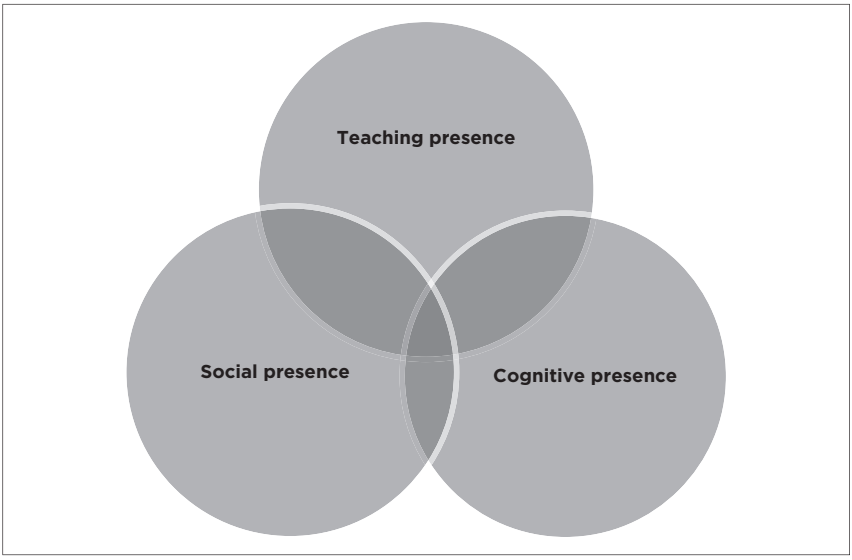
Blended learning

According to Listiana and Jaharadak (2019:1), BL is 'a mix of teaching methods and materials of direct learning or face-to-face in class and eLearning by online methodologies in a formal education situation' (cf. ch. 2, ch. 4, ch. 6, ch. 9 & ch. 10). Blended learning can be informed by and based on the CoI framework (Garrison, Anderson & Archer 2010) (cf. ch. 2, ch. 6 & ch. 9). This framework posits that there are three critical elements (presences) that need to be visible in an experience where education incorporates 'online communications media', namely social presence, cognitive presence and teaching presence. Figure 10.2

illustrates the CoI framework, as developed and refined by Garrison et al. (2010:6). In this framework, the educational experience (when using online communications media) is framed by the three above-mentioned presences. The three presences then interjoin with one another in specific ways (i.e. cognitive presence and teaching presence interjoin when content is selected).

It is crucial that any module or course that makes use of a BL approach attempts to stimulate these presences as much as possible – this ensures a positive educational experience. It also becomes clear that the social aspect (social presence) plays a role. Infusing CL (cf. ch. 6 & ch. 9) into BL intuitively makes sense.

The following section unpacks CL, followed by a discussion on how CL and BL can be interlinked.



Source: Adapted from Garrison et al. (2010:6).

FIGURE 10.2: Community of Inquiry framework.

Cooperative learning

Cooperative learning is 'the instructional use of small groups so that student's work together to maximise their own and each other's learning' (Johnson, Johnson & Smith 2014:87). Johnson and Johnson already stipulated in the 1970s that five specific elements need to be addressed during any groupwork activity in order to increase its success. Today, these elements still hold true for the use of CL. In a publication, Johnson and Johnson (2009) reiterate the five elements as PI, individual accountability, promotive face-to-face interaction, social skills and group processing, which are described as follows:

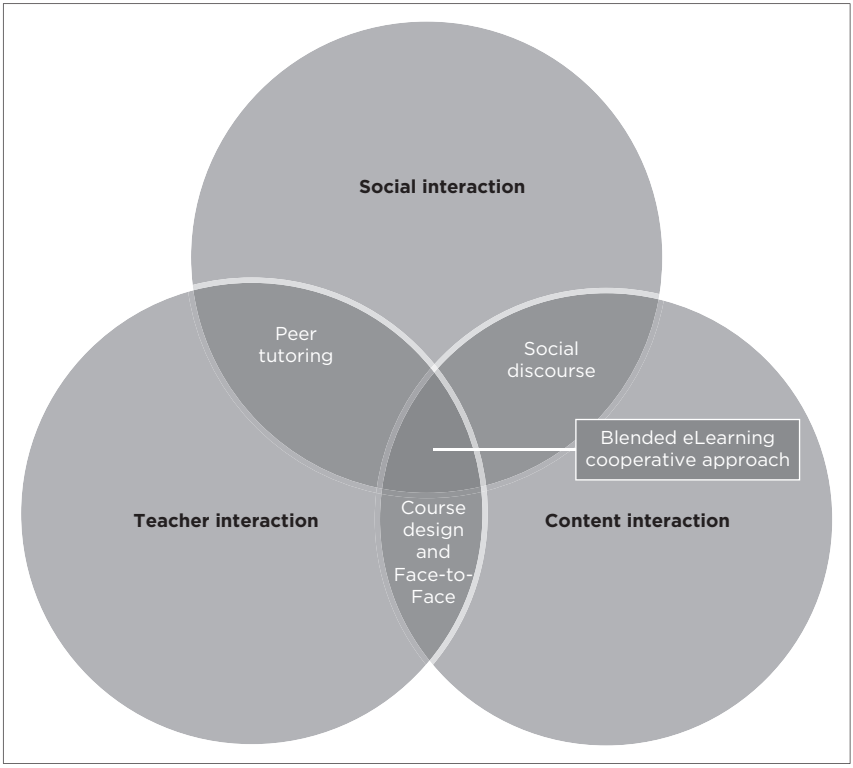
- Positive interdependence means individuals in the group realise they 'sink or swim' together (Johnson & Johnson 2009:107). This implies that if one of the group members does not learn during the CL task, all group members suffer, and vice versa.
- Although CL is a group effort, individuals in the group need to realise that they still hold an individual responsibility to the group. Johnson and Johnson (2009:110) define this as individual accountability.
- Promotive face-to-face interaction is the element of CL where group members assist one another through guidance and questioning, thereby challenging each other's beliefs and opinions (Johnson & Johnson 2009:111).
- In a successful CL activity, the stimulation of the appropriate use of social skills is valued (Johnson & Johnson 2009:111). These social skills include communication skills, praising skills, supporting skills, etc.
- Cooperative learning activities should always value metacognitive activities. This can be done by stimulating group processing where the groups evaluate their progress, strengths and weaknesses (Johnson & Johnson 2009:112).

Blended and cooperative learning strategies

Although both CL and BL hold many benefits, the combination of these two strategies increases the viability of developing SDL. Demetry (2010), for instance, noticed that merely using BL and informal groupwork did not provide sufficient support to enhance active involvement of students in class. Although it seemed as though the students in Demetry's class were positive to engage in the flipped-classroom activity, the ill-structured groupwork during class inhibited them from being mindfully engaged during formal class activities. This finding is also supported by Foldnes (2016), who found that putting CL as a central element during a flipped classroom significantly increased students' performance.

EL-Deghaidy and Nouby (2008) indicated how blended eLearning and CL can be infused to take advantage of the strengths of each approach. Figure 10.3 is an illustration of how they infused the two strategies. The three presences of BL (as were mentioned earlier) are evident in their Blended eLearning Cooperative Approach framework. Furthermore, the benefits of CL are also evident in their framework (i.e. peer tutoring and social discourse).

During CL, teacher interaction is simulated through peer tutoring (where students act as 'teachers' to one another) and the teachers or lecturers themselves interact and structure the course and act in class (face-to-face) sessions. Social interaction interweaves with teacher interaction as it is from the social interaction that peer tutoring occurs (if the lecturer structures the social interaction properly, of course). Furthermore, social interaction interweaves with content interaction through the social discourse it stimulates – through the social interaction, content is brought to the fore and students are given an



Source: Adapted from EL-Deghaidy and Nouby (2008:990).
FIGURE 10.3: Blended eLearning cooperative approach.

opportunity to interact with it. Lastly (in no specific order), content interaction and teacher interaction interweave where course design and face-to-face interaction is stimulated.

Methodology

Research design and process

This investigation was informed by the pragmatist paradigm, which asks 'what works for whom', as we focused on determining

whether blended and cooperative teaching and learning strategies 'work' in a computer literacy module for pre-service teachers to develop their SDL skills. We applied a quasi-experimental quantitative design where one group of students worked within the blended cooperative teaching–learning strategy and the other group of students received traditional lecture-based classes. Convenience sampling was employed, and the sample consisted of first-year BEd students (pre-service teachers) all of whom completed a compulsory computer literacy module. As students were asked to voluntarily complete questionnaires, a discrepancy between group sizes was observed. It is thus important to note that we do not set out to make any generalisations in this chapter; however, we set out to illustrate the possibility a computer literacy module (in which blended and CL strategies are used) has to potentially develop pre-service teachers' SDL skills, especially when considering the results obtained from distributing the SDLI by Cheng et al. (2010). The constructs of the SDLI questionnaire are: Learning Motivation (LM); Planning and Implementing (P&I); Self-monitoring (SM); and Interpersonal Communication (IC). We also included the total score for the SDLI. The SDLI questionnaire consists of 20 questions (Likert scale 1–5), which adds up to a total of 100. Groups were subdivided based on their total mean score: low (mean score of 5–35); medium (mean score of 36–70) and high (mean score of 71–100). We specifically were interested in increasing the SDL skills of the low and medium scorers, as high scorers already show a high rating of SDL skills and only low and medium scorers were evident in both groups – this coincides with findings of other scholars that students enter university with a low level of self-direction as a result of the school system from which they come.

Intervention

We had two groups and two different interventions. Both groups completed activities based on the computer literacy module,

and both groups worked in computer labs where practical activities were completed; however, one group (Group 1) participated in lecture-based classes and completed the activities individually, whereas the other group (Group 2) participated in cooperative BL.

Individual lecture-based classes

In these classes, the lecturer mostly used a lecturer-centred approach for the formal contact sessions. Although the lecturer used a direct teaching strategy, the students were always actively involved during the contact sessions because the lecturer asked various types of questions (e.g. open questions and confrontational questions) and created learning opportunities, like discussions and problem-solving, and gave the students practical class activities in which they had to apply theoretical content. During the practical sessions, the students worked individually and the lecturer walked through the class and assisted the students who experienced problems with the fulfilment of the class activities. The practical activities were linked to real-life problems. At the end of each contact session, the attention was directed to the aims of the next contact session lesson so that they could prepare for the next contact session. As keyboarding is an essential skill for everybody who uses a computer for whatever reason, videos on how to master touch typing were uploaded to the eFundi LMS to motivate the students to practise touch typing. Although an electronic platform was used to teach the students touch-typing skills, it was not promoted in the contact sessions and, therefore, this way of trying to teach touch-typing skills was not successful because the students who used the hunt-and-peck or buffering keyboarding method at the beginning of the semester were still using it at the end of the semester.

☐ Blended cooperative learning classes

Students in this group (Group 2) were required to watch a short video clip on certain topics that were going to be covered in the following contact session or class. After the students felt comfortable with the content, they were required to complete a short online individual test that was intended to serve as a tool for them to know their shortfalls and gaps in knowledge before coming to class – the video and online test were considered the flipped-classroom (BL) aspect. When students attended the formal class activities, CL was utilised. Students were randomly paired up (by the lecturer) and were asked to complete a pair problem-solving task during the contact session. One student would be the 'driver' whose responsibility would be to handle the keyboard and type, and the other student would be the 'navigator' whose responsibility would be to constantly double-check what the driver was typing and handle the resources, which included asking the lecturer for help if need be. The lecturer also asked students to switch roles at a time she deemed appropriate so as to ensure that both students had an opportunity to spend time behind the computer, both students learnt from the two roles and both students were engaged as they never knew when the roles would switch and the 'navigator' would have to take over the role as the 'driver' and continue typing.

■ Results

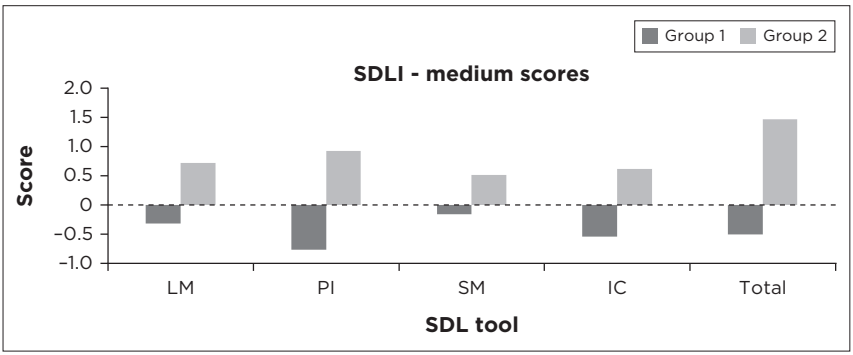
From the *t*-tests conducted (pre- and post-test of the SDLI), the following results emerged (see Figure 10.4 and Figure 10.5). Group 1 illustrated the group where individual work prevailed, whereas Group 2 illustrated the group where BL and CL were implemented.

From Figure 10.4, it is clear that the practical significant differences (*d*-values) were noticeably higher for Group 2 in

SDLI, self-directed learning instrument; LM, learning motivation; P&I, planning and implementing; SM, self-monitoring; IC, interpersonal communication.

FIGURE 10.4: Self-directed learning instrument scores (low scores).

comparison to Group 1. This was true for all constructs except 'Planning and Implementing', which, as observed, were quite similar between the two groups. It is also clear that, for students who had a low perceived self-direction at the onset of the module, the computer literacy module (regardless of individual work or cooperative BL work) may have had a positive impact. This is evident from the high effect sizes for both Group 1 and Group 2. This result could be attributed to the fact that students in both groups were still required to solve problems and use higher-order thinking skills during the fulfilment of class activities and tests. This coincides with Soh et al. (2012), who note that higher-order thinking skills ensure successful problem-solving in everyday life – successful problem-solving plays a role in SDL and can possibly be the reason for the huge increase in the SDLI scores. Another aspect that can play a role in the results, is the fact that digital literacy is part of 21st-century skills development (NCREL & Metiri 2003) requires students to implement planning skills intentionally – students in these classes (both groups) were thus required to intentionally plan their solutions for the various activities.



SDLI, self-directed learning instrument; LM, learning motivation; PI, planning and implementing; SM, self-monitoring; IC, interpersonal communication.

FIGURE 10.5: Self-directed learning instrument scores (medium scores).

From Figure 10.5, it is clear that the practical significant differences (*d*-values) differed vastly between Group 1 and Group 2. For Group 1, there was a practical significant difference between the pre- and post-test for all constructs, and for Group 2, there was a decrease with practical significance between the pre- and post-test (for all constructs).

From these results, it became evident that, in all cases in this investigation, the cooperative BL group increased in perceived self-direction, whereas the more traditional individual learning group increased less and even decreased when referring to the students who initially had a medium score in the SDLI questionnaire.

Although both classes had a positive impact on students' SDLI scores (irrespective of individual, or BL and CL) for those students who initially scored low, the same cannot be said for the students who initially had a medium score on the SDLI questionnaire. This can possibly be attributed to the fact that students who initially scored low on the SDLI had a higher

possibility of showing an increase attributed to interventions and that all students who were exposed to the BL and CL strategy gained from the experience.

From the literature, it is clear that giving students the opportunity to engage in a social event can have a positive influence on their self-direction (Knowles 1975), considering the five elements (especially the individual accountability that speaks to individual responsibility) stimulated in CL (Johnson & Johnson 2009). Furthermore, this investigation viewed SDL within the collaborative constructivist paradigm. The results from the SDLI scores for Group 2 in both figures clearly show the benefits of the cooperative nature of the intervention. Infusing BL (flipped classroom) into CL also gave students the opportunity to take responsibility as they were required to view the videos that were posted online and write a test (as a reflective tool to gauge their progress and not an extrinsic motivator).

Conclusion

From the results of the investigation, it is clear that the students in the BL and CL group (Group 2) had a greater increase in SDL skills as opposed to the traditional lecturer-based group (Group 1). It is also clear, however, that both groups (especially the low-scoring groups) increased in SDL skills. We can surmise that a computer literacy module holds the potential to enhance first-year BEd students' (pre-service teachers) SDL skills, but we also need to keep in mind that using BL and CL strategies had a greater influence on the improvement of SDL skills of the students than using an individual teaching–learning strategy.

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Chapter 11

Conclusion

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This book was written with the aim to explore self-directed multimodal learning in terms of how instructional and institutional multimodality functions within selected HE contexts. Through the varied approaches, this evidence-based commentary provides an insight in how self-directedness and multimodal learning function in a synergistic manner. This concluding chapter provides a concise synthesis of the research presented in this book.

Chapter 1 of this book aimed at revealing what multimodal learning entails within the specific context of transformative open education. This chapter explains how multimodality can be interpreted as a tetradic, covering individual, interactional, instructional and institutional levels of multimodality. In this regard, the foundational elements of multimodality on these four levels are interrogated in terms of the relevant literature. As this approach to multimodality is framed by the theoretical axioms

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of SDL, the concept of self-directed multimodal learning is conceptualised. The praxis of self-directed multimodal learning is also finally approached in terms of open education. Consequently, this chapter provides a theoretical basis for all references to multimodal learning throughout the book.

In Chapter 2, focusing on instructional multimodality, trends from academic articles and postgraduate studies related to BL, SDL and the CoI framework from 2009 to 2019, within the South African context, were explored by means of a systematic literature review. This chapter showed clear trends from the analysis of the research methodologies used in CoI for blended SDL. A number of SDL skills that were identified in the reviewed literature and specific SDL and SDL-related strategies were used in the different studies. However, SDL was not the central focus in most studies and quite often it would only entail a cursory reference to the concept. The affordances of BL were evident in all the reviewed publications. The three traditional elements (a social, a cognitive and a teaching presence) and some interaction between them were also found in all the documents. It was clear from the documents that establishing a teaching presence is not the sole responsibility of the teacher or lecturer, and that students can also contribute in this regard. Finally, this chapter also identified some clear gaps for future research.

Chapter 3 relates to the way in which attributes of adaptive learning technology relate to the assumptions and principles of SDL by proposing a conceptual model to guide future research and implementation. According to this chapter, in a multimodal environment adaptive learning technology allows students to set well-defined learning goals and continuously gauge the extent of knowledge for students. This in turn allows for re-assessment of students' progress and ultimately tailor-made learning paths based on student-specific data. This conceptual chapter focused on what attributes of adaptive learning technologies ensure that effective learning takes place and whether adaptive learning technology can be used to enhance SDL. It is recommended that a self-directed and adaptive learning model needs to incorporate

all the principles and assumptions formulated about SDL. The proposed model is regarded as an exchange between two main components, namely the learner profile and an adaptive system. Finally, the chapter also highlights the importance of the affective domain and possible future applications in terms of wearable devices.

In Chapter 4, a systematic literature review is presented through which the design guidelines for a self-directed BL environment, as used in instructional multimodal contexts, were probed. To this end, relevant publications were scrutinised in order to provide lecturers as facilitators with comprehensive guidelines on designing effective BL environments with emphasis on the aspects necessary to promote SDL. By examining and summarising the past 10 years' relevant literature on guidelines for the design of a BL environments these authors were able to synthesise the conclusions into workable design guidelines. The proposed guidelines for designing BL environments include details regarding course design, aspects of learning, the learning environment and the role of the facilitator, as these were the main themes that emanated from the literature review.

A comparative autoethnographical study was presented in Chapter 5. Here diffractive pathways in self-directed multimodal learning were explored in terms of experiences from Botswana and South Africa. The focus in this chapter was on both instructional and institutional multimodality. The chapter reported on the lived experiences within a context with a long history of distance education in comparison with a context in which this approach was more recently implemented in addition to face-to-face instruction. Key to this discussion were the intersections of diverging experiences in terms of different modes of delivery. Despite some similarities between the two contexts, there are clearly some entanglement and various differences. There also seem to be challenges with regard to technology and interaction in both contexts with some SDL being very prominent at one institution specifically. A number of practical recommendations were made towards improving self-directed multimodal learning in these contexts.

Chapter 6 involves research on implementing CL elements by means of Google Docs to optimise the online social presence in a self-directed environment. Here the emphasis was on creating social presences without neglecting the important teaching and cognitive presences in designing online learning environments. Consequently, the CoI framework acted as a theoretical basis for this research. Cooperative learning opportunities were created for students by using Google Docs. From the research it was clear that the students were overwhelmingly positive about the implementation of CL with Google Docs and it holds advantages for SDL. Furthermore, it was concluded that the use of Google Docs, combined with the elements of cooperation within a PBL task, contribute to a higher social presence online. Yet, to increase the cognitive presence in online multimodal environments, it would be necessary to place an even stronger emphasis on positive role interdependence, group processing and face-to-face promotive interaction.

In Chapter 7, empirical research on situated and culturally appropriate self-directed multimodal learning amongst distance education students and lecturers were investigated. From this qualitative study it was clear that situated and culturally appropriate self-directed multimodal learning were acknowledged by the research participants, but that both of these aspects were not adequately addressed in this context. In addition, some good practices can be built upon, and technology has a role to play especially in terms of instructional multimodality. Furthermore, a perception was observed that knowledge could be regarded as neutral and that content is related to the teaching profession but not to other aspects of culture. The lecturers were not always fully aware or merely inept at including culturally appropriate content in their learning content and some lecturers do not believe that students should have choices with regard to content. From the data it is clear that lecturers sometimes have limited choices in selecting content because of module alignment, outcomes and prescribed resources. Finally, language and multilingualism in education are also associated with culturally appropriate learning.

The chapter also provides some recommendations for more situated and culturally appropriate self-directed multimodal learning.

The focus of Chapter 8 was teachers' critical reflection in a South African distance learning programme through a design-based study. In this qualitative study, done within the context of institutional multimodality, reflective journals were included as part of a WIL portfolio in the Diploma in Grade R Teaching, offered via distance learning. In order to investigate how the reflective format supported critical reflection and how the design had to be revised to improve the reflective format for increased support, a two-cycle DBR process was conducted. The findings from this research confirm the need and value of a more detailed reflective format to scaffold critical reflection by student teachers in this context. Different factors may have contributed to a need for support amongst students, this could include poor competence on the side of the teachers in the language of teaching and learning, a lack of critical reflective knowledge and skills and inexperience in journaling. It was found that the stronger scaffold, in the form of a reflective format that provided richer reflective text in English as the language of teaching and learning, enhanced the level of student–teacher reflections to a more critical level. Finally, this chapter concludes that when student teachers are empowered as professionals who are able to learn continually from their own practices as self-directed teacher learners through critical reflection, they would be better equipped to act as agents of change to transform the current poor education standards.

Chapter 9 involved research on optimising the CoI principles of online SDL environments in terms of instructional multimodality. This research involved third-year geography student teachers' perceptions and feedback over four years with the aim of improving the design of online PBL managed in a LMS. The quantitative and qualitative results in this research indicated that students held positive views of these designs and that moving from the Wiki of the LMS to Google Docs to create

an interactive collaborative working space wherein all group members can work simultaneously, optimised not only teaching presence but also a social presence, which ultimately enhanced the online cognitive presence above the expected norm. The collaboration on Google Docs increased the effectiveness of the online PBL activity and completing the higher-order learning activity successfully. It was also determined that if the social presence is of good quality, it would increase the cognitive presence above the required level. Finally, the supportive online collaborative application of Google Docs also had a positive impact on all three CoI presences.

In Chapter 10, the opportunity to develop SDL skills in terms of blending and cooperating in the computer literacy classroom was researched. Hence, this research also focused on instructional multimodality. In this chapter, it is proposed that a computer literacy module can be used to develop pre-service teachers' SDL skills by using BL and CL as teaching and learning strategies. The importance of being digitally literate is clear, but these authors also emphasise that students need to become more self-directed in order to cope with the rapidly changing advancements in computer technology. The research concludes that the students in a BL and CL group had a greater increase in SDL skills, as opposed to the traditional lecturer-based group. However, it is clear that both groups gained in SDL skills. Finally, it is stated that a computer literacy module holds the potential to increase first-year BEd students' SDL skills, but that using BL and CL strategies had a greater influence on the improvement of SDL skills of the students than using an individual teaching–learning strategy.

In conclusion, the chapters in this book explored self-directed multimodal learning by theoretical and empirical means within the context of HE. A theoretical basis for multimodal learning and the levels of multimodality was also presented. Most of the studies in this volume pertain to instructional multimodality with some work within the context of institutional multimodality. A unifying element was the need to foster SDL and it is clear that

in multimodal contexts self-directedness can be supported by means of instructional multimodality or BL and different technologies. The prominence of the CoI in these chapters highlights the importance of the social, cognitive and teaching presences within multimodal environments. Consequently, these presences can also be explored further in terms of the other levels of multimodality. Further trends present in this volume: learning should be more situated and culturally appropriate, whilst the affordances of adaptive learning technologies be considered in terms of SDL. Another aspect that would require further research is the difference in designing for the learning experience versus designing for learning the content especially in terms of the context of self-directed multimodal learning.

Despite the fact that some research from the chapters is confined to a single institution, the findings are also relevant in other contexts and there has been an attempt to provide a balance between research from the wider scholarship in terms of literature reviews and conceptual chapters, as well as more specific context-bound empirical research. As stated at the start of this chapter, this volume can be considered evidence-based commentary as it provides selected vignettes of self-directed multimodal learning which can act as impetus for further research.

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Chapter 2

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Our knowledge of self-directed learning is sketchy at best, with much of the research in the 20th Century focusing on teacher-centred, behaviourist educational methods, and socio-constructivism in educational technology only really emerging in the mid-nineties. Learner-centred education is a very recent phenomenon, with much of the emphasis of learner-centred methodologies still focusing on the instructor having to put the learner in the centre – effectively still making it instructor-led. This book is thus providing ground-breaking work in providing two systematic literature reviews that provide a theoretical framework for the study of self-directed learning. It also provides six examples of empirical research into self-directed multimodal learning that not only provide good practical insights, but also serve as examples of innovative methodologies that may be used in further studies. The first comprises two case studies of distance and face-to-face education in a multimodal learning environment. On this follows a study of social presence, supported by Google Docs and then a piece on the role of culture and the importance of training in multiculturalism in learning design. Then comes a discussion of journaling and critical reflection, while chapter nine extends the reach to problem-based learning. The final chapter considers self-directed learning and digital literacy – a field that requires self-directed learning as the technology changes all the time, requiring lifelong self-directed learning. In conclusion this book provides a useful overview of the theories, technologies and practices of facilitating multimodal self-directed learning in a blended higher-education context.

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