A strategy development framework for educational technology

by

Jorietha Hugo

90325924

Submitted in fulfilment of the requirements for the degree

PHILOSOPHIAE DOCTOR IN COMPUTER INTEGRATED EDUCATION

in the

Faculty of Education

at the

UNIVERSITY OF PRETORIA

Supervisor: Prof Ronel Callaghan
Co-supervisor: Prof Johannes Cronje

MARCH 2024

DECLARATION AND ETHICS STATEMENT

I, Jorietha Hugo, declare that this thesis: *A strategy development framework for educational technology* is submitted in fulfilment of the requirements for the degree Philosophiae Doctor in Computer Integrated Education at the University of Pretoria and is my original work. It has not previously been submitted by me for a degree at this or any other tertiary institution.

The author, whose name appears on this thesis's title page, has obtained the applicable research ethics approval for the research described in this work. The author declares that all the ethical standards required in the University of Pretoria's Code of Ethics for researchers and the Policy guidelines for responsible research have been observed and applied.

.....

Jorietha Hugo (Student number 90325924)

March 2024

ETHICAL CLEARANCE CERTIFICATE

FACULTY OF EDUCATION
Ethics Committee

RESEARCH ETHICS COMMITTEE

CLEARANCE CERTIFICATE	CLEARANCE NUMBER: **EDU047/23**
DEGREE AND PROJECT	PhD A strategy development framework for educational technology
INVESTIGATOR	Mrs Jorietha Hugo
DEPARTMENT	Science Mathematics and Technology Education
APPROVAL TO COMMENCE STUDY	22 November 2023
DATE OF CLEARANCE CERTIFICATE	27 March 2024

CHAIRPERSON OF ETHICS COMMITTEE: Prof Funke Omidire

Mr Simon Jiane
Prof Ronel Collaghan
Prof Johannes Cronje

This Ethics Clearance Certificate should be read in conjunction with the Integrated Declaration Form (D08) which specifies details regarding:

- Compliance with approved research protocol,
- No significant changes,
- Informed consent/assent,
- Adverse experience or undue risk,
- Registered title, and
- Data storage requirements.

ACKNOWLEDGEMENTS

I am grateful to have reached this milestone in my life, and I would like to express my sincerest appreciation to the following:

- My Heavenly Father, for providing me with the wisdom, knowledge, and understanding to complete this study.
- Prof Ronel Callaghan, my research supervisor, for her invaluable advice, guidance, motivation, and unwavering commitment to research rigour and best practices throughout the project.
- Prof Johannes Cronje, my co-supervisor, for his conceptual and procedural guidance throughout the PhD process and for allowing me to learn through peripheral participation in his PhD Community of Practice.
- My editor, Luke Perkins for his exceptional attention to detail.
- And finally, but certainly not least, my husband Francois and daughter Christina for their unconditional love, support, and encouragement.

ABSTRACT

Emerging technologies are transforming educational practices, but their successful integration requires improving the quality and efficiency of learning. New technology emerges in hype cycles, but adoption and performance lag over time. A strategic framework is required for decision-makers to understand the complex interaction of all the factors to consider when making new technology investments.

This research explores how strategy development occurs through the dynamic interaction of strategy with learning, and technology integration. It analyses the key elements of a strategy map for learning with technology and how these elements influence each other within the overall strategy map.

The research design integrated the different cycles of Design Science Research (DSR) with a modified Delphi technique in two research phases. During the first phase of research, Delphi panel members were interviewed to understand current challenges and practices in terms of learning with technology. The results of the literature review and thematic data analysis from the interviews were used to create a strategy development framework, as an artefact, as part of the DSR process. This framework was shared with Delphi members in the second phase of research, and they were requested to evaluate the framework for its fit and utility in similar contexts of learning with technology.

This study contributes a strategy development framework for educational technology, which enhances theories around the analytical and conceptual processes when planning and implementing new emerging technologies in learning. Other key outcomes of the study include a hypothetical strategy map for learning with technology that can be applied in a dynamic context, and the identification of current focus areas for operational excellence in learning with technology.

Key Terms: Balanced scorecard, educational technology, emerging technology, learning with technology, strategy development, strategy map.

LANGUAGE EDITOR CERTIFICATE

This certificate confirms that the following manuscript has been checked for standard and appropriate academic English usage and edited accordingly. Changes made after the issuing of this certificate are not covered by it.

Title: A strategy development framework for educational technology

Student: Jorietha Hugo

Student number: 90325924

__ _____ Date: ____23/03/2024_____

Luke Perkins, Editor

M.Sc (Wildlife Management) (University of Pretoria)
B.Sc. (Hons) Wildlife Management (University of Pretoria)
B.Sc. (Hons) Industrial Psychology (University of the Witwatersrand)
Diploma (Economics and Public Finance) (UNISA)
H.E.D (UNISA)

Professional EDITORS' Guild

Luke Perkins
Member no. PER003
Cell 083 388 3861
Email lukeprkns@gmail.com

LIST OF ABBREVIATIONS

AI	Artificial Intelligence
AIED	Artificial Intelligence in Education
AR	Augmented Reality
BSC	Balanced Scorecard
CIO	Chief Information Officers
CoI	Community of Inquiry
CSCL	Computer-supported Collaborative Learning
DSR	Design Science Research
ETQA	Education and Training Quality Assurance
LMS	Learning Management System
NQF	National Qualifications Framework
QCTO	Quality Council for Trades and Occupations
ROI	Return on Investment
SAQA	South African Qualifications Authority
SETA	Sector Education and Training Authority
VR	Virtual Reality

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. CHAPTER 1: GENERAL ORIENTATION

1.1 Introduction

A good strategy informs good technology choices and contributes to significant business performance. Companies who make choices in terms of technology based on the strategic drivers of the business achieve superior performance; companies who make business decisions based on technology run the risk of overinvesting in technology (Zahra & Covin,1993). Strategic choices in terms of technology investments require decision-makers to make trade-offs between short-term profitability and sustainable performance in times of uncertainty (Dong, 2021; Pelser & Prinsloo, 2014). Emerging technologies are a catalyst for educational innovation with the potential to radically transform education. However, technological innovations need to improve the "productivity and efficiency of learning and the quality of learning" (Serdyukov, 2017: p.12).

The oversupply and proliferation of technological advances emerge in hype cycles but the adoption and performance of these technologies lag after a significant time lapse (Linden & Fenn, 2003). The Gartner technology hype cycle illustrates how a technology cycle navigates through a pattern of initial over-enthusiasm, disillusionment, and eventual productivity. An understanding of this cycle guides decision-making in terms of the most relevant technological choices in terms of strategic goals. A strategy process enables decision-makers to make technology choices in line with business goals. Chief Information Officers (CIOs) from institutional learning organisations have identified operational excellence through technology, as a primary goal of technology in their organisations (Gartner Inc., 2022).

Key trends in emerging technologies are indicated in terms of the relative position of a technology or cluster of technologies in terms of the Gartner Hype Cycle for 2023 (Gartner Inc., 2023). These trends include generative artificial intelligence (AI), blended learning or hybrid learning environments, technology-supported collaborative learning, engaging learning experiences (augmented reality, virtual reality, simulation and game-based learning), adaptive learning and analytics and micro-credentials. These trends are discussed in Chapter 2 Section 2.2.3.

Strategic decision-making involves complex systemic processes, and a strategic framework is therefore required to guide strategic and operational decision-making in terms of educational technology adoption and implementation. Digital transformation strategies need to accommodate cross-functional elements such as technologies and processes to develop an agile system for digital adoption (Mohamed Hashim et al., 2022). Educational technology impacts instructional design in terms of its pedagogical, technological, and organisational implementation and impacts students, teachers, and designers in different contextual settings such as education, military, and business (Ipek & Ziatdinov, 2017).

A balanced scorecard (BSC) maps the complex interactions of all factors that drive business performance and operational excellence and can be used for strategic decision-making (Kaplan & Norton, 1993). Instructional design has interfaces with complex operational, pedagogical, and technological processes. The “analysis, design, develop, implement and evaluate (ADDIE) paradigm” provides a systemic process for instructional design and involves activities in different phases of the design process (Gustafson & Branch, 1997: p.15). ADDIE also provides a systemic design model to identify core capabilities associated with designing learning interventions in an online environment (Allen, 2006; Durak & Ataizi, 2016; Khalil & Elkhider, 2016; Lee et al., 2017; Peterson, 2003; Sezer et al., 2013). When elements of ADDIE are superimposed on perspectives of the BSC, strong alignment occurs with strategic vision and goals coinciding with learning as the central business purpose and drive, as was demonstrated by Cronje (2008).

It can be concluded that a BSC provides a systemic framework for strategic management and implementation of educational technology in different operational contexts. It combines strategic and operational levels and provides measures for operational performance and clear indicators for overall success in line with strategic objectives (Hladchenko, 2015).

1.2 Problem statement

The problem driving this study is that we do not understand how strategic decisions in terms of technology align with the complex dynamics of operational excellence when learning with technology. Lerner (1999) contends that learning organisations

need an understanding of the concept of strategic planning, why it is important, and the complex dynamics driving it. Strategic planning is required in terms of the effective use of digital educational technologies and should address aspects such as lesson planning, continuous professional development of teachers, and other media, activities, and practices (Ayu, 2020; Mercader & Gairín, 2020).

We know that the oversupply and proliferation of technological advances emerge in hype cycles but the performance of these technologies lags after a significant time lapse (Gartner Inc., 2022). We also know that a good strategy informs good technology choices and contributes to significant business performance (Zahra & Covin, 1993).

A strategy map outlining systemic dynamics can guide decision-making in complexity and chaos (Kaplan & Norton, 1993). Strategic decisions about learning and technology need to align closely with the strategic intent of technology in learning, which is primarily to drive operational excellence (Gartner Inc., 2022).

1.3 Rationale of the research

The rationale of the study is to develop a strategy map as a guiding framework to understand the strategic dynamics of learning with emerging technology. This strategy map will guide strategic choices in terms of technology adoption and integration and will outline critical dimensions and associated success factors contributing to operational business performance.

1.4 Research questions under investigation

The study addresses the research questions as set out below:

1.4.1 Primary research question

How does strategy development occur through the dynamic interaction of strategy with learning, and technology integration?

1.4.2 Secondary research question

a) What are the elements to consider in a strategy map for learning with technology?

b) How do these elements influence each other in the overall strategy map?

1.5 Purpose of the research

The purpose of this study was to contribute to knowledge about strategic thinking in learning with technology and specifically the use of the BSC as a strategy tool to explain the complex systemic dynamics between learning with technology, business performance and strategic planning. The specific contributions are described as:

Exploratory research: Systemic analysis of all internal and external factors influencing learning with technology through an extensive literature review. The review includes key trends as presented through the Gartner hype cycles and how they are operationalised in practice. This was done through an extensive literature review (Chapter 2) and in-depth interviews with research participants. Feedback from the interviews was analysed in Chapter 4.

Theoretical exaptation: Theoretical models and concepts related to business strategy, strategy development and learning design were analysed for their usefulness in providing theoretical grounding for exaptation to an environment for learning with technology. Theoretical models were applied in the process of designing a strategic framework for learning with technology in Chapter 5.

Development of new knowledge and good practice: The strategy development framework for learning with technology contributed to new knowledge regarding strategy processes in learning with technology but also the key elements to consider in an overall strategy map. The study also highlighted current operational focus areas in learning with technology in Chapter 5.

Evaluate and empower: The strategy development framework was evaluated for its fit and usability to other similar environments of learning with technology with unique contextual variables. This analysis is documented in Section 4.6 and indicates that the strategy development framework is transposable to similar environments where learning with technology is applicable.

1.6 Key theoretical concepts

The conceptual framework that guides this study includes models and concepts of an interdisciplinary nature. The interaction of concepts related to strategic planning, business performance measurement, instructional design, educational technology, and training evaluation are explored to understand the complex dynamics between strategy and learning with technology. The BSC relates to strategic planning and critical dimensions of business performance management while the ADDIE model for instructional design provides a perspective on systemic elements to consider when learning with technology. A superimposition of the BSC on ADDIE combined with some elements of design thinking provides a grounding framework for the construction of a strategy map for learning with technology.

1.6.1 The balanced scorecard

The BSC can effectively be used to develop a strategy map that links strategy, technology, and learning. It addresses current and future successes and helps to identify critical success factors and measures of success in key dimensions of business performance. These dimensions are contextualised in a "financial perspective, internal business perspective, learning and innovation perspective, and a customer perspective" (Kaplan, 2009: p 4)

1.6.2 The ADDIE systems model

Learning interventions are designed systemically by using the "phases of an instructional design model such as ADDIE" (Gustafson & Branch, 1997: p.15). The design of learning material for online environments involves the use of many emerging technologies. An analysis of the components of ADDIE in online learning environments highlights some generic technology components to be considered (Allen, 2006; Durak & Ataizi, 2016; Khalil & Elkhider, 2016; Lee et al., 2017; Peterson, 2003; Sezer et al., 2013).

1.6.3 Superimposition of BSC on ADDIE

The study builds on work previously done (Cronje, 2008), which introduced *The learning scorecard* model as depicted in Figure 2.9. In this model, the perspectives of the BSC are superimposed on the ADDIE elements of learning, proposing a

holistic approach to align and integrate learning with business processes through a clear business strategy.

1.6.4 Design thinking

Further analysis of the integration of ADDIE in complex systems highlighted elements of design thinking. Agile methodologies, from a software development environment, were integrated with ADDIE in a study by Budoya et al. (2019) to provide for the continuous iterative processes of software development in an e-learning environment. Battou et al., (2016) also discussed the agile learning design approach as an optimal design strategy for virtual learning environments. The concept of rapid prototyping is discussed by Tripp and Bichelmeyer (1990) as a viable alternative approach to instructional design. Rapid prototyping allows for modularity and plasticity in design.

The concepts of rapid prototyping and agile development are prominent constructs in design thinking. Design thinking involves complex systemic processes where innovation cycles are quick, iterative, and practical. It provides insights into environmental dynamics that could lead to innovation, offering solutions to complex problems (Brown, 2008). Design thinking deals with real-world problems in a situated environment. Conceptual models form abstract conceptualisations of how design issues are dynamically related to one another in a specific domain (Razzouk & Shute, 2012).

1.7 Research design and approach

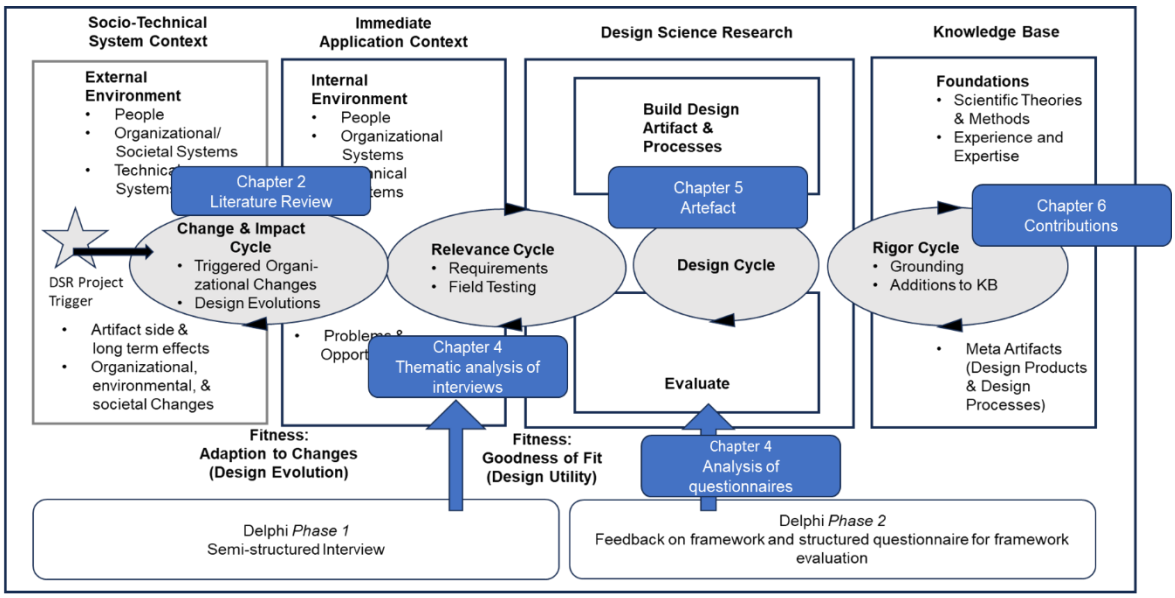
The study was conducted in a multidimensional environment of external socio-technical dynamics as well as internal organisational dynamics. The iterative cycles of design thinking were central to the research design. The use of expert opinions during the research process was an important determinant of the success of the framework.

The research design integrated the different cycles of Design Science Research (DSR) with activities informed by a modified Delphi technique. Figure 1-1 also appears in this report as Figure 3-2 and is discussed in detail in Chapter 3, Section 3.6. The fundamental difference between Figures 1-1 and 3-2 is that Figure 1-1

illustrates how the integrated research design is documented in the different chapters of this report.

Figure 1-1

Research design and chapter outline



Note: Adapted from "A four-cycle view of Design Science Research" reprinted from A four-cycle model of IS design science research: capturing the dynamic nature of IS artefact design. By Drechsler, A., & Hevner, A.(2016), In Breakthroughs and Emerging Insights from Ongoing Design Science Projects: Research-in-progress papers and poster presentations from the 11th International Conference on Design Science Research in Information Systems and Technology (DESRIST) 2016. St. John, Canada, 23-25 May (p5). Copyright (2016) by The Author(s).

This study adopted the four different cycles of DSR as a guiding framework for research (Drechsler & Hevner, 2006). Although the picture illustrates a linear relationship between the different cycles, the iterative cyclical nature of DSR needs to be emphasised. This cyclical back and forth is also evident in this study.

The study begun with a comprehensive analysis of the internal and external environment to determine the main factors impacting the strategic analysis of emerging technology in learning. This was documented in the literature review in Chapter 2 and links closely with the change and impact cycle. Next came the Delphi first phase where participants were interviewed to gain an understanding of their contextual representations of the unique environments in which they operate. This links closely with the relevance cycle of DSR. The interviews were analysed through thematic analysis and the results of the analysis are documented in Chapter 4, Section 4.3-4.5.

The results from the thematic analysis of the interviews were combined with insights from the literature review to develop a first draft of the artefact. The first draft of the artefact was then evaluated by Delphi participants through a structured questionnaire in the Delphi second phase. The analysis of the questionnaires is documented in Chapter 4, Section 4.6. The design of the artefact and the evaluation of the artefact aligns with the design cycle of DSR. The artefact was improved based on the feedback from Delphi participants.

The artefact is documented in Chapter 5 and is known as: “A strategy development framework for learning with technology”. The contribution of this study is documented in Chapter 6 and links with the rigour cycle where the contributions to practice and theory are documented.

1.8 Research structure

This research report is structured to flow logically and to ensure alignment between the research questions, the literature review, methodology, data analysis, conclusions, and recommendations. The chapters are outlined as follows:

Chapter 2: A research agenda for learning with technology

This chapter provides a comprehensive discussion in terms of the literature that was analysed for this research. It discusses the determinants in the context of learning with technology and potential theoretical models as lenses for further analysis.

Chapter 3: Methodology

This chapter describes the philosophical underpinning of the study, the research design, sampling strategy, instruments for data collection and data analysis principles and methods. It highlights the framework development process and concludes with a discussion on quality criteria for the study and ethical considerations.

Chapter 4: Data analysis

This chapter discusses the analysis of data during the research process. It discusses the thematic analysis of the interview data but also the evaluation of the proposed framework through structured questionnaires. The data analysis of this chapter provided input to the development of the artefact presented in Chapter 5.

Chapter 5: The strategy development framework

The overall intent of this chapter is to integrate the research findings from both the questionnaires and structured surveys (discussed in Chapter 4) with findings from the literature and key constructs of the theoretical models used (Chapter 2). Summaries from the previous chapters are used in this chapter to demonstrate how a strategy development framework for learning with technology will work in practice. In DSR this chapter will represent the artefact.

Chapter 6: Conclusion

This chapter provides a summary of the findings and relates the findings to the research aim and research questions. It highlights the contribution to theory, practice and methodology and discusses some lessons learned from methodological choices. It concludes with final recommendations.

1.9 Summary

This chapter started by setting the scene for this study by elaborating on the problem statement, rationale for the study, research questions and purpose of the study. It continued with a discussion of the key theoretical concepts driving the analysis of findings and framing the final contribution of the study. The research design gives a high-level overview of the progressive iterative cycles of research. It ends with a high-level summary of the intent and core contribution of each chapter. The next chapter discusses the strategic dynamics in the internal organisational and external socio-technical environment as well as the theoretical framework that guides this study.

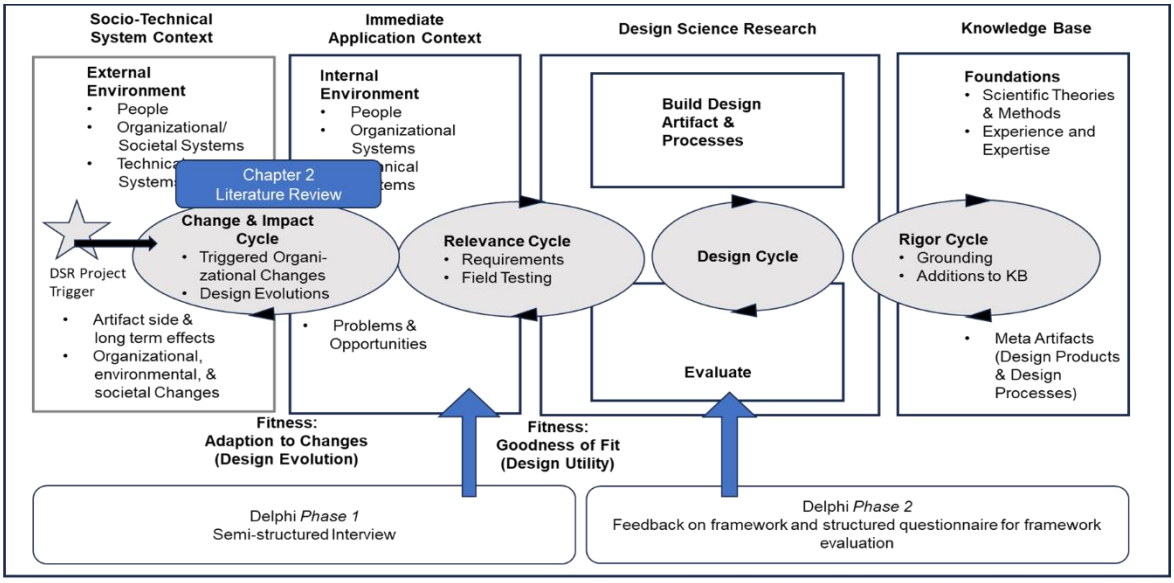
2. CHAPTER 2: A RESEARCH AGENDA FOR LEARNING WITH TECHNOLOGY

2.1 Introduction

This chapter discusses the literature review as part of the change and impact cycle of DSR, as illustrated in Figure 2.1.

Figure 2-1

The literature review as part of the integrated DSR and Delphi process



Note: Adapted from "A four-cycle view of Design Science Research" reprinted from A four-cycle model of IS design science research: capturing the dynamic nature of IS artefact design. By Drechsler, A., & Hevner, A.(2016), In Breakthroughs and Emerging Insights from Ongoing Design Science Projects: Research-in-progress papers and poster presentations from the 11th International Conference on Design Science Research in Information Systems and Technology (DESRIST) 2016. St. John, Canada, 23-25 May (p5). Copyright (2016) by The Author(s).

This chapter describes the context of this study as derived from relevant literature. Figure 2.1 gives a pictorial description of how different sections and paragraphs in the chapter fit together to describe the complex nature of learning with technology and all systemic aspects to consider when drafting a strategy map. The strategy map aims to link the different dimensions related to operational performance when learning with technology, to a strategic objective in a visual representation which includes a "financial, customer, process and learning and growth perspective" (Kaplan & Norton, 1993).

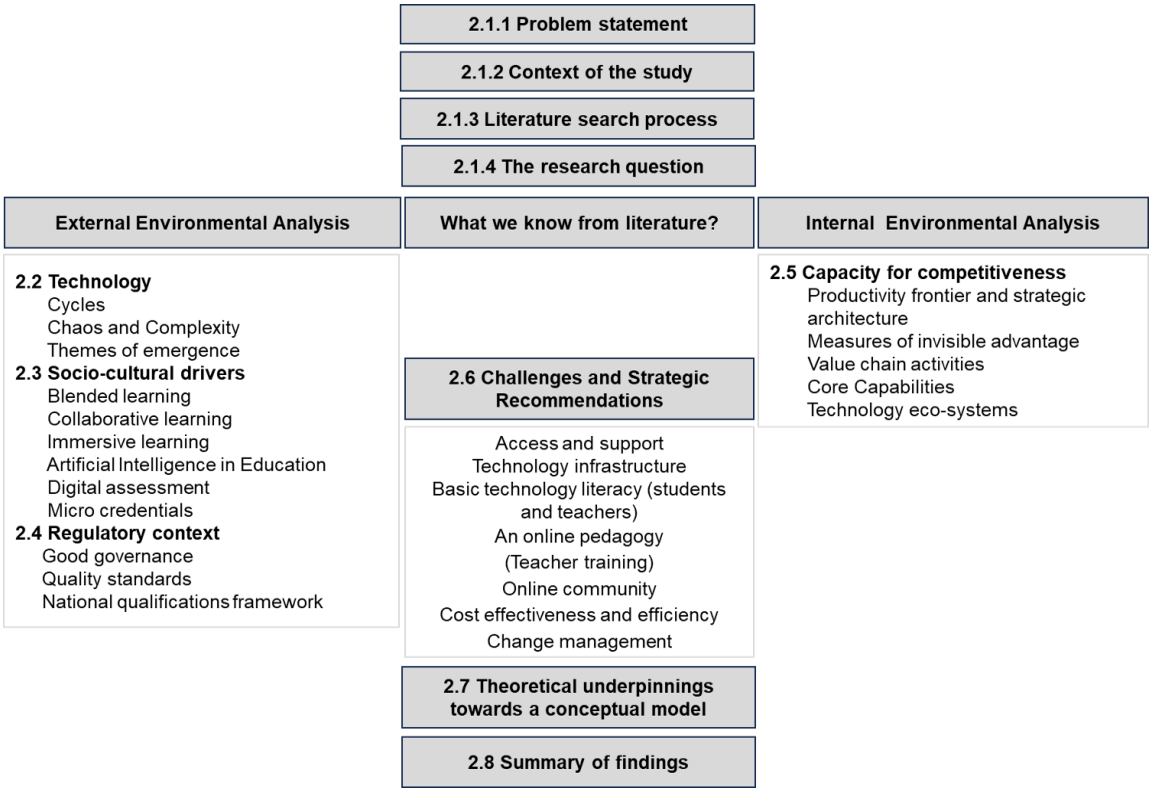
Section 1 describes the nature of the problem and, the context of the study, as well as the process followed to identify relevant literature. The research questions are

also reiterated. Section 2 starts by describing the influences in the external environment that drive the use of technology in learning. Technology hype cycles and themes of technology emergence indicate new emerging technology (Section 2.2). The changing educational practices regarding learning with technology look at how technology is currently applied in different learning environments and settings (Section 2.3). It is also important, to look at the requirements of good governance as this is required for accreditation of learning materials in different learning settings (Section 2.4). The internal environment describes how a learning institution can build capacity for competitiveness (Section 2.5) by establishing a proper technology eco-system, considering measures for invisible advantage, value chain activities and core capabilities in the context of learning with technology.

The analysis of the internal and external contextual environment of learning with technology highlights some challenges and strategic recommendations to consider when making investment decisions in terms of the use of emerging technology in learning (Section 2.6).

Figure 2-2

Chapter outline



An analysis of the literature revealed what we know about current practices, but we still do not know, what role all these elements play and how they fit together strategically. The theoretical underpinnings that could potentially provide meaningful input to answering the research question are discussed in Section 2.7. The chapter concludes with a summary of findings in Section 2.8.

2.1.1 The problem statement

The problem driving this study is that we do not understand how strategic decisions in terms of technology align with the complex dynamics of operational excellence when learning with technology.

Emerging technologies are a catalyst for educational innovation with the potential to radically transform education. Technology innovations need to "improve the productivity and efficiency of learning and the quality of learning" (Serdyukov, 2017: p.12). The oversupply and proliferation of technological advances emerge in hype cycles, but adoption and performance of these technologies lag after a significant time lapse (Gartner Inc.,2022).

A good strategy informs good technology choices and contributes to significant business performance (Zahra & Covin, 1993). Strategic planning regarding the effective use of digital educational technologies is required and should address aspects such as planning, continuous professional development of teachers, and other media, activities, and practices (Ayu, 2020; Mercader & Gairín, 2020).

2.1.2 The context of this study

Learning with technology occurs in business environments and academic institutions. This study attempts to highlight the complexities through a systemic analysis of the multiple factors that contribute to the effective implementation of emerging technologies in learning. The audience for this study is ideally decision-makers in educational institutions or training institutions. It will be equally informative for teachers or instructional designers who are embracing new technology advancements in their field of practice or operation.

Technology advancements drive innovative human resource practices in the area of learning and development. They have an impact on technology infrastructure and tools and strategies that practitioners use to deliver training interventions. Technological developments need to be understood systemically in line with the strategic objectives of digital transformation (Torraco & Lundgren, 2020). New methods of collaborative and cooperative learning and instructional techniques not only require sophisticated infrastructure and data analytics, but practitioners also need to address future skills requirements for AI, robotics, and AR (Sousa &Rocha 2019).

New technology innovations produce systemic changes in all areas of teaching and learning and involve stakeholders at all levels: decision-makers, teachers, and students, to transform teaching approaches and strategies. It requires a sound theoretical approach to inform a sound pedagogy for technology-based learning (Serdyukov, 2017).

Digital transformation is complex and involves multiple systemic factors. Some important factors, discussed in Balakrishnan and Das (2020), include: building a robust digital ecosystem that allows for system integration across the organisation, insights through data analysis, building a culture of digital innovation, reconfiguring the value chain, enhancing processes to accommodate new technologies, blending physical and digital experiences to deliver new products and services.

2.1.3 The literature search process

The literature for this study was sourced in a purposeful, iterative intuitive way through thematic keyword searches on Google Scholar. The themes that emerged from initial keyword searches are indicated in the left column of Table 2-1. The search started by understanding the trends of emerging technology in learning and teaching. These trends highlighted emerging tools, devices, applications, approaches and technology infrastructure. A further search was done on the trends identified to understand the current application of new technologies and approaches in practice. The next step was to look for literature associated with technology processes in business and educational institutions specifically related to technology strategy. COVID-19 provided fertile ground for experimenting with learning

technology and a further search was done on lessons learned from implementing new technologies during COVID-19. This search led to an understanding of the challenges and recommendations emerging from emergency remote teaching and subsequent technology implementations. Literature searches were further done on ADDIE, a systemic philosophy for learning design, and the BSC as a potential model to understand strategy development in the context of this study. The themes and the keywords used for each theme are highlighted in Table 2.1.

Table 2-1

Thematic keyword searches

Theme	Keyword searches	Outcomes
Emerging technology trends in learning and teaching	Digital learning innovation trends, digital transformation in education, disruptive technologies in education, technology evolution and disruptive pedagogies based on technology-enhanced learning.	Understanding the emerging technology landscape i.t.o devices, tools and applications.
The application of disruptive technologies in education and related innovative practices. Keyword searches were informed by results from emerging technology trends analysis.	Trends in approaches and pedagogies since COVID. Application of disruptive technologies: new learning environments (online, blended and e-learning), Online collaborative communities, technology ecosystems, Immersive learning, AI, adaptive learning, micro-credentials, and online assessment.	Understanding the evolving patterns in terms of instructional practices, strategies, approaches, methods, and theories.
Strategy processes in education specifically related to learning with technology. Technology strategy processes in business	Strategic planning, technology planning, value drivers, competitive advantage, core capabilities, value chain activities in education and business	Understanding the internal business environment of learning with technology.
Strengths, Weaknesses, Opportunities and Threats associated with online learning	Challenges, opportunities, success factors, obstacles, of online learning since COVID.	Understanding critical components of an effective strategy for learning with technology.
Systemic design principles of ADDIE	ADDIE principles for online learning	Understanding systemic design principles for learning with technology.

BSC as a strategy tool in business and education	Strategy map, BSC, Performance Measures	Understanding how a BSC can be applied as a strategy tool for learning with technology.

The intuitive iterative search process resulted in 450 articles, which were scanned for relevance in terms of the study. Some articles (270) related to the strategic context of learning with technology, while some (188) related to the operationalisation of specific concepts in an environment where learning with technology occurs. All the articles were scanned for their relevance in terms of the literature review, but only the articles that contributed significantly in terms of depth and richness were included and referenced in this study.

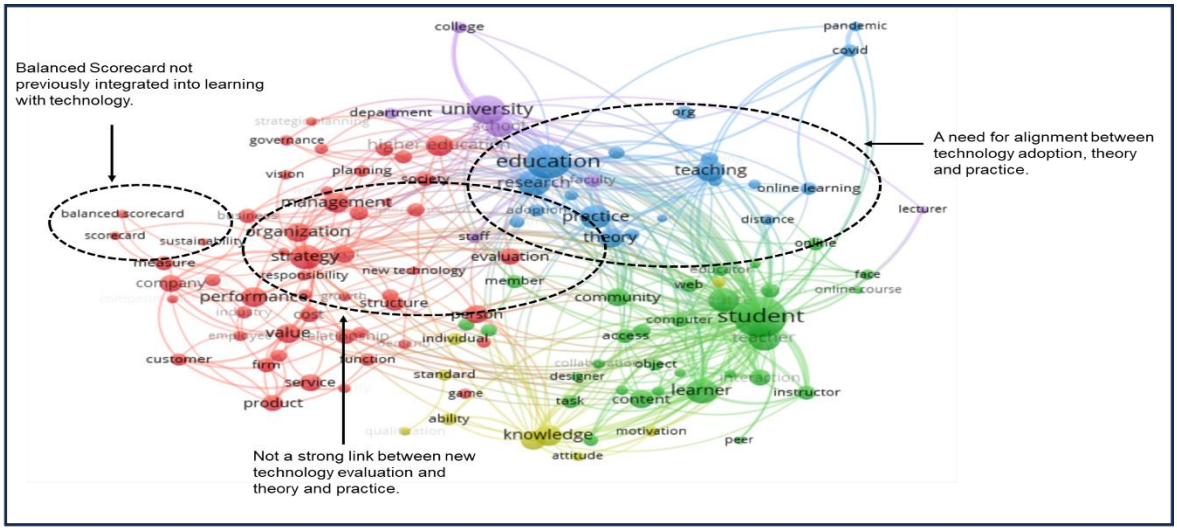
The articles were combined in two separate categories and analysed through VOSviewer to determine if the landscape of learning with technology was sufficiently covered. VOSviewer is an online tool to create visualisations from bibliometric data (van Eck & Waltman, 2024). Figure 2.3 gives a visual representation of the concepts covered in the 270 strategy-related articles. The colours indicate clusters of concepts while the lines indicate the links between the concepts. The size of the bubble indicates the weighted number of mentions relative to other concepts.

Some key findings are indicated by the circles and annotations in the picture and highlight the gaps between strategy, new technology, evaluation and theory and practice. Another gap is the distance between the BSC and concepts of new technology, evaluation, and educational practice.

Figure 2.4 visualises concepts in the literature about the operationalisation of technology in current practices. It is important to note that new emerging technologies such as chatbots, artificial intelligence in education (AIED), online assessment and AR are emerging at the periphery while data is central to operations where new technology is employed. Collaboration, interaction, and social presence also were significant in terms of the relative number of mentions in the literature.

Figure 2-3

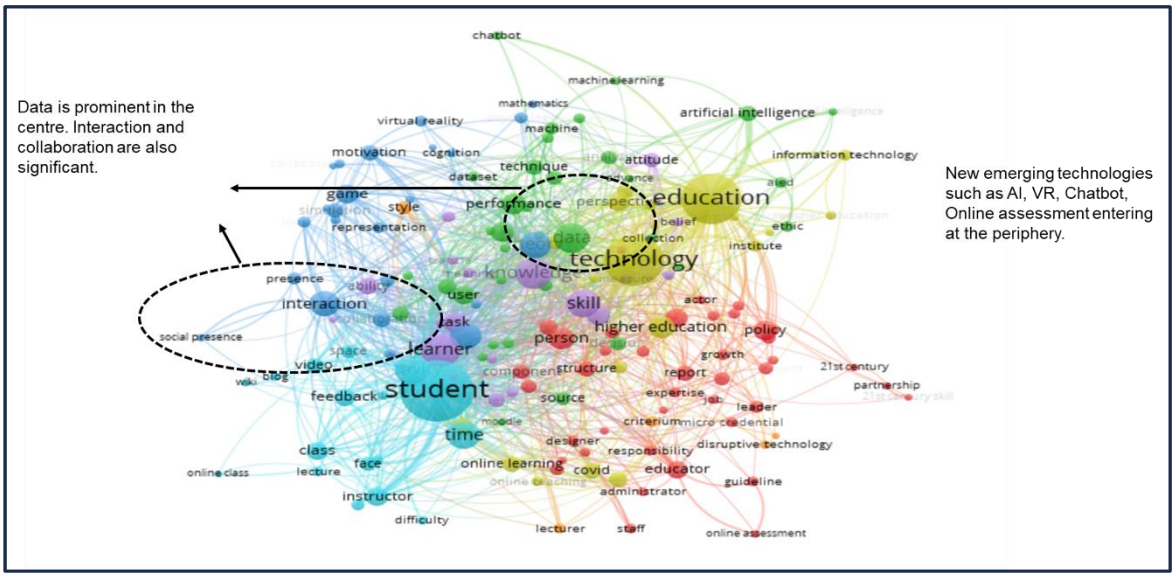
The strategic landscape of learning with technology



Note: VOSViewer diagram on related concepts in learning with technology.

Figure 2-4

New technology and practice



Note: VOSViewer diagram on the operationalisation of current practices in learning with technology.

Figures 2.3 and 2.4 give visual pictures of related concepts in this study about learning with technology and inform the in-depth findings in the literature.

The literature provided an understanding of key trends and operational practices regarding learning with technology. The trends that were investigated in more detail

include blended learning, technology-supported collaborative learning, immersive learning, AIED, digital assessment, and micro-credentials. The literature also provided a comprehensive understanding of the technology ecosystem, core capabilities, value chain activities and intangible measures of invisible advantage. An analysis of the challenges indicated key performance areas for the successful implementation of technology in learning. Findings from the literature are discussed in this chapter, Sections 2.2-2.6.

2.1.4 The research questions

The literature review attempts to understand the complex multi-dimensional factors that interact with and influence each other strategically.

The primary research question is “How does strategy development occur through the dynamic interaction of strategy with learning, and technology integration?”. The secondary research questions look at a) the elements to consider in a strategy map for learning with technology, and b) how the elements influence each other in the overall strategy map.

The literature review aims to address the elements in the internal and external environment that will inform the development of a strategy map as part of the secondary research question (a). An analysis of theoretical models aims to provide a framework for mapping the interaction of these elements to answer research question (b).

2.2 External environment - the emergence of new technology

The Gartner hype cycle for Education 2023 (Gartner Inc., 2023) was used as a guiding framework for the analysis of emerging technology. This section discusses the concept of technology cycles, briefly touches on the concept of chaos and complexity, and then provides a view of the emerging technology themes from the Gartner hype cycle for Education 2023 (Gartner Inc., 2023).

2.2.1 Technology cycles

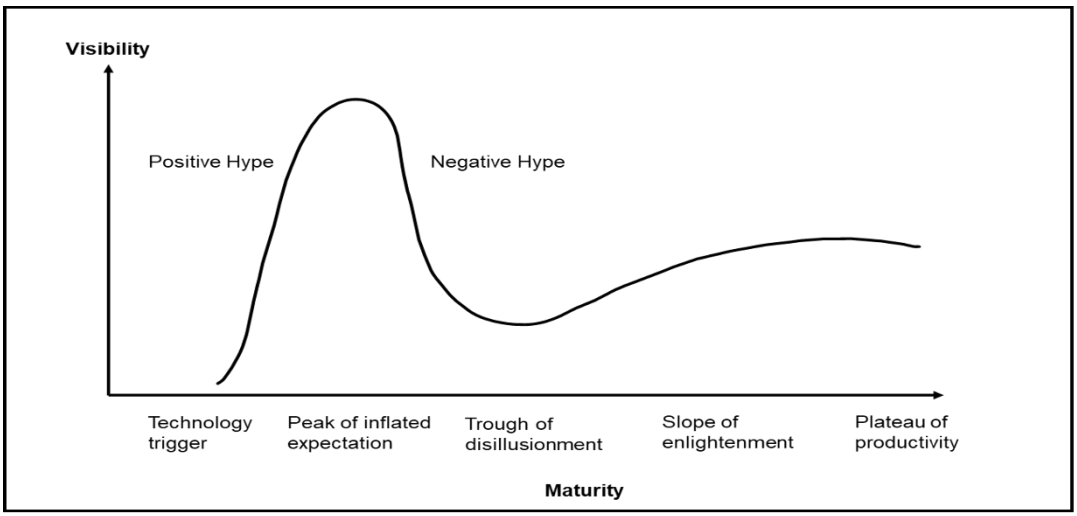
The Gartner technology hype cycle describes the different stages of a technology cycle navigating through a pattern of initial over-enthusiasm, disillusionment, and

eventual productivity. An understanding of this cycle guides decision-making in terms of the most relevant technological choices in terms of strategic goals. A strategy process enables decision-makers to make technology choices in line with business goals. CIOs from institutional learning organisations identified operational excellence through technology, as a primary goal of technology in their organisations (Gartner Inc., 2022).

An understanding of technology life cycles helps technology planners navigate through the complexity of market perception, performance, and adoption of emerging technologies to determine the opportune time to invest in new technologies based on strategic business objectives.

Figure 2-5

The Gartner hype cycle



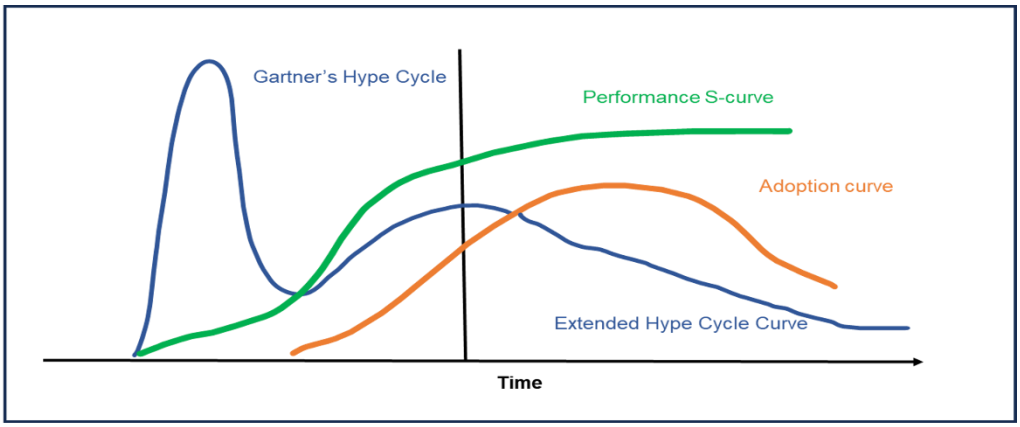
Note. "The Gartner Hype curve" adapted from Understanding Gartner's Hype Cycles by A. Linden and J.Fenn, 2003, Strategic Analysis Report, p5. Copyright (2003) by Gartner, Inc. and/or its Affiliates.

The Gartner hype cycle is illustrated in Figure 2-5: the first part of the hype cycle represents initial overenthusiasm about an emerging technology, driven by media perception and expectation of market players regarding potential prospects of the new technology, while the second part represents actual adoption and performance gains. The hype cycle provides a snapshot of the relative maturity of a technology as it progresses through phases of inflated expectation, disillusionment, and enlightenment, to eventual productivity. Organisations should guard against

overinvestment in the early stages of the hype cycle but should also not ignore potential benefits in the long run.

Figure 2-6

Hype, adoption and performance cycles



Note. "The Gartner Hype curve" adapted from Understanding Gartner's Hype Cycles by A. Linden and J.Fenn, 2003, Strategic Analysis Report, p5. Copyright (2003) by Gartner, Inc. and/or its Affiliates..

Technology inventions develop and navigate through different life cycles. Figure 2-6 illustrates how the technology performance S-curve develops over time and lags the hype cycle. The adoption curve indicates how adoption progresses over time. The adoption curve lags both the hype and performance curve (Linden & Fenn, 2003).

2.2.2 Chaos and complexity

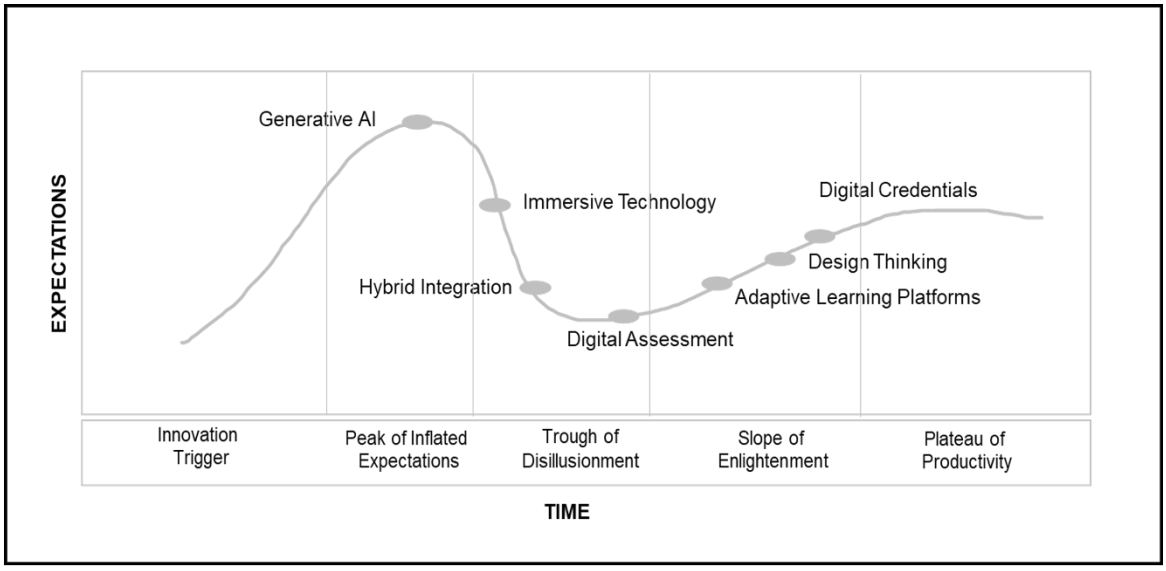
Emerging technology trends, navigating through patterns of uncertainty as described by the Gartner hype cycle, introduce an environment of chaos and complexity. In their Cynefin framework, Kurtz & Snowden (2003) discuss different domains of chaos and complexity and contend that the complexity of the multiple cause-and-effect relationships in complex systems can often only be perceived clearly in retrospect. This will provide insight through multiple perspectives in terms of the patterns in a system. Action in chaos is however reserved for the few courageous decision-makers who thrive on risk and cannot or do not want to wait for patterns to emerge from complexity. This study aims to identify the elements contributing to multiple cause-and-effect relationships in learning with technology.

2.2.3 Different themes of technology emergence

New technologies are emerging in different themes when learning or educational settings are considered. These themes include business models, operations management, and technology integration as well as themes in terms of the design of learning environments and facilitating learning experience and engagement (Gartner Inc., 2023). Figure 2-6 indicates emerging technologies in the different themes. A discussion on these themes is integrated into the discussion on the changing educational practices when learning with technology (Section 2.3).

Figure 2-7

Themes of technology emergence 2023



Note. Adapted from "Hype cycle in education 2023" reprinted from Hype Cycle for Higher Education 2023, by R.Yanckello, 2023, Gartner. Copyright (2022) by Gartner, Inc. and/or its Affiliates.

2.3 External environment - changing educational practices of learning with technology

Technological advances radically transform educational practices. This section discusses how new technology is operationalised in different educational settings. An analysis of changing practices provides important information about critical elements of learning with technology that need to be included in a strategy map. This section looks at learning environments such as blended learning, technology-supported collaborative environments, and immersive learning. The impact of AI is discussed, along with other inevitable changes in assessments and credentials.

2.3.1 Blended learning

Technology facilitates virtual learning, remote learning, and distance learning. Blended learning has emerged as a dominant theme when designing learning environments. *Design* incorporates all the elements related to the design of learning material, learning environments, and social experiences (Joosten et al., 2020; J. Singh et al., 2021).

The term "blended learning" can however have different meanings for different people. It is often used inconsistently and can be incoherent in its conceptualisation (Oliver & Trigwell, 2005). Driscoll (2002) attempted to define the term by referring to different concepts of blended learning. These concepts include the application of web-based technology, a new pedagogy, educational technology and job tasks. Hrastinski (2019) also stated that blended learning could include different blends of instructional methods, technologies, and pedagogical approaches. A comprehensive definition of blended learning was proposed by Cronje (2020):

> *"The appropriate use of a mix of theories, methods and technologies to optimise learning in a given context" (Cronje, 2020, p120)*

The concept of blended learning is further enhanced by blending learning approaches and strategies, delivery media, and activities. Different forms of technology-enhanced learning tools are mixed with traditional face-to-face training, synchronous online engagement, asynchronous self-directed, and structured personal contact with a mentor or instructor on the job. Some dimensions of blended learning could include variations of online and offline, self-directed, and collaborative learning, and synchronous and asynchronous learning (H. Singh, 2021).

Synchronous and asynchronous digital technologies can be combined in an optimal way to facilitate learning, digital assessment, continuous student support and ongoing student communication (Moorhouse & Wong, 2022). Blended learning provides flexibility to facilitate substantial change and to include and maximise new educational functionalities (Dziuban et al., 2018).

2.3.2 Technology-supported collaborative learning

Complex communication and collaboration have been identified as some of the most important skill sets required to successfully work and learn in the 21st Century. Communication encompasses the clear articulation of thoughts and ideas by using a wide range of methods and technologies. Collaboration is the ability to work effectively and respectfully with others, while demonstrating a willingness to accommodate diverse viewpoints, take responsibility and be flexible in working towards a common goal (Trilling & Fadel, 2009).

Computer-assisted collaboration is an important component of online learning. Lipponen (2023), offers a useful definition for computer-supported collaborative learning (CSCL):

> *"CSCL is focused on how collaborative learning supported by technology can enhance peer interaction and work in groups, and how technology facilitates sharing and distributing of knowledge and expertise among community members." (Lipponen, 2023: p.72)*

All levels of interaction among peers and tutors can have an impact on the effectiveness of online learning. The most important of these interactions are student-tutor interactions, student participation, peer interaction and collaboration, and learner-content interaction. These interactions need to be carefully incorporated into the design of online courses (Vlachopoulos & Makri, 2019).

Fiock (2020) builds on the Community of Inquiry (CoI), theoretical framework of (Garrison et al., 1999: p 2), incorporating "cognitive presence, social presence, and teaching presence". He proposes instructional strategies for each of the presences to facilitate communication, collaboration, feedback and support among learners, the instructor, and peers.

To conclude, effective online collaboration and interaction, considering teacher-student and student-student interaction, can sustain emotional support. Cognitive presence, social presence and teaching presence can effectively be created virtually

when online tools are integrated as part of a fluent learning process to facilitate collaboration and sustain emotional support (Berry, 2019).

2.3.3 Immersive learning (AR, VR, Simulation, and game-based learning)

The proliferation of software and hardware technologies for VR environments creates opportunities for the development of game-based approaches and exploration-based learning. One of the most prominent benefits of VR learning is the visual communication of knowledge in an authentic environment. It further contributes to the immediate transfer of skills in a risk-free environment. Studies have, however, indicated that the applicability of VR-learning is domain-specific. The medical industry has successfully developed knowledge and skills transfer applications on VR platforms (Checa & Bustillo, 2020).

Vlachopoulos and Makri (2017) contend that simulations create a scenario-based learning experience with real-world relevance where participants need to interact to communicate and solve problems. Digital games and simulations can create a supportive environment for learning and are often perceived as enjoyable learning tools. Virtual learning, games, and simulations are popular in the fields of Computer Studies, Health Sciences, Biology and Business Management. Game-based learning in virtual worlds has shown some positive results in terms of its effect on learning, however, the cost of development is a significant challenge.

VR learning interventions have high entertainment value but require technical competence and engineering skills. Further research in terms of the effective use of VR for learning is required (Joosten et al., 2020).

Gamification refers mainly to the mechanics of engaging experiences. Although it creates a lot of fun for learners, it can also be counterproductive (Baker et al., 2012). A systemic literature review by Hamilton et al. (2021), of learning outcomes from immersive VR interventions, indicates that further research is required in terms of assessment methods and learning outcomes associated with VR, to understand the potential of immersive VR as an effective pedagogical tool.

2.3.4 Artificial Intelligence in Education

AI can transform traditional educational practices through the introduction of new technology (Holmes et al., 2023). AIED is highly technology-dependent and research across disciplines is required to understand its affordances and effective application. There is, however, no doubt that AI will open up new opportunities for improving learning and teaching, and that new strategies are required to benefit from these intelligent systems (Hwang et al., 2020). The proliferation of AI technologies and applications has a direct impact on pedagogical approaches which translates into different learning strategies (Ouyang et al., 2022). The concepts of adaptive learning and generative AI are components of AIED.

2.3.4.1 Adaptive learning:

Adaptive learning puts the student and his/her unique characteristics, abilities, knowledge competencies and preferences at the centre of the learning experience. Adaptive approaches and technology are required to design instructional strategies around the personalised interests, expectations, and abilities of diverse groups of learners. Adaptive technology provides information on a learner's progress and performance on a range of tasks and enables educators to provide immediate personalised adaptive feedback to the learner (Muñoz et al., 2022).

Wang et al., (2023) emphasise that adaptive learning systems with their analytical capability, could mimic a one-on-one tutor experience and provide information that even the most experienced teachers could miss in day-to-day teaching activities. AI powered adaptive learning systems collect data and analyse the behaviour of students. They suggest an optimal learning route, and learning material, based on a student's learning patterns and unique abilities (Alam, 2022).

Adaptive learning is also known as assistive scaffolding and enables differentiated instruction and content that suits every individual learner. Personal attributes and learning styles of learners translate into different pathways that inform content creation and delivery (Weber in Muñoz et al., 2022).

AI is broadly used in learning analytics to analyse data from students by applying knowledge from different scientific fields such as sociology, psychology and,

pedagogy. These insights in terms of learner characteristics and behaviour can be used to predict learner responses and to provide feedback. AI-enhanced learning management systems (LMSs) can automatically analyse data to generate dashboards to support real-time decision-making (Pedró, 2019).

Adaptive learning technology requires a solid technology infrastructure that includes appropriate hardware, software, and internet connectivity for execution. The design of these systems needs to accommodate the complex requirements to be adaptable and responsive to individual learners. Real-time data challenges and the interoperability and integration complexity of LMS's remain significant challenges (Muñoz et al., 2022).

AI is also used in CSCL as a virtual team player or to provide individualised support to team members in a synchronous online environment. AI can monitor discussions, analyse them and provide feedback to the tutor in terms of group activity (Pedró, 2019). Holmes et al. (2023) further contributed to the discussions by proposing the use of AI to play the role of expert facilitator and moderator of collaborative activities. They further envision AI as a student forum monitor to analyse posts of students on public forums where massive numbers of posts are generated. The analysis could be used to identify generalised queries, as well as the questions that need to be referred to a human tutor for personal attention. They further envisage that AI could do sentiment analysis to track negative emotional states and mental health issues, as well as unacceptable posts or those that drift from the original topic of discussion.

AI offers unique opportunities to streamline assessment practices in education. It could, however, require a transformation in assessment practices and an abandonment of traditional practices. AI offers the opportunity to track all student interactions with computer-mediated learning material, peers, and tutors, as well as test results and knowledge representations of student work. It can provide a report of a student's overall performance against a norm that could inform adaptive feedback, learning pathways and scaffolding (Cope et al., 2021).

AI enables continuous assessment where overall results of learning experiences and achievements are reflected as a kind of "moving average" that indicates a

student's understanding of the learning material and overall progress (Holmes et al., 2023). AI can be used for automatic assessment to provide immediate feedback to learners (Ouyang et al., 2022). It can be used to create automatic tests and will in time become more scientific in grading and assessing students' assignments and performances (Alam, 2022).

2.3.4.2 Generative AI

AI learning companions offer guided support on a specific topic chosen by the learner. An AI companion can structure some activities and give personalised feedback (Holmes et al., 2023). Hwang and Chang (2023) support the concepts of intelligent tutor and learning tool. AI as an intelligent tutor provides recommendations and concurrent feedback while working on assignments, while an intelligent learning tool facilitates higher-order thinking skills by providing concept mapping tools and knowledge graphs to present information in a way that relationships between concepts become visible. Alam (2022) expands on the concept of robots as intelligent tutors. These robots are purpose-built to assist students in an educational environment, aim to facilitate analytical, creative, and practical skills, and can play the role of a virtual instructor.

The teaching assistant works alongside the AI learning companion and creates automated assessment activities (Holmes et al., 2023). Okonkwo and Ade-Ibijola (2021) elaborate on the role of chatbot systems in education. Their research indicates that chatbot applications focus on support for personalised learning and teaching, but expand applications to advisory services, administration and research and development.

A study by Hwang and Chang (2023), found that, although chatbots were used in education, there was little evidence of effective learning designs or learning strategies when using chatbots in education. They emphasised the need for research in terms of innovative strategies to improve learning outcomes when using chatbots in education. The study found that chatbots were mostly used in guided learning.

Recent developments in generative AI expanded and progressed into the application ChatGPT in November 2022.

> *Generative Pre-trained Transformer (GPT) models use large amounts of publicly available digital content data (natural language processing [NLP]) to read and produce human-like text in several languages and can exhibit creativity in writing from a paragraph to a full research article convincingly (or near convincing) on almost any topics (Aydin & Karaarslan, in Baidoo-Anu and Ansah, 2023: p 52).*

Baidoo-Anu and Owusu Ansah (2023) and Kasneci et al., (2023) elaborated on the inherent opportunities for learning and teaching with ChatGPT. ChatGPT can be used for personalised tutoring and creates personalised support in terms of research and report writing in that it can generate summaries or provide an outline for a report. It can suggest specific information or resources on a topic. ChatGPT acts as a conversational partner and can provide personalised scaffolding based on the conversation. It can also play a role in language translation. Teaching support includes lesson planning and course design based on the personalised needs of learners. ChatGPT can recommend assessment activities or grade essays and reports. It can also generate rubrics for assessment activities and can be used to create engaging learning interventions with AR and VR to create games and simulations.

2.3.4.3 Challenges and limitations of AI in education

AIED requires a sound technology infrastructure with AI-enhanced data analysis systems to take advantage of AI to improve learning and teaching. Effective AI systems are highly dependent on data and require quality data systems. Data must be complete, reliable, and timely, and the analysis thereof must be useful and relevant to learners and educators to provide real-time feedback to inform instructional strategies. Data collection activities are however subject to ethical considerations of data privacy, security, and transparency (Alam, 2022; Pedró, 2019).

AI cannot perform complex problem-solving activities and cannot think or plan strategically. It can also not feel empathy or compassion and does not have the capacity to be emotionally involved like a human tutor. AI cannot handle unknown or unstructured phenomena, especially if it has not encountered them before through machine learning (Holmes et al., 2023).

There is a need for digital competency frameworks for learners and teachers to thrive in a technology-enabled AI world. This goes beyond a basic understanding and use of technology and requires a new curriculum to prepare learners for a digital AI-powered future and a new pedagogy where content and methods of instruction are revisited. Digital competencies must be able to comprehend the future impact of AI; its scope, limitations, potential and challenges. It also requires strengthening AI capability through education and training (Pedró, 2019). Baidoo-Anu and Owusu Ansah (2023) conclude that professional capacity building is required to provide teachers with the skills to use AI in instructional activities and assessment practices that will improve student learning.

The future of AI is uncertain and requires experts from various fields to collaborate and discuss blueprints for the ethical implementation, implications, and consequences of AI (Alam, 2022; Pedró, 2019).

2.3.4.4 Challenges specific to ChatGPT

When asking ChatGPT to assist with content development there could be copyright issues. Large language models are trained on specific datasets. The responses are based on datasets that could be biased towards certain cultural groups. ChatGPT cannot correct any misconceptions that students might have, cannot explain any variations in data, and has limited creativity and originality because it lacks an understanding of context as a result of the data it was trained on. This may lead to inappropriate or irrelevant responses. Students and educators could become over-reliant on using ChatGPT, and the use of ChatGPT could negatively impact the creativity of students. Teachers should use it as a supplementary tool. It is difficult to distinguish model-generated responses from the authentic responses of students. Current AI detection applications are not yet capable of detecting plagiarism.

Furthermore, ChatGPT could produce fake knowledge convincingly, and students will be unaware of that. (Baidoo-Anu & Owusu Ansah, 2023; Kasneci et al., 2023).

2.3.4.5 Further research required

Hwang et al.,(2020) suggest further research in terms of the following areas: implementation frameworks for AI-based learning incorporating emerging technologies and educational theories; the effectiveness of AI-supported learning designs on student performance and the effect on higher-order thinking skills; redefining existing pedagogies and educational theories in the context of new technology; innovating learning and assessment strategies for AI-supported learning and ethical principles and practices when adopting the use of AI technologies and applications.

2.3.5 Digital assessment

Online learning requires some changes in traditional assessment practices. This section looks at some challenges in online assessment, the difference between synchronous and asynchronous assessment, and the impact on technology platforms and applications. An awareness of the changing dynamics of online assessment provides important input to the development of the strategy map for learning with technology.

2.3.5.1 Intent and purpose of online assessment

Online assessment is an important component of learning with technology and can enhance communication and interaction in an online learning community. It involves both formative and summative assessment strategies and activities as in any other face-to-face setting. The alignment of assessment activities and learning objectives with Bloom's taxonomy provides a mechanism for quality, well-structured feedback. A well-designed rubric and postings in online forums, chatrooms and discussion boards can provide students and tutors with continuous formative feedback (Gamage et al., 2020; Gaytan & McEwen, 2007; Guangul et al., 2020; Rahim, 2020; Tuah & Naing, 2021).

2.3.5.2 Challenges in online assessment

The main challenges in online assessment are plagiarism and assessment security. Text-matching software such as Turnitin is widely used by educational institutions

to detect a violation of academic integrity. Assessment security detects any form of cheating when completing assessments. Cheating practices include impersonation, forbidden aids, peeking, peer collaboration, ghost-writing, contract cheating through essay mills, and student–staff collusion (Gamage et al., 2020; Guangul et al., 2020; Tuah & Naing, 2021).

Combining various assessment methods at different intervals allows the educator to assess the consistency of a student's performance, thereby limiting opportunities for dishonesty. In an online environment, assessment security is maintained through strict deadlines for assessment submission. This limits available time for cheating (Gamage et al., 2020; Guangul et al., 2020).

Virtual invigilation or online proctoring requires sophisticated camera and authentication software to verify the identity of the students and to secure the environment against any breach in examination regulations. Formal written or in-vivo exams can also be used to prevent contract cheating (Tuah & Naing, 2021).

The computer literacy of students and their access to technology can cause a challenge for students when doing online exams and assessments (Gamage et al., 2020). When designing online assessments, educators need to consider the diversity of students in terms of their technology infrastructure, computer literacy, ability to speak English, and other socio-economic factors. Other factors to consider include the reliability of systems in terms of network connectivity, hardware, software, and power, while also considering physical security systems such as cameras to safeguard against cheating (Tuah & Naing, 2021). Technical problems with connectivity, hardware or software might occur during online assessment. Students and assessors need to know how these issues will be dealt with in advance (Guangul et al., 2020).

2.3.5.3 Assessment in synchronous and asynchronous online environments

Online assessment is part of the virtual learning experience and needs to be carefully communicated, scheduled, and integrated into the LMS (Rahim, 2020). This is an important aspect of course design, development, and implementation.

The literature provides many examples of synchronous and asynchronous assessment examples in an online environment (Gamage et al., 2020; Gaytan & McEwen, 2007; Guangul et al., 2020; Rahim, 2020; Tuah & Naing, 2021). Synchronous assessment often happens in real-time and includes proctored exams, time-constrained assessments, online quizzes, professional audiovisual demonstrations and presentations, and viva-voce assessments through an online communication platform such as Zoom. Asynchronous assessments are not done in real-time and include open book/take-home assignments, reports, fact sheets, e-portfolios, or presentations with a voice-over.

2.3.5.4 Online learning platforms and applications

Online assessment platforms and applications can have a significant cost implication for learning with technology, and different options need to be considered carefully. A variety of free open-source applications are available and can be used for quizzes, video conferencing and presentations. Educators can also use online plagiarism-checking platforms to verify the academic integrity of essays and assignments. LMSs such as Moodle, Canvas and Sakai can be used for a wide range of assessment activities. Technology companies also offer software and infrastructure for technology-based invigilation (Tuah & Naing, 2021).

2.3.6 Micro-credentials

Micro-credentials can be viewed broadly as small units of study, focusing on specific skills and competencies required in the workplace (Brown et al., 2021). These are not recognised as formal stand-alone qualifications and could include certificates and digital badges (Kato et al., 2020). They are applied in work environments where specific skills are required and are useful in continuous professional development where learning is learner-centric and focused on specific skills and competencies that can be applied in an immediate work environment (McGreal & Olcott, 2022; Zhang & West, 2020). Micro-credentials can be offered as stand-alone short courses, integrated as a module in a full qualification, or could even be combined and stacked to carry credits toward a full qualification (Kato et al., 2020); they can be formal, semi-formal or informal (Brown et al., 2021).

Micro-credentials are offered by corporate organisations, institutes of higher education and government organisations, and require a partnership between all service providers to address the growing need for skills in the workplace. Strategic decisions are required to design an implementation framework for micro-credentials globally. They could provide a new income stream for short courses, but major uncertainty around stackable components in curriculum design, and specifically standardisation, validation, and accreditation in the context of a quality framework, remains at the centre of the debate (Kato et al., 2020; McGreal & Olcott, 2022).

2.4 External environment - the regulatory context of learning with technology

The regulatory context of learning with technology can have a direct impact on operational practices. A National Qualifications Framework (NQF) ensures quality standards, which are an important aspect of learning design. The regulatory context is an important element to consider in a strategy map for learning with technology.

2.4.1 Good governance and quality assurance in learning and development

Tertiary education institutions diversify training courses in response to the market need and labour demand in a quest to be relevant to the economy. Competitive market forces also lead to the expansion of training courses by private learning and development institutions. This diversification is often brought about by innovations and improvements in training design, as well as new modes of training delivery. Public funds are often appropriated for learning and development initiatives and therefore require strict accountability (Hénard & Mitterle, 2010). In South Africa, private companies with an annual turnover of more than R500 000 need to pay 1% of the total salary bill as a skills levy to the South African Revenue Services (www.sars.gov.za).

2.4.2 The relationship between good governance and quality assurance

Good governance in educational institutions refers mainly to the corporate structures and governing bodies where decision-making around autonomy and accountability is situated. It is often characterised by strong visionary leadership, a culture of success and excellence and a drive to measure performance to ensure organisational learning and growth. Good governance facilitates interaction with

internal, external, and international stakeholders through different advisory boards and governing structures, and employs a sound quality assurance framework (Hénard & Mitterle, 2010)

2.4.3 The benefits of quality standards and quality assurance

A quality assurance framework has pedagogical relevance in that it provides a roadmap for quality standards and aspirational benchmarks. Compliance with standards will ensure accreditation from external bodies and assure beneficiaries that funds were spent wisely on high-quality training courses (Hénard & Mitterle, 2010).

2.4.4 The National Qualifications Framework

Many countries use an NQF as an instrument to regulate qualifications. An NQF can consist of many regulatory sub-frameworks, but evidence of the impact of NQFs in different countries is complex and variable. Frameworks and sub-frameworks differ in terms of objectives achieved and some are more successful than others, although evidence of success is mostly weak and often negative (Raffe, 2013).

It is important to examine any learning intervention through the lens of a country's NQF and the required practices of a national accreditation authority. Most countries aim to have some kind of NQF to ensure academic quality assurance. The NQF provides a comprehensive hierarchical framework for all the degrees and qualifications in different sectors based on valuable and reliable information in terms of quality standards linked to outcomes and criteria. NQFs can be technically and institutionally complex but the main aim is to improve the quality of training and to provide a basis for comparison of qualifications. The allocation of credits creates zones of trust, ensuring that qualifications in different sectors are comparable (Dill, 2009; Tuck, 2007).

In South Africa, the South African Qualifications Authority (SAQA) is the governing body that oversees the implementation of the NQF. Providers of training initiatives need to apply for accreditation with an Education and Training Quality Assurance (ETQA) body. Every sector has an ETQA body and will provide information on the unit standards and qualifications specific to the specific sector (www.gov.za).

2.5 Internal environment – building capacity for competitiveness

Decision-makers who need to decide on new technology investments need to consider a range of qualitative and non-qualitative indicators in the context of the organisation. Technology investments can move the productivity frontier outward and impact all operational activities in the value chain. Core capabilities and technology components in an overall technology eco-system are important elements of the strategy map for learning with technology.

2.5.1 The productivity frontier and strategic architecture

The productivity frontier of an organisation is impacted by the adoption of emerging technologies and represents the maximum value that a company can deliver to identified customers at a given time and at a given cost. It involves the deployment of available technology, skills, and management best practices to achieve operational performance and includes all activities inherent to an organisation. The emergence of new technology moves the productivity frontier outward. The productivity frontier involves multiple dimensions of operational excellence, superior profitability, and technology investments (Burgelman et al., 2004).

Operational efficiencies move the productivity frontier outward through the effective use of new technologies, management techniques and skills. When the productivity frontier moves outward, multiple dimensions of performance are improved simultaneously. Continuous improvement of operational excellence will in time lead to superior performance and profitability (Porter, 1996).

The strategic architecture of organisations provides a high-level blueprint of functionalities and competencies and their interaction with customer interfaces. It provides a sense of direction and a broad agenda for functionality deployment and competence acquisition. It provides a link between current capabilities and future requirements to remain sustainable and competitive. The strategic architecture enables organisations to learn from their actions in a targeted way. It enables decision-makers to gain insights in terms of technology investments, customer needs, functionalities, and competencies (Hamel & Prahalad, 1994).

2.5.2 Intangible measures an invisible advantage

Traditional financial measures of company performance have become increasingly inadequate to measure the full potential of a company to create wealth based on intangible assets**.** The Value Creation Index, measuring value creation through intangible, non-financial measures, indicates that decision-makers often lack important information when making decisions about the future of a company. The Index indicates further that innovation, management capabilities and employee relationships are some key differentiators when measuring the value of intangible assets. The value of alliances and partnerships in a technologically connected world cannot be underestimated. Technology is not seen as a key differentiator but rather a given minimum requirement to be in the game. Technology does, however, play a role in terms of the quality of products and processes that impact the competitive advantage and performance of a company (Low, 2000).

These intangible variables are a source of an invisible advantage. It is particularly IT executives who must demonstrate how value is increased through investments in technology. Some of these intangible benefits are contained in strategic vision, leadership, innovation and an improvement of products and processes. They also include measures for customer satisfaction and environmental and social responsibility. It is important to identify the key areas that contribute to this invisible advantage. Metrics for employees, customers, suppliers, and other stakeholders need to be identified and targets must be communicated to ensure a continuous focus on improvement and performance (Low & Kalafut, 2002).

2.5.3 Competitive advantage and value chain activities

Porter (1985) proposes a value chain analysis of key activities to determine the areas where technology will impact the business. It will also determine the linkages and relative influences of each activity in the overall value-creation process. A business consists primary activities, directly involved in service delivery and support activities which contribute to the overall effectiveness and efficiency of primary activities.

Technology innovation pervades every component in the value chain of a business and can affect the overall competitive advantage of a business. A technology

strategy needs to accommodate continuous evolution in technology innovation. This potential path of evolution in key technologies needs to be monitored and anticipated (Porter, 1985)

Value chain analysis is a useful method to unbundle activities in an educational value chain. Isolating some activities determines the scope of cost control and operational management and helps to identify core competencies and value drivers in the entire value chain (Pathak & Pathak, 2010).

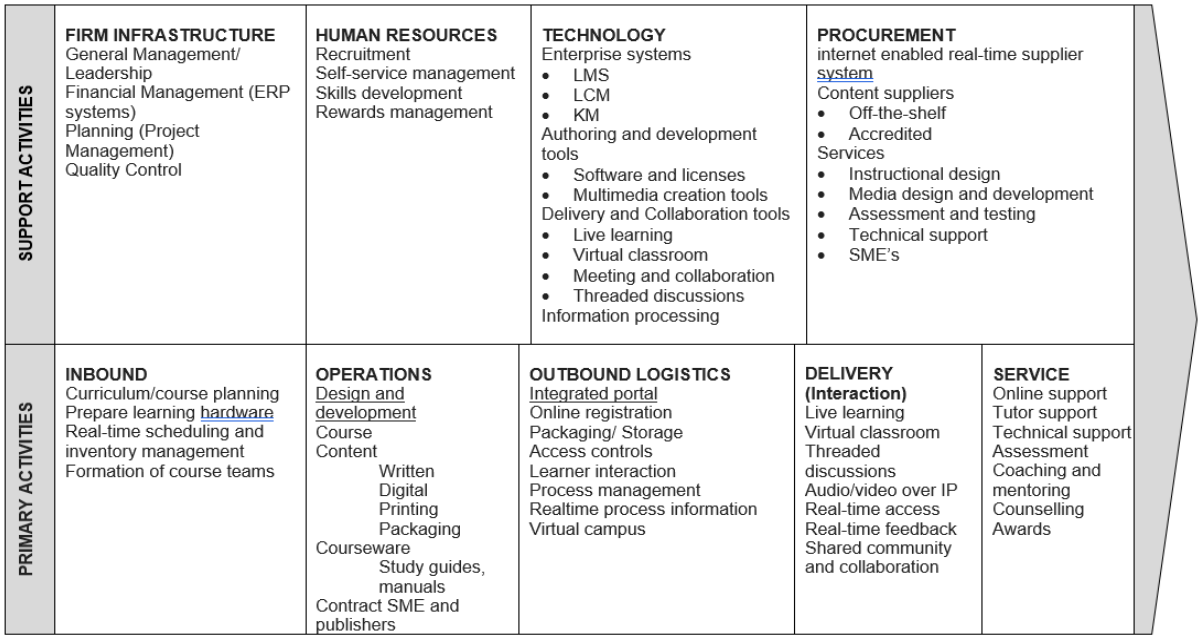
A value chain framework for online learning is an important strategy tool for understanding the activities and practices that drive value and cost. These activities are sources of potential differentiation to gain competitive advantage through superior quality and excellence. Online learning requires a large financial investment in technology infrastructure but also the skills of designers, facilitators, and tutors. When the interdependence of activities in a value chain and the relative focus and importance of these activities are perceived and understood, costs can be allocated and analysed. Costs have a direct impact on volume and profitability and will guide strategic decision-making about activities in the value chain (Elloumi, 2004).

The value chain framework in Fig 2-8 provides a complete understanding of all the activities and role players in value delivery and can assist decision-makers in identifying potential strategic alliances and partnerships with suppliers and distribution channels.

The online learning value chain provides important information about the activities in key dimensions of business performance and informs the operational elements to be included in a purposeful way in a strategy map for learning with technology.

Figure 2-8

The online learning value chain



Note. "Online learning value chain" adapted from Value chain analysis: A strategic approach to online learning. F.Elloumi, (2004: p 71).Theory and practice of online learning.

2.5.4 Core capabilities for technology innovation

Advances in new technology impact the core technology infrastructure as well as the development of e-learning content. New technology creates new learning environments and the stakeholders or role-players in an e-learning environment constantly need to learn new skills to adapt to changes brought about through technology. Wu et al., (2008) summarised core capabilities in an online learning environment as:

1) Technology infrastructure for communication and delivery: This capability involves network infrastructure, applications platforms, LMSs, Technology-Mediated Learning Systems (TMLS) and devices such as PC's and Tablets.
2) Technology for content development: Technology used for content creation, packaging, and delivery.
3) Capabilities to design learning environments: Learning and teaching theories, strategies, and methods for online learning; methods for

collaborative learning and new evaluation and assessment methods for online learning environments.

4) Technology support to learners, instructors, and institutions.

The value-chain activities and core competencies are complementary elements to consider in a strategy map.

2.5.5 The technology eco-system

A digital ecosystem is an adaptive digital infrastructure environment populated by digital components that are constantly evolving. Digital components can be hardware, software, applications, training modules, or knowledge or business processes that can be shared and distributed across the infrastructure. An LMS is an example of such a self-organising environment that facilitates collaboration and integration of different components in an evolving business model.

A macro-level strategy for learning with technology informs the design of a roadmap for technology integration. Selecting the right LMS is an important step in constructing the technology solution. The integration and interoperability of emerging and legacy components need to be facilitated by the overall roadmap. Sound principles of pedagogical design should drive the design of a digital ecosystem for learning with technology. Digital content standards ensure the interoperability of content that can be reused across the networked infrastructure (Uden et al., 2007).

The digital learning eco-system does not only focus on the LMS and interoperable content creation components but also incorporates collaboration and community-based practices for knowledge sharing. The learning environment is dynamic and learning processes, changing situations, and contexts, also need to be accommodated in the digital eco-system (Gütl & Chang, 2008).

Although traditional LMSs such as Moodle and Blackboard are designed around a neutral pedagogical model or approach, Laanpere et al. (2014) propose an evolution to next-generation digital learning ecosystems with built-in affordances based on

online pedagogical principles, approaches, strategies and learning activities (Laanpere et al., 2014).

2.6 Strategic recommendations to overcome challenges when adopting technologies for online learning

The coronavirus disease in 2019 (COVID-19) forced schools and universities across the globe to find alternative teaching-learning approaches amidst lockdown restrictions. Emergency remote teaching on e-learning platforms created a fertile ground for research in terms of the challenges of online learning and possible ways to overcome those challenges in the future (Almaiah et al., 2020; Ferri et al., 2020; Maatuk et al., 2022; Mishra et al., 2020; Rasheed et al., 2020; Turnbull et al., 2021). The table below highlights the challenges thematically and indicates some recommendations to strategically manage these challenges to be better equipped for learning and teaching in an online environment.

Table 2-2

Challenges and recommendations for technology adoption

Theme	Challenges	Recommendations
Access and support (Maatuk et al., 2022; Mishra et al., 2020; Rasheed et al., 2020)	Access to internet services, bandwidth, and affordable devices.	Training institutions to provide affordable network services and devices.
Technology infrastructure (Almaiah et al., 2020; Ferri et al., 2020; Maatuk et al., 2022; Mishra et al., 2020; Rasheed et al., 2020)	An optimal digital platform for interoperable education technology tools. Continuous technology maintenance and upgrades.	Provide technology support to teachers and students. Global standards for inclusive platforms.
Basic technology literacy (students and teachers) (Almaiah et al., 2020; Ferri et al., 2020; Rasheed et al., 2020)	Lack of technology competence, literacy, and skill.	Formal training, workshops, seminars, and awareness sessions
An online pedagogy (Teacher training) (Almaiah et al., 2020; Ferri et al., 2020; Maatuk et al., 2022; Mishra et al., 2020; Rasheed et al., 2020; Turnbull et al., 2021)	Teacher training required in terms of: Teaching strategies and approaches. Development of digital content. Tools techniques and online processes. Online community through teacher presence, immediate feedback, and scaffolding. Alternative electronic assessment and AI	Continuous professional development, formal training programmes, conferences, and seminars. Online pedagogical approaches to include AI.

Online community (Almaiah et al., 2020; Ferri et al., 2020; Rasheed et al., 2020)	Sense of closeness, engagement, and satisfaction	Integration of social media sites. Blended learning approach
Online Assessment (Gamage et al., 2020; García-Morales et al., 2021; Gaytan & McEwen, 2007)	Challenges in terms of academic integrity and assessment security	Need to equip and support educational staff in the methodologies, procedures, and tools for online assessment – Drive continuous professional development and awareness
Cost-effectiveness and efficiency (Serdyukov, 2017)	Uncertain about the effectiveness and efficiency of ed-tech tools and platforms	Requires systematic research in terms of technology affordances, theoretical approaches, and sound pedagogical principles
Change management (Almaiah et al., 2020; Mishra et al., 2020)	Resistance to change	Involve all stakeholders. Awareness programmes

2.6.1 Access and support

Access to reliable internet services, bandwidth, and connectivity, as well as sophisticated but affordable electronic devices, poses a significant challenge to how students adopt and embrace new technology in an online learning environment (Mishra et al., 2020; Rasheed et al., 2020). Training institutions need to play a more prominent role in providing technical and financial support to teaching staff and students in terms of affordable network services, devices, and applications (Maatuk et al., 2022; Rasheed et al., 2020).

2.6.2 Technology infrastructure

The technical equipment for learning with technology includes hardware, software, operating systems, and communication infrastructure. An optimal digital technology platform for online instruction consists of an LMS with basic features that must accommodate different learning styles and must be interoperable with other educational technology tools. The successful deployment of an LMS depends on its accessibility, usability, availability, and quality of web interfaces (Mishra et al., 2020; Rasheed et al., 2020).

An optimal IT infrastructure is costly and requires technical skill to maintain and upgrade infrastructure, networks, and systems (Maatuk et al., 2022). Data protection and information security, system reliability and protection against viruses are important components of technical management and support (Almaiah et al., 2020). Ferri et al. (2020) recommend the development of global standards for more inclusive platforms, tools and devices to ensure adequate e-learning platforms with structured interactive digital content and learning resources.

2.6.3 Technical skills (teachers and students)

Technology competence, literacy and skill determine how students will interact with different user interfaces in an online learning environment. Overly complex technology applications cause intimidation, resistance, and anxiety. Online institutions should address the technology competence and literacy of students in order to reduce the complexity of an online environment (Rasheed et al., 2020).

This could effectively be done by providing formal training programmes to improve basic literacy, e-learning awareness programmes to manage resistance to change, and other workshops and information sessions regarding the technology to be used. (Almaiah et al., 2020; Rasheed et al., 2020). These training guidelines and interventions will encourage students and teachers in the use of emerging technologies and approaches for online learning (Ferri et al., 2020).

2.6.4 An online pedagogy (continuous professional teacher development)

Teachers need technological and pedagogical support in how to use and integrate technology into the online learning experience (Rasheed et al., 2020). Teaching strategies and approaches equip teachers to focus on the balance in terms of academic readiness, pace of learning and a sufficient understanding of the content. Teachers must know how to develop multi-modal approaches to achieve outcomes in line with course objectives. The curriculum must reflect content in terms of specific experiences in a learning environment and must enable critical thinking (Mishra et al.,2020). Instructional design principles for the design of synchronous/asynchronous components need to be addressed (Turnbull et al., 2021). The e-learning strategy needs to accommodate the characteristics of

students in their electronic context, and factors impacting student motivation also need to be considered (Maatuk et al., 2022).

The technology literacy and competence of teachers determine how they will use technology to create online content. Video creation, editing and sharing is technically complex (Rasheed et al., 2020). Teachers must learn the skills to create interactive digital content (Ferri et al., 2020), and must ensure the availability of digital study material and other resources with a good balance between material for visual and audio learners (Mishra et al., 2020).

Teachers must be proficient in terms of computer knowledge. They must be able to do online presentations, use tools, techniques, processes, and platforms in the online teaching process (Mishra et al., 2020), and manage an online course (Rasheed et al., 2020). Teachers experience anxiety in terms of the operational complexities of an online environment when they need to resolve and troubleshoot technical problems and difficulties in synchronous and asynchronous components (Rasheed et al., 2020).

Teachers need to create new strategies for digital education assessment and must learn to integrate intelligent technologies such as AI, into new online pedagogical approaches to create an inclusive, personalised learning path (Ferri et al., 2020). Continuous professional development contributes to support teachers in the application and implementation of e-learning tools and instructional technology and can be achieved through ongoing training and seminars (Maatuk et al., 2022; Rasheed et al., 2020)

2.6.5 Online community through teacher presence, immediate feedback, and scaffolding

Students have a need to engage with fellow scholars in an interactive and collaborative environment. LMSs are not optimally providing such a collaborative learning environment (Rasheed et al., 2020). Optimal Communication and interaction between teachers and students in online spaces pose some challenges in that both a social and cognitive presence is required to sustain a CoI (Ferri et al., 2020).

Teachers need to understand critical strategies for collaboration and motivation, which include, scaffolding, immediate feedback, and evaluation (Ferri et al., 2020), or changing teaching strategies based on feedback (Mishra et al., 2020). Good communication skills, the ability to connect on an emotional level, care for students, and resolve issues quickly, create an effective online environment for interaction and support (Rasheed et al., 2020).

2.6.6 Sense of closeness and connection through social media sites

A sense of closeness in an online collaborative learning environment reduces student isolation and contributes to engagement and satisfaction. It can be brought about by combining social media sites with an LMS. This also improves communication between students and educators and sustains social interaction between students. Social media is beneficial as an intervention when students experience challenges in the online environment (Rasheed et al., 2020), and can be used to support and encourage learning and to engage students (Almaiah et al., 2020).

Ferri et al. (2020) suggest the development of strategies to enhance communication and a sense of belonging in a virtual community, and where possible, suggest supporting communication through a blended learning approach.

2.6.7 Online Assessment

Emerging technology in online education requires educational institutions to develop and enhance online instruction and assessment strategies to accommodate the requirements of technology, learning styles, learning outcomes, pedagogy, and delivery (Gaytan & McEwen, 2007). There is a strong need for leadership to enable this technological transformation and to involve all stakeholders in this change process to re-invent online teaching and assessment practices and activities (García-Morales et al., 2021).

Educational staff worldwide lack the essential skills and preparedness to do online remote assessments. There is a clear need to equip and support educational staff in the methodologies, procedures, and tools for online assessment to maintain academic integrity and assessment security in an online learning environment.

Professional development and capacity building in terms of the policies and practices to mitigate instances of academic misconduct in an online environment are required (Gamage et al., 2020).

2.6.8 Decisions in terms of cost-effectiveness and efficiency

When making decisions about new educational technology, decision-makers need to consider the applicability of new technology in a specific context, with its associated cost and benefit implications, as well as possible side effects. New technological tools should be accompanied by effective instructional approaches and methods that will maximise the productivity of learning and increase cost and time efficiency. According to Serdyukov (2017):

> *"All technology applications require a solid theoretical foundation based on purposeful, systemic research and sound pedagogy to increase efficiency and decrease possible side issues." p.27.*

2.6.9 Change management

A clear vision for online teaching-learning involves a change in mindset involving all stakeholders including educators and students (Mishra et al., 2020). Change management needs to deal with the resistance experienced by learners and instructors when adopting new technology for learning-teaching. Resistance to change is dealt with through cultural interventions such as awareness programmes and IT skills enhancement programmes. It also must deal with the changes in processes, procedures and methodologies when using new technology in the learning-teaching process (Almaiah et al., 2020).

2.7 Theoretical underpinnings

The theoretical underpinnings provide the foundation to structure all aspects of the research process. Theories explain constructs, principles, concepts, and definitions that guide the research questions, literature review, and choice of research design and findings (Grant & Osanloo, 2014). This framework also demonstrates how important concepts and constructs from different theories unite through logical connections throughout the study (Varpio et al., 2020). The theories guide coding and analysis through making connections explicit, which increases the exploratory

power and legitimacy of qualitative research (Collins & Stockton, 2018). Merriam and Simpson (Rocco & Plakhotnik, 2009: 122) explain that theoretical frameworks demonstrate how the study advances new knowledge and provide a reference point for the interpretation of results.

The theoretical underpinnings for this study include models and concepts of an interdisciplinary nature. The interaction of concepts related to strategic planning, operational business performance, instructional design, and educational technology, are explored to understand the complex dynamics between strategy and learning with technology.

The BSC, related to strategic planning and business performance management, and the ADDIE model for instructional design, were specifically explored in terms of the interaction and interrelation of specific components inherent to the different models. The BSC was specifically selected because of its usefulness in a strategic context for operational business planning (Kaplan & Norton, 1993). ADDIE provides a generic framework for instructional design and guides the analysis of systemic elements in its operational context because of its system-oriented nature (Gustafson & Branch, 1997).

This section discusses the BSC, its conceptual foundations, and its application to educational contexts. Thereafter, ADDIE is explored in terms of its core capabilities in an online learning environment. Previous work highlighting the benefits of a superimposition of the BSC on ADDIE is briefly discussed, as well as important concepts of design thinking in online learning environments.

2.7.1 The balanced scorecard

The BSC can effectively be used to develop a strategy map that links strategy, technology, and learning. It addresses current and future performance and helps to identify critical success factors in key dimensions of business performance. These dimensions are contextualised in a “financial perspective, internal process perspective, learning and innovation perspective, and a customer perspective” (Kaplan, 2009 :p 4).

2.7.1.1 Conceptual foundations of the balanced scorecard

The BSC provides a comprehensive framework of critical areas in the business and how it links to a company's strategic vision and objectives. This visual picture links internal and external measures of operational performance with indicators of financial control.

The four perspectives of the BSC highlight the critical operational areas of a business to be successful in a competitive environment. The financial perspective contains traditional financial measures but can also include measures related to shareholder value. The customer perspective includes measures that will contribute to market share and customer satisfaction, e.g., customer management and market development. The internal process perspective focuses on core capabilities, product development and related internal processes. The innovation and growth perspective builds capacity through initiatives that aim to improve performance in the financial, process and customer perspective (Kaplan & Norton, 1993).

The BSC creates a visual map of the strategy of a company and is a tool to describe, communicate and implement the strategy. The guiding question for each perspective drives the strategic objectives for each perspective in the context of the overall strategy. The strategic objectives describe what the company wants to achieve through the different strategies in each perspective.

Table 2-3

BSC Leading questions and aspects to consider in each perspective

Perspective	Leading question	Aspects to consider
"Financial perspective" (Kaplan, 2009: p 4).	"To succeed financially, how should we appear to our shareholders?" (Kaplan, 2009: p 4).	Profit, return on investment (ROI), Shareholder value, revenue growth, risk management, productivity improvement.
"Customer perspective (Heart of the strategy)" (Kaplan, 2009: p 4).	"To achieve our vision, how should we appear to our customers?" (Kaplan, 2009: p 4).	Customer segments, value propositions for different customer groups. Products and services determine customer value propositions and segments

"Process perspective" (Kaplan, 2009: p 4).	"To satisfy our shareholders and customers, what business processes should we excel in?" (Kaplan, 2009: p 4).	Core capabilities, product development, productivity improvement in all processes.
"Learning and growth" (Kaplan, 2009: p 4).	"How will we sustain our ability to change and improve?" (Kaplan, 2009: p 4).	Culture and alignment, technology systems, employees

The impact of people's capacity, knowledge, skills and technology infrastructure on financial performance is not directly measurable. There is a chain of causal relationships with critical aspects in the process and customer perspectives, leading to financial performance. Value creation in a BSC map is influenced by the interaction of critical aspects within a perspective and across perspectives, linked by a simple vision and strategy. It is an aggregated view of causal relationships within an overall strategy (Kaplan, 2009).

The BSC is a performance management system. It communicates the strategy and aligns the activities and contributions of different areas and teams in the overall strategy. It measures operational performance in the short term while building capabilities for long-term competitiveness and sustainability. The strategic objectives of a perspective are linked to the capabilities of each perspective and are translated in terms of performance assumptions and targets. The BSC links the cause-and-effect relationship of performance drivers and outcomes to the overall strategy. Core output measures such as profitability and customer satisfaction are lagging indicators, while the leading indicators relate to the uniqueness of the business in terms of activities that will lead to profitability and customer satisfaction in certain market segments. Every output measure must have performance drivers to ensure that every member of the team understands how effort and performance drive overall outcomes. Measures must be consistent and mutually reinforcing. The BSC is also a mechanism for double-loop learning. Performance measures provide short-term feedback on progress towards long-term objectives. Assumptions regarding performance drivers and activities are revisited continuously to ensure the validity and alignment, of each aspect in the strategy map, and its contribution to strategy implementation (Kaplan & Norton, 1996).

2.7.1.2 The application of the BSC in higher education

The Baldrige Criteria for Performance Excellence in Education is congruent with the BSC in that it provides a measurement system with leading and lagging indicators of performance. These measures enable the continued monitoring of short-term results while building capacity and capabilities for the future. In a business environment, the bottom-line (lagging) results would be measured by financial indicators such as profitability and return on investment (ROI). In education, the bottom-line (lagging) measurement relates to student learning success. All the measures must link to the overall vision and strategic objectives of a business unit or institution (Karathanos & Karathanos, 2005).

The BSC enables educational institutions to translate their strategies into operational objectives, actions, and measures in line with strategic vision and core values. The leading questions of the BSC help institutions identify what matters to customers and stakeholders and how to become efficient and excellent in a competitive environment**.** Beard (2009) demonstrated how the Baldrige criteria for performance excellence in education can be integrated into the BSC (Beard, 2009)**.**

The BSC is an effective strategic management system in higher education and provides a tool to translate strategic vision into measurable objectives. It provides a balanced perspective of all internal activities and external demands and can be translated to different operating levels. The process of BSC development is highly participative and communicates objectives and targets coherently and transparently. It is effective for strategic management but also for day-to-day operational performance management (Hladchenko, 2015).

Chen et al. (2006) investigated the use of the BSC in tertiary education and found that effective strategic targets crystalise in strategic themes that can be categorised in the perspectives of the BSC. These strategic themes are associated with specific performance targets and measurements, related to core competencies, and can drive quality improvement and operational excellence in education. The targets and measurements allow staff members to understand how daily activities contribute to the implementation of an overall strategy.

Table 2.4 is the author's construct of a comparison between the BSC perspectives in a business environment in the first column (Kaplan, 2009; Karathanos & Karathanos, 2005), strategic themes in education in the middle column (Chen et al., 2006; Hladchenko, 2015) and the Baldridge criteria for Education in the last column (Beard, 2009; Karathanos & Karathanos, 2005) in an attempt to highlight the alignment of the different viewpoints in terms of the different perspectives of the BSC. The elements highlighted in the table were compared to findings from the literature review and thematic analysis of the interviews in terms of their usefulness and fit in an overall strategy map for learning.

Table 2-4

The BSC and Baldridge criteria for education

BSC Business (Kaplan, 2009; Karathanos & Karathanos, 2005)	**Strategic themes in education** (Chen et al., 2006; Hladchenko, 2015)	**Baldridge criteria for education** (Beard, 2009; Karathanos & Karathanos, 2005)
Financial Perspective		
Financial and market results ***Bottom-line result** Profit, ROI, Shareholder value, revenue growth, risk management, productivity improvement, liquidity, asset utilisation and operating margins.	Financial structure Income/sources of finance Efficient use of assets	Budgetary, financial, and market results Sources of funding (fees and subsidies) Expenses (Infrastructure, administration, and instruction) Growth in student numbers
Governance and Social Responsibility		
Governance and social responsibility Fiscal accountability, Social responsibility Ethical behaviour and trust Regulatory compliance Risk management		Governance and social responsibility Financial accountability Social responsibility Ethical behaviour and trust Regulatory compliance
Customer Perspective		
Customer results Satisfaction Product, service and delivery Loyalty Customer segments and value propositions	Customer expectation Satisfaction Image of institution	Student learning results ***Bottom-line result** Holistic appraisal of student learning (Alignment of objectives, methods and outcomes) Quality and relevance of assessment methods Student learning and development.

Process		
Product and service results Key performance metrics of products and services. Measures related to core capabilities, product development, and productivity improvement in all processes.	Excellent learning environment Usage of new information and communication technologies more consistently. Quality service administration Teaching facilities Quality of teaching.	Student-and-stakeholder-focused results Student satisfaction in terms of programmes, service features, delivery, and interactions. Satisfaction with the learning environment and support Quality of teaching and instruction. Quality of technology infrastructure.
Organisational effectiveness I Operational metrics Quality, productivity, and performance Measures related to suppliers and partners. Strategy implementation.	Quality management System for ongoing assessment of the processes according to the achievement of goals.	Organisational effectiveness Internal operations performance Measures. Measures linked to improvement of student development and performance. Measures related to student support, learning environment and climate. Measures related to supplier and partner performance Indicators linked to strategy implementation
Learning and growth		
Systems and employees Culture and alignment, technology systems, employees New product or service innovations. Performance improvement through learning. Up-skilling and knowledge sharing. Employee well-being and satisfaction. Collaboration.	Organisational learning and management Promote learning technology application. Continuous further development of the IT infrastructure to support goals that concern the quality of education and research. Establish a performance-leading culture (productivity). Increase staff quality.	Faculty and staff results Innovation in courses and educational programmes. Up-skilling and knowledge sharing. Employee well-being and satisfaction. Collaboration. Opportunities for continuous professional development.

Please note the indication of where bottom-line results reside in the different viewpoints. In a business environment, the bottom-line (lagging) results would be measured by financial indicators such as profitability and ROI; in education, the bottom-line (lagging) measurement relates to student learning success. The table indicates further that there is strong alignment in terms of financial objectives of income and effective usage of assets. There is also alignment in terms of processes to create excellent learning environments, aspects of organisational effectiveness and performance, and upskilling and continuous professional development.

Table 2-4 provides a comprehensive list of factors that can be considered when developing a strategy map for learning with technology. These elements were considered as part of the artefact design in Chapter 5.

2.7.2 The ADDIE Systems model

An analysis of instructional design with educational technology highlights elements related to operational performance. These elements inform the construction of the overall strategy map.

An effective instructional process needs to be responsive to a specific educational context. The purpose of instructional design models is to provide a conceptual representation of the systemic instructional process. Although many instructional design models exist, some core elements need to be present for instructional design to be effective. These elements are “analysis, design, develop, implement and evaluate” (ADDIE) (Gustafson & Branch, 1997: 4). ADDIE was chosen as a generic design paradigm for this analysis because it frames the comprehensive inclusion of progressive instructional steps in a systems environment.

Instructional models can be classified based on their purpose and usage. Gustafson and Branch (1997), classify instructional design models as classroom, product, and systems-oriented type models. Simsek (Donmez & Cagiltay, 2016: 371) classifies models in terms of their structure, namely, core, linear, flexible, communicative, heuristic and hybrid models. ADDIE is classified as both a product-oriented as well as a system-oriented model based on purpose and usage, and a core model based on its structure.

Learning interventions are designed systemically by using the phases of the ADDIE paradigm. The design of learning material for online environments involves the use of many emerging technologies. An analysis of the components of ADDIE in online learning environments highlighted some generic technology components to be considered (Allen, 2006; Durak & Ataizi, 2016; Khalil & Elkhider, 2016; Lee et al., 2017; Peterson, 2003; Sezer et al., 2013). Please see Annexure A for a comprehensive analysis of the contribution of various authors. The core capabilities derived from this analysis are listed in Table 2-5.

Table 2-5

ADDIE core capabilities for e-learning

Analyse	Design	Develop	Implement	Evaluate
Needs analysis. (Goals and objectives) **Learner analysis** (Learner characteristics) **Technical analysis** (Equipment, software, support) **Content Analysis** (Instructional analysis of methods and media for content delivery)	**Content outline** (Objectives and sub-objectives) **Instructional strategy** (Online pedagogy) Instructional methods and media **Communication factors** (Channels to support interaction) **Support services** (Announcements, chat, and messaging) **Course calendar and structure** **Course content and activities** (Digital content, assessments, and activities) **Technology substructure** (Infrastructure, connectivity, software, licenses) **Evaluation system** (Group tasks, security)	**Learning platform preparation** (Software installation and user-interface) **Course material development** (Synchronous and asynchronous material, digital media, visual elements, interactive features) **Acquisition of existing content** **Activity and assessment development** **Reflection tasks** (Reflection tools – blogs) **Prototype testing** (Test interaction and scaffolding) **Feedback systems** (Ongoing feedback to learners and instructors) **Instructors' manual**	**Introduction and use of system** (Navigation) **Communication of course objectives and expectations** **Support the learning environment** (Activity boards, logs and announcements) Availability of tech and equipment **Course completion** (Monitor progress) **Assessment completion** (Provide feedback) **Instructor monitoring and guidance** **Analyse and redesign**	**Formative** evaluation **Summative** evaluation **Course** feedback and impact **Operational** metrics

The analysis phase is specifically concerned with the goals and objectives of the learning intervention. The analysis of learner characteristics, specifically in terms of their technical competence, becomes important in a technological learning environment. The learning designer needs to understand the online learning environment in terms of software, applications, bandwidth, and access to equipment and devices (Durak & Ataizi, 2016; Lee et al., 2017; Sezer et al., 2013).

The design phase involves all aspects of the learning environment and leans strongly on an instructional strategy based on online pedagogical principles. The instructional media and methods, suitable in an online, interactive environment, are

considered. The communication factors for all interaction types between content, learners and instructors as well as processes and platforms for scaffolding and interaction are designed, and allow for support services, announcements, and chat capabilities. All course content is designed in terms of resources and digital documents. The assessment plan involves all learning activities and exercises as well as processes and forms. It further involves software rights and licenses and the technological substructure in terms of connectivity and (Allen, 2006; Durak & Ataizi, 2016; Khalil & Elkhider, 2016; Lee et al., 2017; Peterson, 2003; Sezer et al., 2013).

The development phases involve the preparation of the learning platform, software downloads, and installation configuration settings. The development of course materials involve different digital media and includes visual elements. Assessment activities and tasks include traditional exams, rubrics for projects and portfolios, and reflection tasks on different platforms e.g., blogs. The prototype includes formative and summative assessment, an instructor's manual, and electronic feedback systems (Allen, 2006; Durak & Ataizi, 2016; Khalil & Elkhider, 2016; Lee et al., 2017; Peterson, 2003; Sezer et al., 2013).

Implementation includes an instructional setting conducive to learning with support of the learning environment through activity boards, logs, and announcements. Students navigate through the learning systems easily and know where to find course materials and where to submit activities, assignments, and homework. The instructor monitors, guides and facilitates as learners complete the course (Durak & Ataizi, 2016; Khalil & Elkhider, 2016; Sezer et al., 2013).

The evaluation phase includes formative assessment and summative assessment, as well as operational performance measures of effectiveness, profitability, and impact (Allen, 2006; Durak & Ataizi, 2016; Khalil & Elkhider, 2016; Lee et al., 2017; Peterson, 2003; Sezer et al., 2013).

Kirkpatrick & Kirkpatrick (2019) measure training effectiveness on different levels. The first three levels measure if the training was well designed and well received, the degree to which skills were improved or behaviour and attitudes have changed if the learning was transferred to the job environment and if it relates to better on-

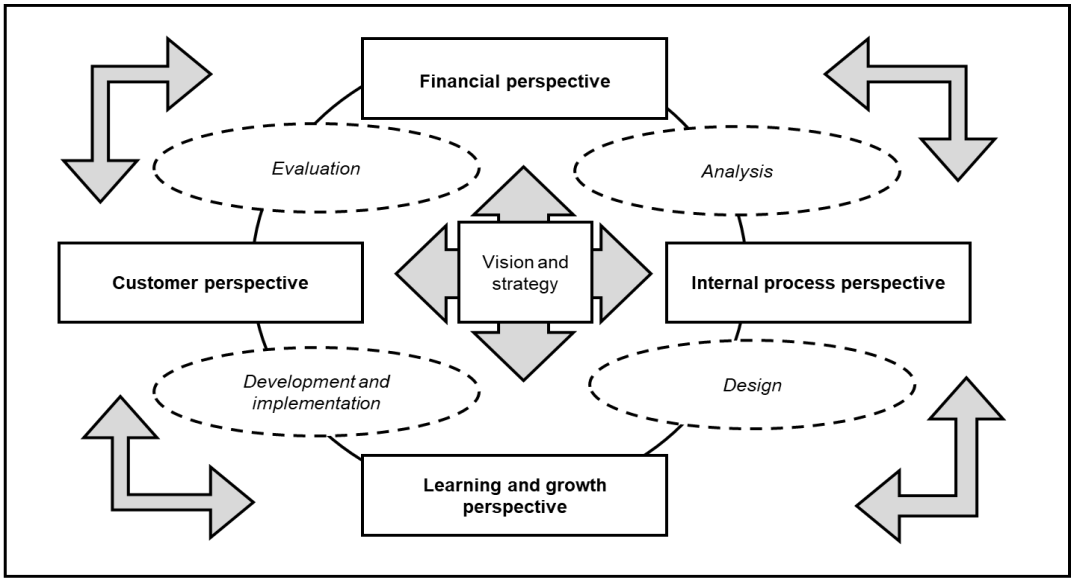
the-job performance. Kirkpatrick & Kirkpatrick refer to leading indicators on level four to indicate improvement in overall business performance. These indicators observe measurable results of critical areas that will contribute to overall systemic business performance and value (Kirkpatrick & Kirkpatrick, 2019).

2.7.3 Superimposition of BSC on ADDIE

This study builds on work previously done (Cronje, 2008), which introduced *The learning scorecard* model as depicted in Figure 2.9. In this model, the perspectives of the BSC are superimposed on the ADDIE elements of learning, proposing a holistic approach to align and integrate learning with business processes through a clear business strategy.

Figure 2-9

The learning scorecard



Note. "The learning scorecard" reprinted from Who killed e-learning, by J. Cronje, 2008, Instructional Technology Forum

The figure highlights the systemic processes of learning with the circle and ovals indicating the ADDIE phases. Learning cannot be operationalised without considering the business strategy and business needs, which are indicated by the elements of the BSC. The perspectives of the BSC are indicated with blocks and arrows, with the vision and strategy situated in the middle driving the integration of business objectives and learning activities. The vision and strategy determine the financial objectives. Learning then starts with an analysis of all aspects related to internal perspectives representing business processes and other business sources.

The development of learning then aligns with the learning and growth requirements. Development and implementation of materials and interventions allow staff to satisfy the needs of customers, contributing to financial performance. The arrows in the picture indicate the systemic iterative, non-linear influence of the different combined aspects of ADDIE and the BSC. Learning is closely integrated with vision strategy and other business processes.

2.7.4 Design thinking in learning environments

Further analysis of the integration of ADDIE in complex systems highlighted elements of design thinking. Agile methodologies, from a software development environment, were integrated with ADDIE in a study done by Budoya et al., (2019) to provide for the continuous iterative processes of software development in an e-learning environment. Battou et al., (2016) also discussed the agile learning design approach as an optimal design strategy for virtual learning environments. The agile learning approach focuses on collaboration and rapid prototyping in parallel iterative cycles. It requires an initial architectural design upfront to assist with problem identification and issue anticipation during the development process. Software functionalities are designed just in time through iterative modelling. Users are actively involved in the development of components and provide early and continuous feedback in the design and development process. All members of the team communicate and collaborate in a productive environment.

The concept of rapid prototyping is discussed by Tripp and Bichelmeyer (1990) as a viable alternative approach to instructional design. Rapid prototyping allows for modularity and plasticity. Technological innovation contributes to complexities in human-technology interaction and therefore many variations in different elements of a traditional ADDIE design process. The traditional instructional design process offers a solid foundation for linear design activities, but effective and efficient design can be enhanced through the integration of rapid prototyping. Rapid prototyping allows for parallel cycles of research, design, development, and implementation of modular components. Modularity allows changes to a segment or unit without affecting the unit as a whole. Plasticity refers to the time and cost efficiency of such changes. The approach is feasible and compatible with real-world design processes.

The concepts of rapid prototyping and agile development are prominent constructs in design thinking. Design thinking involves complex systemic processes where innovation cycles are quick, iterative, and practical. It provides insights into environmental dynamics that could lead to innovation, offering solutions to complex problems. It oscillates through cycles of problem identification, ideation, and implementation. Rapid prototyping leads to short-term incremental or long-term revolutionary innovation, which is a source of differentiation and competitive advantage (Brown, 2008).

Design thinking is a creative analytical process of problem identification, sense-making, solution design, prototype modelling, feedback, prioritising concepts, and improvement to the design. It focuses on analysing and synthesising content and process factors. Solutions are communicated through symbolism, diagrams and complex graphic descriptions and representations of problems and solutions in context. It deals with real-world problems in a situated environment. The solution concept is constantly evolving based on feedback. Conceptual models form abstract conceptualisations of how design issues are dynamically related to one another in a specific domain. The process is iterative and exploratory, sometimes chaotic, and non-linear (Razzouk & Shute, 2012).

The integration of elements of ADDIE and the BSC could potentially provide an optimal strategy map for learning with technology. The literature review provided the necessary elements to include in this strategy map, and further research was done through qualitative analysis to derive at a conceptual model in the form of a strategy map.

The integration of ADDIE components with BSC perspectives creates a complex map of dynamic factors and should be analysed and synthesised in iterative cycles to provide a solution to the main and secondary research questions. DSR was therefore chosen as an appropriate research approach to solve the research questions. The DSR approach is discussed in more depth in Chapter 3.

2.8 Summary

This study aims to understand the strategic dynamics of elements related to learning with technology in a complex multidimensional environment. The complex environment is investigated from a strategic perspective.

This chapter started with identifying the problem driving this study, its situational context, the literature search process, and the research questions. This resulted in an analysis of the current trends in the external environment regarding emerging educational technology. The operationalisation of emerging technologies and current practices are discussed and include themes such as blended, collaborative, and immersive learning environments. Challenges in online assessment and the role of AI in education, adaptive learning through data analytics and large language models are discussed. Some challenges with micro-credentials are also highlighted. Every theme contains elements to be integrated with an overall strategy map.

The chapter continued with a discussion of variables in the internal environment required to operationalise new technology in practice and discussed value chain activities, core capabilities and components of an effective technology eco-system. An analysis of the literature post-COVID on emergency remote practices highlighted challenges and recommendations, to consider in an overall strategy map for learning with technology.

Lastly, the chapter discussed the theoretical lenses that provided a structure for analysis to answer the research questions. The BSC and its application as a strategy tool was discussed, as well as the ADDIE systems model for learning design. The chapter concluded with a reference to the superimposition of the BSC perspectives on ADDIE phases in previous work, and elements of design thinking in learning design.

The chapter provided a comprehensive analysis of the internal and external environment for learning with technology, as well as the theoretical lenses, and provided a grounding for the research methodology to be discussed in Chapter 3.

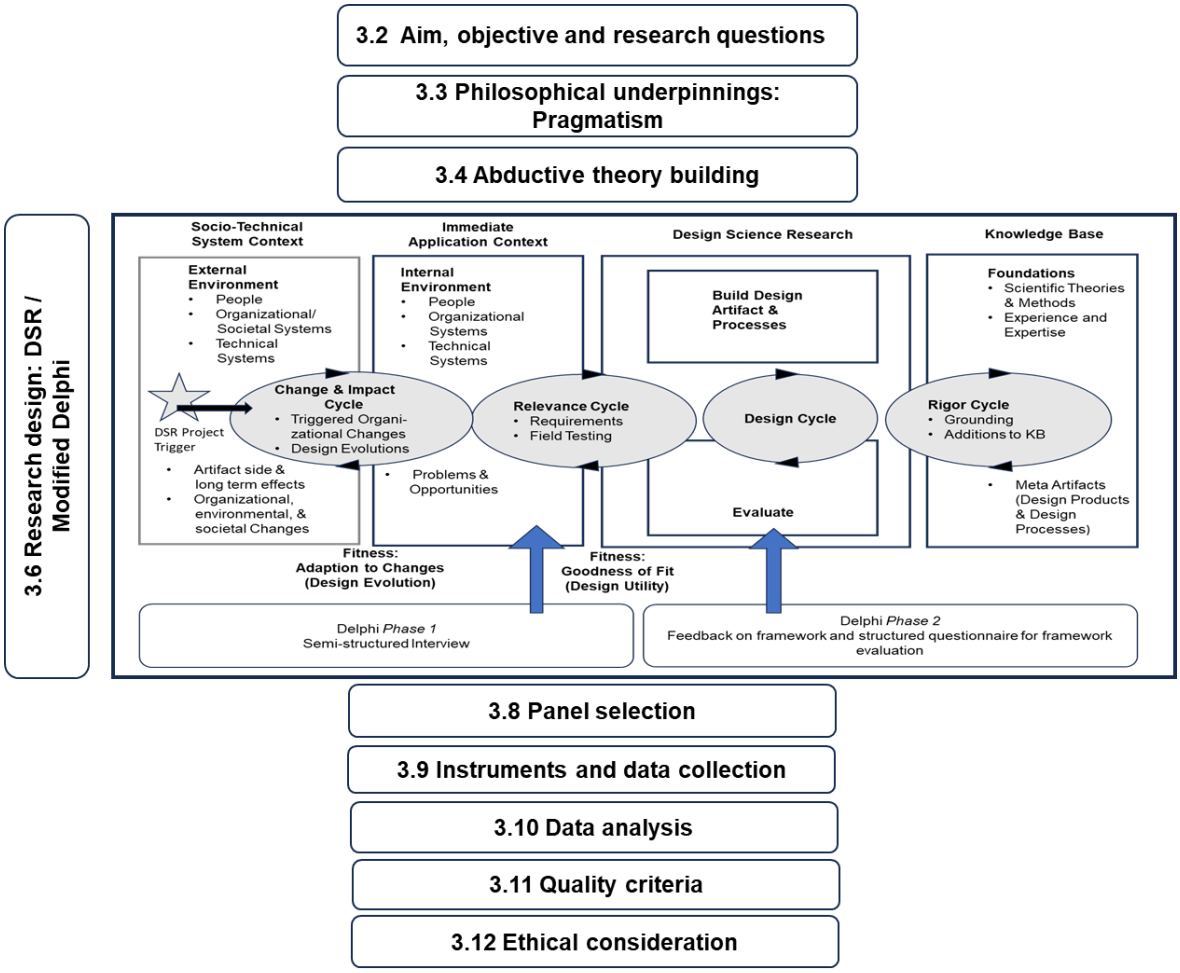
3. CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the methodological aspects of this study. Figure 3-1 gives a visual representation of a roadmap for this chapter.

Figure 3-1

Chapter outline



The chapter reiterates the research aim, objective, and research questions (Section 3.2) and then elaborates on the philosophical underpinnings of the pragmatist paradigm (Section 3.3). It further describes the qualitative abductive approach to theory building (Sections 3.4 and 3.5) and the research design (Section 3.6). The sampling strategy is discussed in Section 3.8, while the instruments and data collection are discussed in Section 3.9. Data analysis is discussed in Section 3.10

The chapter concludes with a discussion on quality criteria (Section 3.11) and ethical considerations (Section 3.12).

3.2 Aim, objective, and research questions

The aim of this study is to contribute to knowledge about strategic thinking in learning with technology, and specifically the use of the BSC as a strategy tool to explain the complex systemic dynamics between learning with technology, operational business performance, and strategic planning.

The objective is to develop a strategy map to guide strategic choices and decision-making in terms of technology adoption and integration, and to outline critical dimensions and associated success factors contributing to operational business performance.

The primary research question is: “How does strategy development occur through the dynamic interaction of strategy with learning, and technology integration? “ The answer is achieved through the following secondary research questions:

a) What are the elements to consider in a strategy map for learning with technology?
b) How do these elements influence each other in the overall strategy map?

3.3 Philosophical underpinnings

The study was approached with the orientation of a pragmatic philosophical worldview. It was conducted in a multi-dimensional environment where technological, cultural, and socio-economic factors influence organisational systems in terms of aspects related to learning with technology. The study explores the context through the lenses of existing theories to construct new theories, ideas and solutions for future action and organisational improvement.

The choice of a research paradigm frames the beliefs and assumptions that drive all aspects of the research project. This section discusses why the choice of an appropriate paradigm is important and then elaborates on the ontological and epistemological assumptions of pragmatism.

3.3.1 The role of paradigms in research

A paradigm is a set of beliefs and assumptions relevant to the research project that inform the practical choices when designing and conducting research (Kivunja & Kuyini, 2017). It frames the philosophical thinking about the nature of reality (ontology), the nature of knowledge (epistemology) and how the values of the researcher (axiology) impact the study (Creswell & Poth, 2016). The philosophical paradigm forms the basis for methodological choices and the interpretation of findings (Mackenzie & Knipe, 2006; Morgan, 2014).

3.3.2 Ontological assumptions of pragmatism

Ontology conceptualises how things are in reality (Kivunja & Kuyini, 2017) and describes how things are perceived to be. This study has a multidimensional context and includes concepts in a business management environment and related organisational dynamics (Creswell & Poth, 2016).

In a multidimensional context, the environment consists of social, historical, and political influences that contribute to a non-singular reality ontology where individuals within organisations can have a unique interpretation of what reality means to them, based on their previous experiences (Feilzer, 2010; Kivunja & Kuyini, 2017).

In this context, experience in action is valued because of its practical consequences. People and organisations are constantly adapting the way they work, and the way they fit in the world, based on past understanding and experiences. The environment is rich and complex, and processes are constantly in flux (Johnson & Onwuegbuzie, 2004; Morgan, 2014; Saunders et al., 2019)

3.3.3 Epistemological assumptions of pragmatism

Pragmatism has a strong problem-centred orientation that informs the choice of research approach, instruments, data collection and analysis techniques. It focuses on the “what” and “how” of research and its intended outcome (Creswell & Poth, 2016). Experience is a source of knowledge that can contribute to the solution of real-world problems. It provides information on processes of decision-making

situated in the organisational context, where meanings and experiences link to complex problem-solving and action (Kelly & Cordeiro, 2020).

Pragmatism is about practical solutions to real-world problems that inform future practice (Johnson & Onwuegbuzie, 2004; Kelly & Cordeiro, 2020; Rahi, 2017; Saunders et al., 2019). Knowledge produced is relative and not absolute; it should support action but is only relevant in its context (Feilzer, 2010).

Theories are instrumental in problem-solving based on their relevance and applicability in context. Knowledge is provisional truth and can change when circumstances or dynamics change over time (Johnson & Onwuegbuzie, 2004).

The choice of pragmatism as a paradigm is congruent with the values and beliefs of the author, that practical solutions to real-world problems in a contextual environment are influenced by the knowledge and experience of multiple parties situated in the contextual environment.

3.4 Abductive theory building

This study is built on the premise that the BSC is highly effective as a strategy tool where technology plays a determining role in terms of innovation and business performance. The proliferation of technology in a learning environment is explored in the context of the systemic influences on performance and efficiencies. Themes and patterns emerged during data collection and analysis that correlate well with the perspectives of the BSC. These findings were used to modify and adapt the use of the BSC in such a way that a strategy map for learning with technology could be derived. The strategy map can be generalised to any context of learning with technology.

Organisational life is complex, but different theories can inform our conceptualisation and understanding of organisational processes and structures that impact behaviour. A continuous back-and-forth between these theories and data from the environment reinforces links between theories and data and strengthens research findings. This interplay between observations in the empirical world with conceptual theories is known as abduction. Theories provide a framework

for analysing complex, rich data to find causal links that appear plausible. These links are then interpreted to explain causal conjunctures and consequences (Van Maanen et al., 2007).

Abductive analysis leads to creative conclusions about surprising facts in the evidence through a methodological data analysis that involves a back-and-forth interaction between data and theory. New theory is constructed based on findings against existing theories. Abduction seeks situational fit between observations and rules (Timmermans & Tavory, 2012).

Existing theories influence coding and thematic development in data analysis. The clustering of themes is guided by the theoretical framework. Coding and themes highlight patterns and relationships in the data, which eventually get woven into the conceptual storyline (Thompson, 2022).

3.5 Qualitative approach

The study is predominantly qualitative in its approach, supported by some quantitative data in the artefact evaluation phase. It uses qualitative inquiry as an approach to complement the iterative cycles of DSR. The study seeks to explore the unique perspectives of research participants in terms of known concepts (such as the BSC and ADDIE) to gain insight and an in-depth understanding of the complex dynamics of different aspects of strategy and learning with technology.

The qualitative characteristics of the study, as described in Bogdan & Biklen (2007) and Flick et al. (2004), are evident in the rich information collected from participants in their situational context. The diversity of participants provided perceptions and meaning patterns in their socio-economic structures and institutions. The researcher was involved through subjective understanding and interpretation of phenomena related to the research problem, and through iterative processes of reflection and collective sense-making, contributed to the construction of an alternative reality. Data analysis was bound to contextuality and focused on discovery and theory formulation through thematic analysis.

The small number of participants provided a rich account of experiences and opinions in context and provided information for verbal analysis rather than statistical analysis. The instruments and processes supported the pragmatic orientation of the research approach and design, and the flexible abductive approach as described in Hammersley (2013).

3.6 Research design

The study was conducted in a multidimensional environment of external socio-technical dynamics as well as internal organisational dynamics. The iterative cycles of design thinking were central to the research design. The use of expert opinions during the research process was an important determinant of the success of the framework.

3.6.1 Design Science Research

In the early literature, DSR was described in terms of three iterative cycles, namely the relevance, design, and rigour cycles. The relevance cycle links with the contextual environment where the problem is identified. This is also the same environment where the solution is tested. The design cycle is the essence of DSR and is concerned with the building and evaluation of the artefact. The rigour cycle connects the theories and frameworks in the existing knowledge base to the development of an artefact for problem resolution (Hevner, 2007; vom Brocke et al., 2020). Theories play an important role in conceptualising the problem and framing existing solutions that can be applied in different contexts (Venable, 2006). The change and impact cycle was later added as another dimension to the model (Drechsler & Hevner, 2006).

DSR is a non-linear process model consisting of 6 steps. Step 1 starts with the identification of the research problem, followed by setting objectives for the resolution of the problem in step 2. Step 3 is concerned with designing and building the artefact to solve the problem, and step 4 demonstrates how the artefact is operating in its context. Step 5 evaluates the artefact, and the results of the DSR project are communicated in step 6. Design and evaluation of the artefact can follow a cyclical process (Hevner et al., 2004; Peffers et al., 2007).

The different types of artefacts of DSR are broadly classified in terms of “constructs, models, methods, and instantiations” (March & Smith, 1995: p 255). Peffers et al. (2012) also added algorithms and conceptual frameworks or meta-models to the classification.

Evaluation of the artefact can happen during the DSR process or after implementation. Different criteria for evaluation apply for different steps of the DSR process. During problem identification, evaluation criteria might include relevance and feasibility. Criteria related to simplicity, clarity and consistency will apply during the design phase, while effectiveness and efficiency will be measured during or after implementation (Hevner et al., 2004; Peffers et al., 2007). Evaluation methods for artefacts include expert opinions, technical experiments, development of a prototype, a case study or an illustrative scenario (Peffers et al., 2012). In a study on evaluation methods for artefact types, Peffers et al. (2012) found empirical evidence that a framework can effectively be evaluated through a panel of experts through a Delphi study.

3.6.2 Delphi

The Delphi technique is a group communication technique, structured to solicit the opinions from a group of experts regarding a specific complex problem (Linstone & Turoff, 1975).The techniques have been developed to facilitate interaction and group dynamics while maintaining the anonymity of respondents. If respondents are known to each other, direct confrontation regarding a specific matter could lead to the risk of conforming to the opinions of others or withholding controversial opinions. The technique uses structured feedback to ensure that all participants get relevant and applicable information and reduces unnecessary “noise”. The structured feedback allows participants to reflect and revise their own opinions. The group responses are then analysed statistically (Dalkey, 1969; Dalkey & Helmer, 1963). The Delphi technique has evolved in terms of how it is applied in different fields, and many variations exist (Linstone & Turoff, 1975).

The Delphi method is widely used in framework development and theory building. The experiences and opinions of experts in a variety of settings extend the empirical evidence and provide for generalisability. The iterative cycles of the Delphi

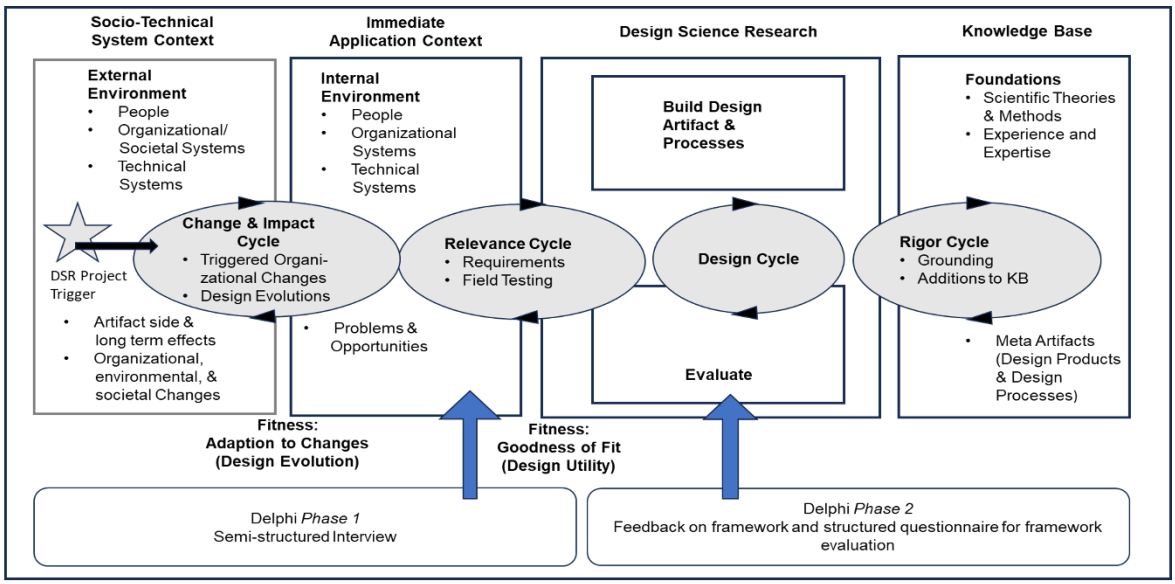
technique provide experts with the opportunity to develop a collective understanding of a theory and to provide feedback on components thereof. This can enhance practice as well as theory and contribute to construct validity (Okoli & Pawlowski, 2004).

3.6.3 Integration of Design Science Research and Delphi

The research design integrated the different cycles of DSR with activities informed by a modified Delphi technique. The research design assumed that the outcome of the study would provide solutions to real-world problems in its organisational context. This study adopted the four different cycles of DSR as a guiding framework for research (Drechsler & Hevner, 2006).

Figure 3-2

Integrated DSR and Delphi process



Note: Adapted from "A four-cycle view of Design Science Research" reprinted from A four-cycle model of IS design science research: capturing the dynamic nature of IS artefact design. By Drechsler, A., & Hevner, A.(2016), In Breakthroughs and Emerging Insights from Ongoing Design Science Projects: Research-in-progress papers and poster presentations from the 11th International Conference on Design Science Research in Information Systems and Technology (DESRIST) 2016. St. John, Canada, 23-25 May (p5). Copyright (2016) by The Author(s).

Figure 3-2 illustrates how the different Delphi phases overlapped with the DSR cycles. The grey cycles depict the different cycles of DSR. The context of the different cycles is indicated by the blocks around the descriptions, e.g., socio-technical context, immediate application context, DSR, and the knowledge base. The Delphi phases are illustrated at the bottom of the picture and the arrows indicate where the Delphi technique overlapped with DSR. The Delphi characteristics of

anonymity, structured feedback and statistical response were integrated with the iterative design cycles of DSR.

The change and impact cycle represents the external environment and represents the socio-cultural dynamics resulting from emerging technological advances. The relevance cycle represents the contextual environment of real-world problems and consists of people, organisations, and technology where problems and opportunities originate and are identified. It is also known as the immediate application environment, and in the context of this study, the internal organisational environment. The relevance cycle is specifically concerned with the problems and opportunities related to strategic elements influencing the operationalisation of learning with technology. The design cycle represents the design and evaluation of an artefact that will solve the problems identified in the relevance cycle. The rigour cycle contributes to the existing knowledge base by adding new experiences, expertise, products, processes, and theories to the existing knowledge base.

The research process started with a comprehensive literature review, in Chapter 2, of the dynamics in the external and internal environment related to the research question and links closely with the change and impact cycle. The literature review guided the semi-structured interview in the first Delphi phase. The first phase of Delphi was mainly concerned with the identification of problems and opportunities in the external and internal environment and links with the relevance cycle. The theoretical framework of this study informed the abductive structure, based on the ADDIE model and BSC guiding themes and perspectives that were used for the thematic analysis of the interview transcripts. Findings from the literature review complemented by the findings from the thematic analysis were used to create the artefact. The artefact for this study is documented in Chapter 5. This artefact was communicated to Delphi participants in a second phase of research through a video presentation. The artefact was evaluated in terms of its fit and utility in an organisational context through a structured questionnaire. The design and evaluation of the artefact coincided with the design cycle. The contribution to the knowledge base is documented in Chapter 6 as a strategy development framework for learning with technology, a hypothetical strategy map for learning with technology and a recognition of the current operational focus areas for learning with

technology. Figure 1-1 in Chapter 1 shows how the study progressed through the cycles and how it is documented in the relevant chapters.

3.6.4 Justification for research design

The study specifically adopted the four-cycle view of DSR because of the illustration of the external situational context through the change and impact cycle. The study analysed both the external and internal contextual environments to understand the inherent strategic dynamics relevant to the research problem in support of the research questions.

The combination of DSR and the Delphi technique in this study was specifically chosen because of the relevance of the different processes to strategy development. Design thinking in instructional design is an acceptable and beneficial practice, as discussed in Section 2.7.3, while the Delphi technique is widely used in theory-building practices and strategy processes as discussed in Section 3.6.1. The anonymity of participants was also an important ethical consideration of the study. The Delphi technique ensured this anonymity but also provided a mechanism to build consensus and alignment towards the outcome of the study.

3.7 Time horizon

The study is a snapshot of the current internal and external environment of learning with technology at a specific time. Saunders et al. (2009) frames this type of study as a cross-sectional study. Significant technological changes and transformations in learning with technology occurred during and after the coronavirus disease in 2019 (COVID-19). Some of these challenges and recommendations were discussed in Section 2.6. Participants were equally impacted by these changes, and the study gives an indication of the elements impacting on learning with technology in the three to five years after COVID-19.

3.8 Sampling strategy – the Delphi panel

Purposive sampling was used to identify participants to form part of the Delphi panel. Panel members participated in two phases of panel processes remotely, via electronic platforms. Participants were selected based on their unique understanding of complex phenomena in context and were considered “information-

rich" individuals (Patton in Onwuegbuzie and Leech, 2007). Table 3-1 highlights the selection criteria that were used to ensure that participants came from specialist clusters or managerial levels in the field of learning with technology. Participants also came from different business and educational environments, and contributed to context-rich findings that were used in the development of the strategy development framework in Chapter 5.

Table 3-1

Selection criteria for Delphi panel members

Criteria	**Challenge – where to find respondents**
Strategic insight and futuristic mindset	Strategy specialist
Key decision-makers in shaping systems to drive change, new methods, and policies	Directors, divisional managers
Instructional design experts with knowledge of emerging technologies and applied technical expertise.	Senior instructional design specialists

Members were further selected based on their professional qualifications, academic rank, interest in the subject matter of the study, and willingness to participate. Some panel members were requested to participate based on their participation at other academic conferences or forums. LinkedIn was also used as a recruitment platform.

The researcher facilitated the debate through the research instruments and structured feedback. The anonymity of participants was respected at all times, and participants remained anonymous to all other participants throughout the process. The panel selection was conducted in line with recommendations by Avella (2016). Table 3-2 describes the individual profiles of panel participants.

The names of participants were completely removed from the research report, and numbers alone were allocated to participants so as to maintain their privacy and anonymity in the study.

Table 3-2

Panel members of the Delphi-panel

Nr	Institution	Role and profile	Academic rank/position
1	Distance education institution SA	Managing director/ instructional designer The company sells courses online. The courses are mainly focused on Accounting, HR, Occupational Health, and Safety. The focus is on courses that sell in high volumes and have a high ROI. A small number of course are custom designed.	Managing director
2	Learning design and delivery company (International)	Managing director/ instructional designer All courses are designed based on client needs. Focus is on mobile learning and on-the job training initiatives as well as compliance training.	Dr
3	Private university in SA	Head: Instructional design University has a clear strategy for student segmentation and online design blueprints for different online modalities.	Dr
4	Public university Africa	Coordinator: Institute of distance education University is exploring alternative delivery channels. Focus is on providing guidelines for expanding online offerings and providing basic literacy programmes.	Dr/ Prof
5	Public university SA	Head: Instructional design A central design unit develops most of interactive and multimedia learning materials. The design unit works in multidisciplinary teams to facilitate design and implementation.	Dr
6	Government education department	Head of policy and implementation Participant is responsible for national guidelines and policies on infrastructure deployment in government schools. Responsible for change management and change agent training.	Dr
7	Private school UAE	Head of data management Participant mainly responsible for data management and facilitates technology infrastructure decisions at a private school in Dubai.	Senior manager

3.9 Instruments for data collection

The study used semi-structured interviews in the first phase of Delphi, as well as structured questionnaires in the second phase of Delphi, as research instruments. The interviews were used as part of the relevance cycle of the DSR process, while the structured questionnaires were used as part of the design cycle to evaluate the framework. Ethical clearance was obtained prior to engagement with any of the participants. Participants received a letter of invitation to participate in the study,

stating the objectives of the study, expectations in terms of their contribution, and the time commitment required. Respondents had to return a signed letter of consent.

3.9.1 The semi-structured interview

The researcher conducted interviews with participants during the first phase of the Delphi process. The interviews were used to explore abstract strategic phenomena in the context of learning with technology through interactive conversation. The responses of participants varied based on their unique understanding of current and future reality. Hoepfl (1997) suggests a semi-structured interview that allows the researcher to probe and explore within predefined areas and themes. The focused interaction allowed for comprehensive and systemic interviewing of multiple participants, while allowing individual variations in responses.

The researcher has a solid background in strategy development. The interview was structured around open-ended questions categorised into different themes or strategic concepts. The strategic concepts linked to variables in the theoretical models used for this study. The questions were also designed to verify and confirm the internal and external factors of learning and development identified in the literature review.

Table 3-3 gives an indication of the concepts that were explored during the semi-structured interview. The interview protocol is added in Annexure C.

Table 3-3

Interview schedule of semi-structured interview

Strategic concept	Themes to explore
Changes in learning design and delivery as result of emerging technologies	Awareness of emerging technologies in learning (tangible or intangible) and current application of new technologies. Changes in instructional design and delivery practices because of technological change. (Focus on ADDIE) Anticipated changes in customer expectations, delivery mechanisms and operational systems.
Driving forces of change	Factors driving or inhibiting change in operational practices. (Focus on BSC perspectives)
Current operationalization (strengths and weaknesses)	Strengths in learning design and delivery Areas for improvement

Strategic choices (opportunities and threats)	Scale and impact of change Potential strategic choices
Critical success factors going forward.	Measurement of success

The interviews were conducted via Microsoft Teams and were recorded. All interviews were transcribed with Microsoft Word and were returned to the participants for validation. The anonymity of all respondents was respected, and the respondents remained anonymous to other respondents throughout the process.

3.9.2 Structured questionnaire

Delphi panel members completed a structured questionnaire on Google forms in the second Delphi phase of the research. The purpose of the structured questionnaire was to evaluate the designed strategy development framework. The questionnaire used a 4-point Likert scale to measure agreement in terms of statements about the artefact fitness and usability. They were asked to indicate on what level in the organisation the strategy development framework will be used, and were also asked open-ended questions about the completeness of the model and if there were any redundancies they had identified. Table 3-4 indicates the questions related to the artefact, which is the strategy development framework.

Table 3-4

Questions related to the artefact

Criteria	Question
Artefact fitness – strategic level (4-point Likert scale)	a) The proposed model makes sense in terms of its strategic importance. It is clear and understandable. b) The model can be adapted to the context in which it is applied. It is maintainable and transferrable.
Artefact utility – operational level (4-point Likert scale)	a) The model can be operationalised to contribute to operational effectiveness and efficiencies. b) The model contains sufficient levels of detail. (Not too high a level, not too granular)
Applicability – on what level in the organisation will it be used (Tick box)	a) Strategic b) Management c) Operational/ Practice
Completeness of the model (Open ended question)	1. Are there any elements that have been omitted and that you would like to add to the model?
Redundancies (Open ended question)	2. Are there unnecessary elements that can be omitted.

Participants were also asked to indicate agreement in terms of the operational focus areas which were identified during the data analysis phase and documented in Chapter 4, Section 4.5. Participants had to rate their agreement on a 4-point Likert scale. The operational focus areas included on the Likert scale are indicated in Table 3-5. The questionnaire is included as Annexure D.

Table 3-5

Operational focus areas indicated on Likert scale for rating

Perspective	Operational focus areas
Financial perspective	a) Optimise profitability through the diversification of income streams and the management of infrastructure and operational cost. b) Non-financial - Improve the learning and teaching experience through optimising efficiencies and productivity through using ed-tech technologies.
Customer perspective	a) Develop an optimal basket of blended learning interventions through a centralised design unit. b) Ensure comprehensive analysis of student personas and student journeys based on unique technology profiles and other student analytics.
Process perspective	a) Develop and online design blueprint, incorporating design principles, instructional strategies, and constructive alignment of learning objectives and outcomes with the use of edtech tools and instruments. b) Develop learning materials based on principles for multi-media development for optimal delivery across different modes (synchronous, asynchronous, online, face-to-face etc.). c) Implement learning interfaces according to principles of navigation and support (learner, social and technical).
Learning and growth perspective	a) Plan for the optimal technology architecture (LSM and stand-alone tools and components) and ensure continuous support and management of the platform. b) Continuous professional development in terms of an online pedagogy which includes instructional design skills, writing skills, technical design skills, curriculum design skills. AI literacy and AI assessment literacy as part of the continuous professional development. c) Develop components for a basic technology usage and skills programme. The programme is for learners and educators involved in learning with technology.

A 4-point Likert scale was chosen for the questionnaire because of the ease of construction and interpretation. The even number of options in terms of agreement provides a forced choice and eliminates the “neutral” position. Participants had to choose a level of agreement on an ordinal scale ranging from “strongly disagree”, to “disagree”, “agree” and “strongly agree”. This type of measuring scale is ideal for

measuring fewer concrete concepts (Allen & Seaman, 2007; Clason & Dormody, 1994; Sullivan & Artino, 2013)

3.10 Data analysis

3.10.1 Thematic analysis of interviews (Phase 1)

The data analysis software program, Atlas.ti was used for thematic data analysis. The perspectives of the BSC and the systemic processes of ADDIE were used to create an abductive structure for thematic data analysis. Interview transcripts were coded in vivo with the abductive structure in mind. Open coding resulted in emerging themes, which were categorised through axial coding. Axial coding meant searching for causal conditions, response patterns or situational factors that link certain themes together. Selective coding was used to allocate different categories of phenomena into super-categories that aligned with the BSC perspectives. This process was borrowed from the grounded research approach as described in J. Creswell and Poth (2016). Figure 3-3 gives a visual description of the coding tree as it was applied in data analysis.

Figure 3-3

Example of coding tree

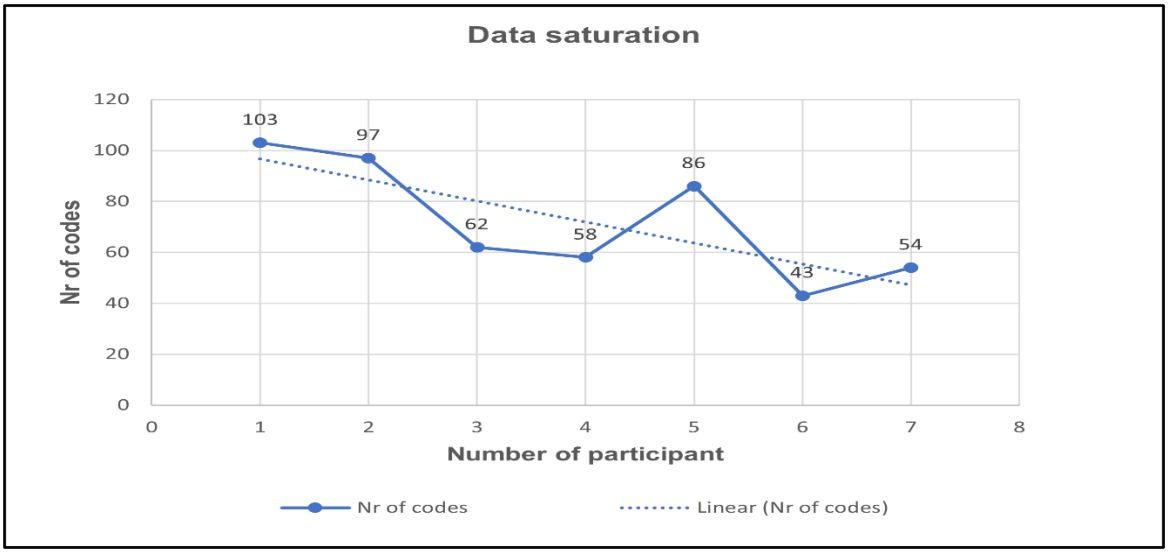
Type of coding		Open coding	Axial coding	Selective coding
Categorisation	Concepts	Themes	Categories	Cluster-categories
Example	ChatGPT	AI Literacy	Online pedagogy	Learning and growth perspective

Concepts were grouped into themes, and themes were categorised and then sorted in cluster categories resembling the perspectives of the BSC. This process is described in more detail in Chapter 4, Section 4.2.

All interviews were coded, and data saturation indicated a constant decline as the interview process progressed. Figure 3-4 gives an indication of the data saturation. The first interview contributed 103 in vivo codes and was also the interview with the highest number of codes. The interview with the lowest number of codes contributed 43 codes.

Figure 3-4

Data saturation



A strategic framework emerged, as the complex interaction of different categories and variables were used to develop a storyline on the complex interwoven strategic reality (Strauss & Corbin in Hoepfl, 1997).

A BSC visual map emerged as all the different codes were linked to relevant categories in the abductive structure. This visual map is presented in Chapter 4, Section 4.4.4. Please refer to Annexure F for a detailed code book of the study.

3.10.2 Framework evaluation through structured questionnaire (Phase 2)

The framework was evaluated by Delphi panel members in phase 2 of the research through a structured questionnaire on Google Forms. The questionnaire is included in Annexure E. A PowerPoint presentation was given, based on an abstract of key elements of the framework presented in Chapter 5. The researcher was conscious of the fact that it was the second time that panel members were involved in research activities and hence tried to keep the presentation at an optimal length of 10 minutes. A video of the presentation was recorded and uploaded onto YouTube. Participants received an e-mail with links to the video presentation as well as the questionnaire on Google Forms. The framework was called a “model” in the presentation and the operational focus areas were labelled, “strategic objectives”. These changes in

terminology were effected after the evaluation and do not change the essence of the presentation or framework.

Seven participants were involved in the first phase, although only five panel members opted to participate in the second phase. The communication was sent to all seven panel members, and a follow-up WhatsApp message with the links to the video and questionnaire was sent to panel members again. The two participants who did not participate in the second phase also received another short reminder on WhatsApp. The researcher decided to respect the non-responses of the participants and decided not to follow up again, but to interpret the results that were received from the other five panel members.

The overall framework was evaluated in terms of its fitness and utility in its environmental context and included aspects such as completeness of the framework, level of detail, its robustness and internal consistency (March & Smith, 1995) . The participants were further asked to rate their agreement in terms of the proposed operational focus areas of the strategy map constructed from their input and participation in the interviews in phase 1. Please refer to the discussion in Section 3.9.2 for details in terms of the questionnaire. The questionnaire is also included as Annexure D.

Descriptive statistics were used to analyse and present the measurement of individual items on the Likert scale. Data were summarised as counts or mean scores. Only five participants completed the questionnaire and that is why data was not presented as percentages. The analysis is presented by means of bar charts. It is non-comparative and unidimensional as it analyses responses in terms of single statements (Allen & Seaman, 2007; Clason & Dormody, 1994; Sullivan & Artino, 2013). The evaluation results are discussed in Chapter 4, Section 4.6.

3.11 Quality criteria for this study

This study explored complex systemic factors in the strategic domain of learning with technology from the perspective of participants, selected to form part of the Delphi panel. The reflexivity of the researcher played an important role in the interpretive rigour of the study. To this end, care was taken to implement procedural

rigour in terms of the research design, sampling strategy, analytical approach, and interpretation of findings. The specific quality criteria are discussed in terms of validity and relevance, and trustworthiness.

3.11.1 Validity and relevance

Respondents were selected through purposive sampling, based on their unique understanding and involvement in learning with technology. Savenye and Robinson (2013) argues that purposive sampling increases the relevance of the study. The validity of a study refers to the “truth” of a study (Savenye & Robinson, 2013) or the honesty and genuineness of the research data (Anderson, 2010). Research techniques such as respondent validation and constant comparison contributed to the validity of the study. Constant comparison contributed to the identification of additional themes throughout the research process (Anderson, 2010).

3.11.2 Trustworthiness

This study adopts the criteria of credibility, transferability, dependability, and confirmability as optimal measures of trustworthiness, as described in Guba and Lincoln (2001).

3.11.2.1 Credibility

Credibility was achieved through the prolonged involvement of members of the Delphi panel in different phases of the research process. The iterative cycles of DSR required the continuous checking of findings from the literature with results from the first-round interviews. In a process of progressive subjectivity, findings from the literature review and interviews, were analysed according to the abductive analytical structure informed by the BSC and ADDIE theoretical frameworks. The results were then provided back to panel members through a structured video presentation. Panel members did have the opportunity to verify the framework/conceptual model and to provide constructive feedback. Hoepfl (1997) argues that credibility refers to the researcher’s attempts to represent multiple realities in a cohesive way.

3.11.2.2 Transferability

The purposive sampling strategy ensured that respondents represented different contexts within the broader domain of learning with technology. Respondents

represented business institutions, internal schools, private and public universities, and government. The second phase of the research requested the participants to evaluate the framework that was developed from their responses. The contextual variations were reasonably integrated as part of the research design. Hoepfl (1997) argues that transferability depends on the degree of extrapolating findings to a new context.

3.11.2.3 Dependability

Administrative and procedural rigour was employed throughout the study. All research articles, voice recordings, transcripts, consent letters and surveys are stored in a shared cloud storage folder, accessible by the researcher and the supervisors of the study. The theoretical frameworks used to derive the abductive structure for data analysis are well known and could potentially evolve over time. The external environment is strongly influenced by developments in the technology domain. It is anticipated that the strategic framework/conceptual model will evolve over time but that the basic components will remain more or less the same.

3.11.2.4 Confirmability

The researcher has a background in strategy development, which strongly influenced the interpretation of findings within a strategic context. The necessary procedural rigour of the iterative DSR cycles, as well as the requirements of the Delphi technique, and the theoretical foundations supporting the study, provide an audit trail of all research activities and processes.

3.12 Ethical considerations

Ethical principles of social research (Hammersley & Traianou, 2012) were embedded in the methodological ethical procedures (Arifin, 2018; Connelly, 2014) to ensure that the research was conducted responsibly and ethically. The principles and associated methodology are discussed concurrently.

3.12.1 Justifiable research design

The research started with a proposal to the Ethics Committee of the University of Pretoria. The proposal gave a comprehensive description of the research methodology and the role that participants would play throughout the research

process. The University of Pretoria also ensured continued institutional ethical oversight in terms of the research project.

3.12.2 Informed consent and voluntary participation

Each participant received an invitation on a formal letterhead of the University of Pretoria to participate in the research process. The letter gave comprehensive information about the research aim and objectives as well as the intended outcome. The letter further informed the participants that the researcher acknowledged that some information could be sensitive. Participants were requested not to share sensitive competitive information that could put the competitive position of their businesses or institutions at risk. Participants were made aware of the fact that, although handpicked, they do have the option to refuse participation or to withdraw at any stage. The research process consisted of an interview phase (Phase 1) as well as a follow-up phase where participants were requested to complete a questionnaire (Phase 2). Some participants did opt out in Phase 2 and the researcher decided to respect the right of participants to opt out, even though in this case it was indicated silently, through nonparticipation. Each participant provided a signed consent form. Participants also provided verbal consent that the interviews could be recorded and transcribed.

3.12.3 Anonymity and confidentiality

The identities of research participants were protected through anonymity. The names of participants were removed completely, and the research report only refers to participants as Participant 1, Participant 2, etc. The names of the businesses and institutions to which the participants are linked, were also anonymised through generalised descriptions. It was important to understand some of the business or personal profiles of the participants to analyse some of the responses in Phase 2 (the questionnaires). A generalised anonymised profile with key variables is presented in Section 3.8.

3.12.4 Reciprocity

The participants were offered feedback on the results of the questionnaires as a reward for participating in the first phase of interviews. This feedback was presented in the form of a video presentation.

3.12.5 Equitable treatment of participants

All participants were interviewed individually at a time that suited their busy schedules. All the interviews were conducted in English. Participants received transcripts of the interviews shortly thereafter.

3.12.6 Data protection

Copies of the interview recordings, transcripts, consent letters, questionnaires and analysis documents are kept on a shared folder where access is restricted to the researcher, supervisor, and co-supervisor. All documents will also be stored on the secure data management platform provided by the University of Pretoria, for a minimum of 10 years.

3.12.7 Methodological choices and situated judgement.

The researcher has a background in strategy development and used situated judgment in each interview to prevent the sharing of sensitive competitive information. The Delphi technique provided a mechanism whereby every participant could share anonymously and receive standardised feedback. The research design and instruments were effective in delivering the research outcome.

3.13 Summary

The chapter started by reiterating the research question and then discussed the philosophical underpinnings of pragmatism as a paradigm and some conceptual foundations of abductive theory building. The research design was discussed in terms of the integration of the DSR cycles with the Delphi technique in two phases of research and justified the methodological choices. The chapter continued with a discussion on the purposive sampling strategy and Delphi panel selection. The semi-structured interviews and structured questionnaires were discussed as data collection instruments.

The discussion on data analysis included the thematic analysis of the semi-structured interviews in the first phase of Delphi and the analysis of the questionnaires, measuring the fitness and utility of the artefact of the design cycle by means of a structured questionnaire. The chapter concluded with a discussion on quality criteria and ethical considerations.

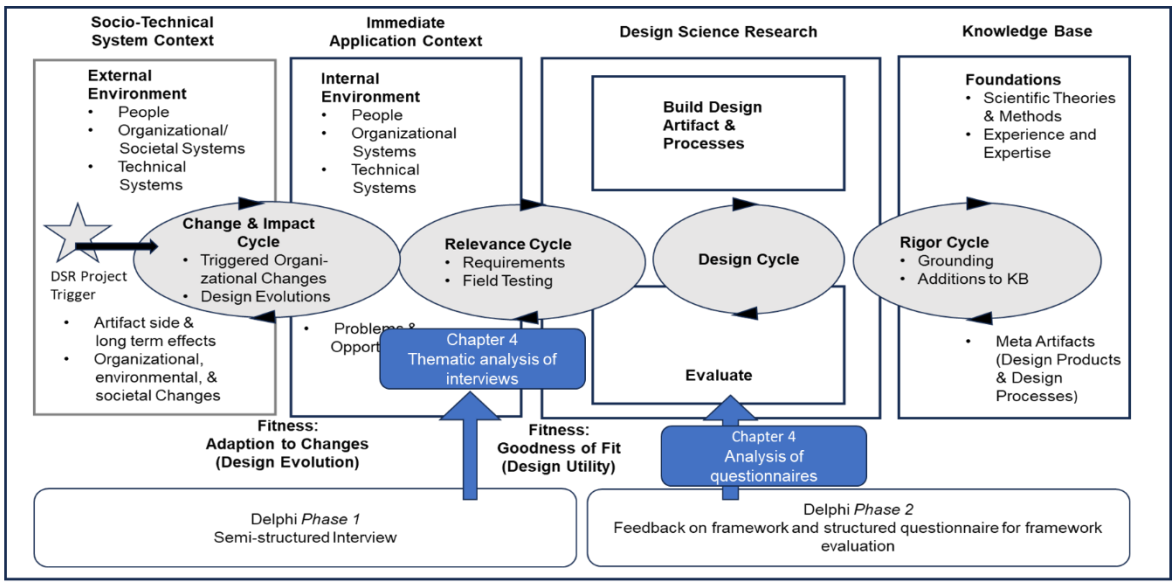
4. CHAPTER 4: DATA ANALYSIS

4.1 Introduction

This chapter shares the results of Delphi phases 1 and 2 and indicates, in Figure 4-1, where they fit into the overall research design. Members of the Delphi panel were involved in two phases of research. In the first phase, members of the panel participated in a semi-structured interview coinciding with the relevance cycle of DSR. In the second phase, participants were requested to complete a structured questionnaire with the purpose of evaluating the strategic framework which was developed as an artefact as part of the design cycle.

Figure 4-1

Data analysis in the integrated DRS and Delphi process



Note: Adapted from "A four-cycle view of Design Science Research" reprinted from A four-cycle model of IS design science research: capturing the dynamic nature of IS artefact design. By Drechsler, A., & Hevner, A.(2016), In Breakthroughs and Emerging Insights from Ongoing Design Science Projects: Research-in-progress papers and poster presentations from the 11th International Conference on Design Science Research in Information Systems and Technology (DESRIST) 2016. St. John, Canada, 23-25 May (p5). Copyright (2016) by The Author(s).

The aim of the study is to understand the strategic dynamics of learning with technology and to develop a strategy map as a guiding framework to facilitate strategic choices in terms of technology adoption, integration, and operationalisation. The strategy map will outline critical dimensions and focus areas for operational business performance.

The data was purposefully analysed to answer the primary research questions namely: “How does strategy development occur through the dynamic interaction of strategy with learning, and technology integration?”. The secondary research questions look at: a) the elements to consider in a strategy map for learning with technology; and b) how the elements influence each other in the overall strategy map. Secondary research question a) is answered by the analysis in Section 4.3 and describes all the elements to consider in a strategy map for learning with technology. Secondary research question b) is answered by Section 4.4. The visual BSC map in Section 4.4.4 illustrates how these elements relate to each other and influence each other in the overall research map.

Figure 4-2

Chapter outline

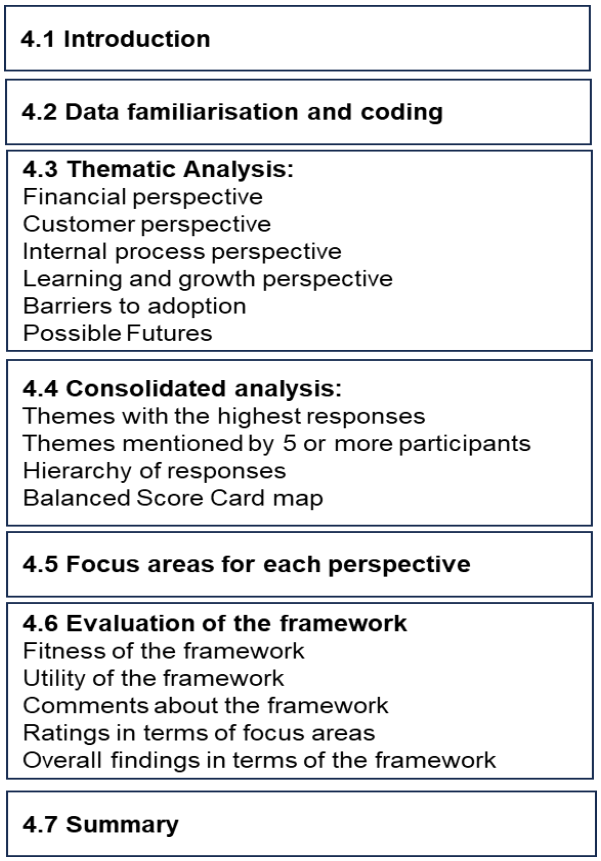


Figure 4-2 gives a visual description of the different sections in this chapter. The chapter starts with a broad outline of the data preparation and the coding and categorisation strategy (Section 4.2). The thematic analysis (Section 4.3) discusses

findings from the interviews in a logical way, based on the abductive structure adopted for the purposes of data analysis. The consolidated analysis (Section 4.4) compares all data sets in an integrated framework. Some findings were then translated in terms of operational focus areas (Section 4.5). The chapter continues to present the findings on the evaluation of the strategy development framework through the structured questionnaires (Section 4.6). The chapter concludes (Section 4.7) with final remarks in terms of the overall findings from the interviews and questionnaires.

4.2 Data familiarisation and coding

Interviews were transcribed through Microsoft Word and interview transcripts were cleaned-up to improve the grammar and syntax of transcriptions. The software application, Atlas.ti was used to code interview transcripts. The study adopted the BSC and the ADDIE systemic instructional design framework as theoretical underpinnings for data analysis and theory building. The structure of the BSC, in terms of the four perspectives were used as super codes/ cluster categories in the dominant abductive structure for data analysis. The four perspectives are: “financial, customer, internal process and learning and growth” (Kaplan, 2009: p 4). Elements of the ADDIE design process, and themes related to organisational management and technology management, were potential placeholders for emerging themes. Other categories of themes emerged in the areas of customer management, skills development, and regulatory requirements. The process of coding was a progressive, iterative process to ensure that codes are categorised in alignment with the abductive structure.

Figure 4-3

Coding process

Open Coding	Axial Coding	Selective Coding
Codes **Themes**	**Categories** Learning design (ADDIE) Business management Technology management Customer management Skills development Regulatory requirements	**Cluster Categories =** **Perspectives of BSC** Financial Customer Internal process Learning and growth

Figure 4-3 illustrates how the coding progressed from the identification of themes to categories and eventually to super categories.

The coding started with an initial identification of concepts through open coding. The concepts were then categorised into themes through axial coding. The clustering of themes into super codes/cluster categories was then done through selective coding. The cluster categories represent the four perspectives of the BSC as well as emergent categories that did not fit the abductive structure. Placement of categories of themes into cluster categories was guided by the leading questions for the BSC perspectives and summarised in Table 4-1. The table includes the BSC perspective in the left column, the associated leading question in the middle column, and some examples of what to look for in the data in the last column. This is based on the "conceptual foundations of the BSC" (Kaplan, 2009; Kaplan & Norton, 1993) and was also discussed in Section 2.7.1.

Table 4-1

Leading questions to guide allocation of categories in cluster categories

Cluster category resembling BSC perspective	Leading question	Examples of what to look for in the data
"Financial perspective" (Kaplan, 2009: p 4).	"To succeed financially, how should we appear to our shareholders?" (Kaplan, 2009: p 4).	Profit, revenue growth, risk management, productivity improvement.
"Customer perspective " (Kaplan, 2009: p 4).	"To achieve our vision, how should we appear to our customers?" (Kaplan, 2009: p 4).	Customer segments, customer value propositions products and services.
"Process perspective" (Kaplan, 2009: p 4).	"To satisfy our shareholders and customers, what business processes should we excel in?" (Kaplan, 2009: p 4).	Core capabilities, ADDIE process elements, other operational processes.
"Learning and growth" (Kaplan, 2009: p 4).	"How will we sustain our ability to change and improve?" (Kaplan, 2009: p 4).	Skills development, capacity building, technology systems, infrastructure

4.3 Thematic analysis

The analysis of the cluster categories and associated categories and themes are systematically described in Sections 4.3.1 to 4.3.6. Every category is a consolidation of themes. The number of responses indicated next to each theme represents the number of times a concept was mentioned in the interviews. The themes identified relate to the secondary research question (a) in Section 4.1 and highlight essential elements of the strategy map. The categories and themes of codes are discussed in terms of the meaning attached to each code as well as specific quotes associated with each code in a code book attached as Annexure F.

4.3.1 Financial perspective

This cluster category deals primarily with the aspects that are important for investors in new educational technology to consider. Traditional financial measures such as profitability and revenue are important, but the effectiveness and improved efficiencies in learning play a dominant role in educational settings.

Leading question: "To succeed financially, how should we appear to our shareholders?" (Kaplan, 2009: p.4). In the cluster category for the Financial Perspective, 5 broad categories and 10 themes emerged.

Table 4-2

Financial perspective cluster category

Cluster Category: Financial perspective		
Category	**Theme**	**No. of responses**
Profitability		**8**
	Cost effective	3
	Diversified income	5
Strategic leadership		**2**
	Strategic leadership	2
Employment and earnings potential		**3**
	Earnings ability	1
	Meaningful employment	2
Improved learning and teaching experience		**11**
	Completion rate and throughput	3
	Student and lecturer satisfaction and engagement.	4
	User experience - learner experience	4
Increased efficiency and productivity		**16**
	Improved learning outcomes	6
	Technology efficiency	10

The three categories with the highest responses were: increased efficiency and productivity (16 responses), improved learning and teaching (11 responses), and profitability (8 responses). The leading question of “how should we appear to our shareholders?” could be modified to ask: “how should we appear to our investors?”. In a business environment, profitability and other financial measures are the ultimate lag factor of good practices. However, in a learning environment, improved learning through effective technology use, is the ultimate lag factor. This was discussed in a comparison between the BSC and the Baldridge criteria for education in Section 2.7.1.2. Because improved learning and increased efficiency and productivity are primary goals of operational excellence, the author decided to allocate these themes to the financial perspective. Strategic leadership (2 responses) did not emerge as a strong theme, although it has a connection with change management. The number of responses could be a result of the role that the respondents play in their own organisations. In the literature, strategic leadership is also associated with change management and is a strong driver for technology adoption. This is discussed in Section 2.6.

4.3.2 Customer perspective

This cluster category deals with how the operating model is designed to deal with different types of customers in different customer segments. ***Leading question:*** ***“***To achieve our vision, how should we appear to our customers?” (Kaplan, 2009: p 4). In this cluster category, 4 broad categories and 11 themes emerged. The customer perspective involves important decisions in terms of a business model (14 responses), the types of courses (35 responses), accreditations (13 responses) and segmentation of learner personas (16 responses). The business model specifically refers to the different variations in online, blended and face-to-face delivery of training. Accreditation has a direct impact on the types of courses that can be sold to customers, and links to the specific needs of specific groups of learners. Compliance training in corporate settings does not require accreditation, but students who are looking for formal full qualifications will compare accreditation standards of different institutions. It is also clear that generational differences influence the design of courses, while adaptive learning is emerging as an approach to provide multiple student journeys.

The elements in this cluster category align with both the internal and external environmental analyses in the literature (Chapter 2). The segment or learner personas require an analysis of generational perspectives and technology usage. It can be inferred that the analysis phase of the ADDIE process is a key determinant in this perspective.

Table 4-3

Customer perspective cluster

Cluster category: customer perspective		
Category	**Theme**	**No. of responses**
Business model		**14**
	Blended: Distance/online vs contact/face-to-face	9
	Centralised design unit	5
Type of course		**35**
	Accredited institutions - full qualifications	13
	Compliance training	3
	Industry specific training programs.	7
	Micro credential linked to credits	7
	Short course	5
Accreditation, quality, and standards		**13**
	Accreditation bodies and standards – Sector Education and Training Authority (SETA),Quality Council for Trades and Occupations (QCTO), SAQA	13
Segment or Learner Personas		**16**
	Adaptive learning approach provides multiple student/ learning journeys	2
	Generational differences	10
	Technology usage of students and lecturers should inform design	4

4.3.3 Process perspective

This cluster category correlates strongly with the ADDIE design phases in an online environment. These categories are online design, online development, online implementation, and online assessment. Other themes such as management and administration, project management and quality assurance align with aspects of organisational management.

Leading question: **"**To satisfy our shareholders and customers, what business processes should we excel in?" (Kaplan, 2009: p 4). In this perspective, 7 categories

and 22 themes emerged. Table 4-4 indicates the number of responses for each theme in this cluster category. When analysing the themes in terms of the number of responses, it appears that some themes dominate the current operational environment.

Table 4-4

Process perspective cluster category

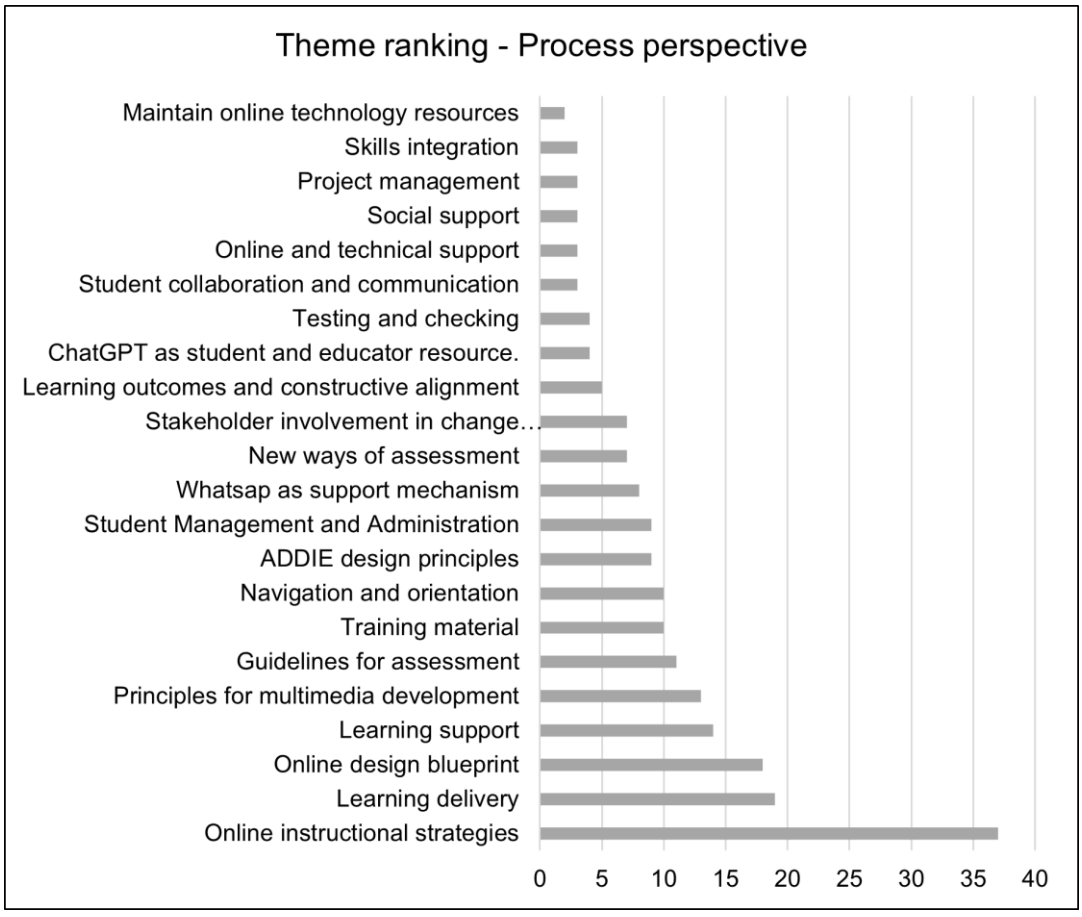
Cluster category: Process perspective		
Category	**Theme**	**No. of responses**
Online design		73
	Online design blueprint	18
	ADDIE design principles	9
	Learning outcomes and constructive alignment	5
	Online instructional strategies	37
	ChatGPT as student and educator resource.	4
Online development		42
	Principles for multimedia development	13
	Learning delivery	19
	Training material	10
Online implementation		43
	Navigation and orientation	10
	Maintain online technology resources	2
	Student collaboration and communication	3
	Learning support	14
	Online and technical support	3
	Social support	3
	WhatsApp as support mechanism	8
Online assessment		18
	Guidelines for assessment	11
	New ways of assessment	7
Management and administration		16
	Stakeholder involvement in change management	7
	Student Management and Administration	9
Project management and skills integration		6
	Project management	3
	Skills integration	3
Quality assurance and testing		4
	Testing and checking	4

Figure 4-4 indicates that the most important current themes, based on number of responses, are online instructional strategies, online delivery, an online design blueprint, learning support, principles for multi-media development, and guidelines for assessment. It is important to note that online instructional strategies include concepts such as AI, game-based learning, AR and VR, micro learning, social

learning, CoI and on-the-job learning. This correlates with the findings in the literature in the section dealing with challenges and recommendations (Section 2.6). Practitioners need clear guidelines and blueprints to effectively use new technology in learning. This also links to a need for an online pedagogy as well as continuous professional development in terms of instructional design for online learning environments.

Figure 4-4

Theme ranking process perspective



4.3.4 Learning and growth perspective

Leading question: ***"***How will we sustain our ability to change and improve?" (Kaplan, 2009: p 4). This cluster of themes deals primarily with building capacity for future growth and development. It focuses broadly on technology infrastructure and skills development. In this perspective, 3 categories and 8 themes emerged. It aligns with the discussion in Section 2.5 on technology infrastructure and Section 2.6 on challenges and recommendations.

Table 4-5

Learning and growth perspective cluster category

Cluster category: Learning and growth perspective		
Category	**Theme**	**No. of responses**
Technology infrastructure		**58**
	Technology LMS	21
	Technology authoring tools	14
	Data Management	8
	Technology management and support	15
Online pedagogy		**31**
	Curatorship and technical design skill	9
	AI Literacy	5
	AI Assessment Literacy	5
Technology awareness basic usage program		**12**
	Technology awareness basic usage programme	12

4.3.5 Challenges

The analysis in this section indicates the themes and categories related to the challenges in a technological environment for learning, mentioned by participants as indicated in Table 4-6 and Figure 4-5. In this cluster related to challenges, 6 categories and 8 themes emerged. These findings correlate with the literature review on challenges and recommendations (Section 2.6) .

Table 4-6

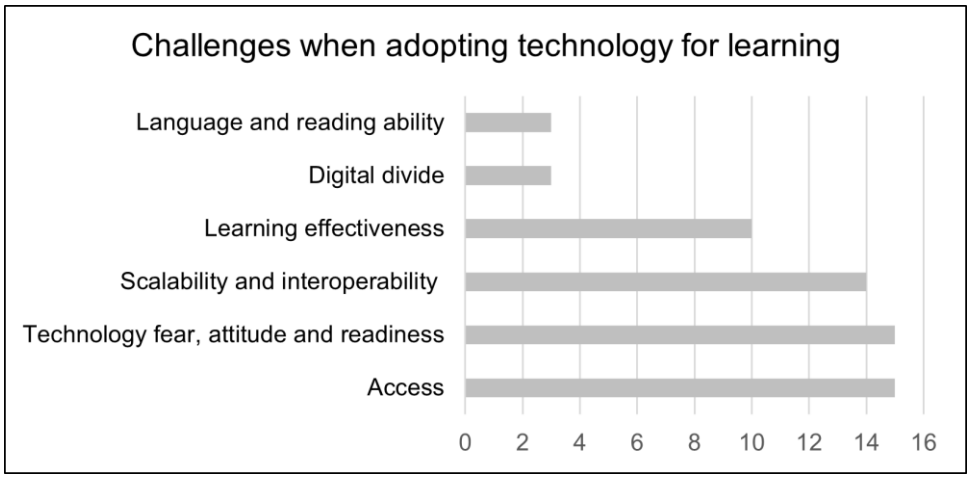
Challenges cluster category

Cluster category: Challenges		
Category	**Theme**	**No. of responses**
Access		**15**
	Infrastructure and inclusivity - cost of education	6
	Electricity and internet connectivity	9
Digital divide		3
	Digital literacy	3
Language and reading ability		**3**
	Challenge of language	2
	Children lack the ability to read and write	1
Learning effectiveness		**10**
	Learning effectiveness	10
Scalability and interoperability		**14**
	Scalability and interoperability	14
Technology fear, attitude, and readiness		**15**
	Technology fear, attitude, and readiness	15

The fear of technology, attitude and readiness contributes to technology deference or adoption. This involves both the learners and the educators. The scalability and interoperability of technology remain a challenge in a fast-evolving technology context. Applications and infrastructure can become obsolete very quickly and the cost of maintaining sophisticated infrastructure is high.

Figure 4-5

Challenges adopting technology for learning



These aspects were also discussed in Sections 2.5 and 2.6 of the literature. The uncertainty around the effectiveness of learning with technology remains a barrier to adoption of learning technology in learning.

4.3.6 Possible futures

The analysis in this section relates to perceptions about the future of learning with technology mentioned by participants, as reflected in Table 4-7 and Figure 4-6. It can be inferred that a belief in terms of where technology is moving towards in terms of future application, will also determine if it will drive activity towards adoption.

In this category, the themes of 21st century skills, advanced learning analytics and machine learning have emerged strongly. Although game-based learning was mentioned often, not all comments about game-based learning were positive. There is, however, a strong drive towards integrating 21st century skills such as collaborative problem solving, project management, and digital literacy in learning.

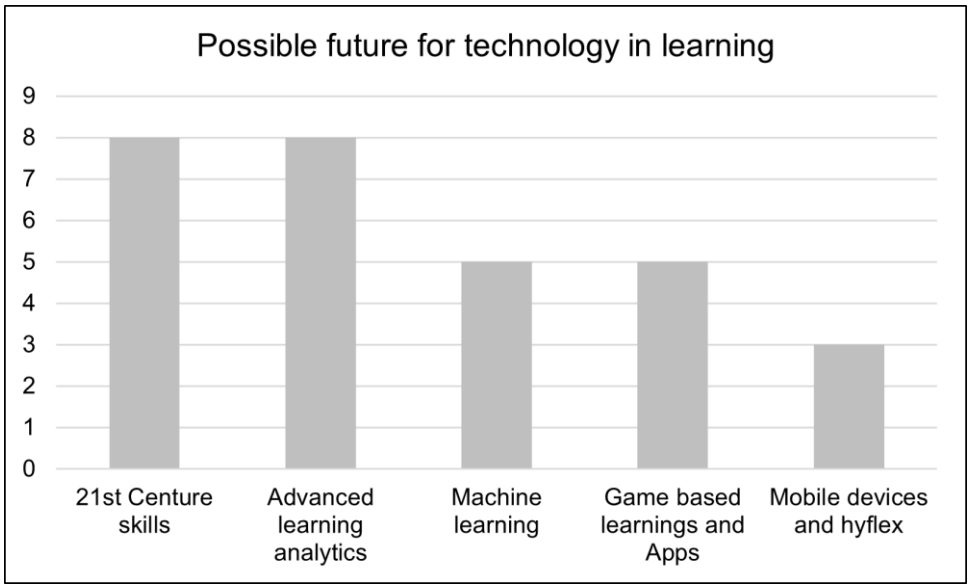
Table 4-7

Possible futures cluster category

Themes	No. of responses
21st Century skills	8
Advanced learning analytics	8
Machine learning	5
Game based learnings and Apps	5
Mobile devices and Hy-flex	3

Figure 4-6

Possible future for technology in learning



Technology offers new capabilities for automation at scale, and big data analytics of student data will inform differentiated learning. Machine learning requires a new awareness and literacy to optimise AI in all learning settings in future. These findings align with the literature review and were discussed specifically in Section 2.3.

4.4 Consolidated analysis - Comparative data sets and data display.

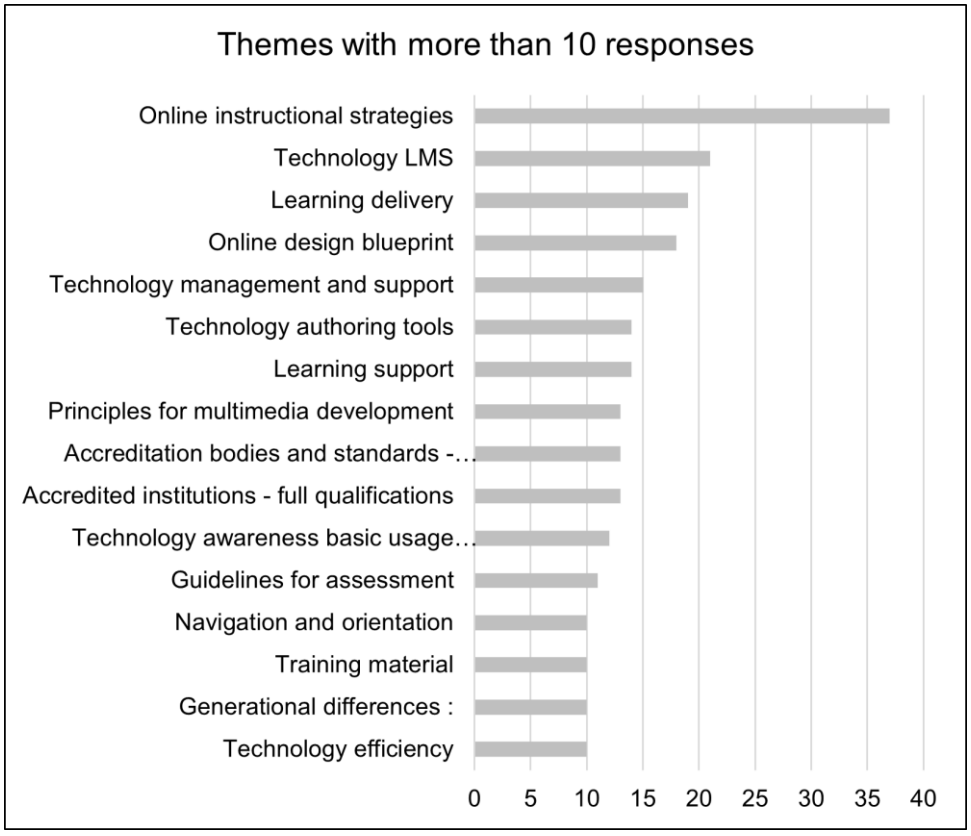
The findings for research question b) deals with how the strategy elements influence each other in the overall strategy map. This section combines the findings of all the cluster categories to analyse trends.

4.4.1 Themes with highest responses

Most comments were around the technical infrastructure and its affordances and how it is currently used to design and deliver online/ blended learning. Instructional strategies are mentioned, but not well employed. There is a strong need for blueprints and models, principles (multi-media design) and guidelines (assessment). Leadership does not play a prominent role in decision-making; instead, the BSC is driven from an internal process perspective. Learning support and technology support is an integral part of the success of learning with technology.

Figure 4-7

Themes with highest responses



4.4.2 Themes mentioned by 5 or more of the 7 participants.

This section deals with the themes that were mentioned by five or more of the seven participants and is categorised per cluster.

Financial perspective cluster:

Improved learning and teaching experience (11 responses) and increased efficiency and productivity (16 responses) crystalised as important themes in the financial cluster.

Customer perspective cluster:

The theme segment/learner personas (16 responses) was mentioned by all participants as an important determinant of learning with technology. The choice of an appropriate business model was also mentioned by five participants, and links strongly with delivery mode and a centralised design capability.

Internal process perspective cluster:

The themes in this cluster relate to principles, strategies, and guidelines for learning with technology. Online instructional strategies (37) were mentioned by all participants as an important component of online learning. There is, however, uncertainty about the application of different strategies associated with different technological affordances. There is a need for an online design blueprint (18 responses) as a guiding framework for development and implementation. Principles of multimedia development (13 responses) also emerged as a strong theme. The use of WhatsApp (18) as a parallel support mechanism to online learning, and ADDIE design principles (9 responses) and modes of learning delivery (19 responses) also emerged as themes.

Learning and growth perspective cluster

The technology infrastructure, specifically in terms of the choice of an LMS (21 responses) was mentioned by all participants.

4.4.3 Hierarchy of responses in different cluster categories

The figure below, maps the hierarchical relationship of the different themes in each cluster, relative to all themes in the 4 BSC clusters.

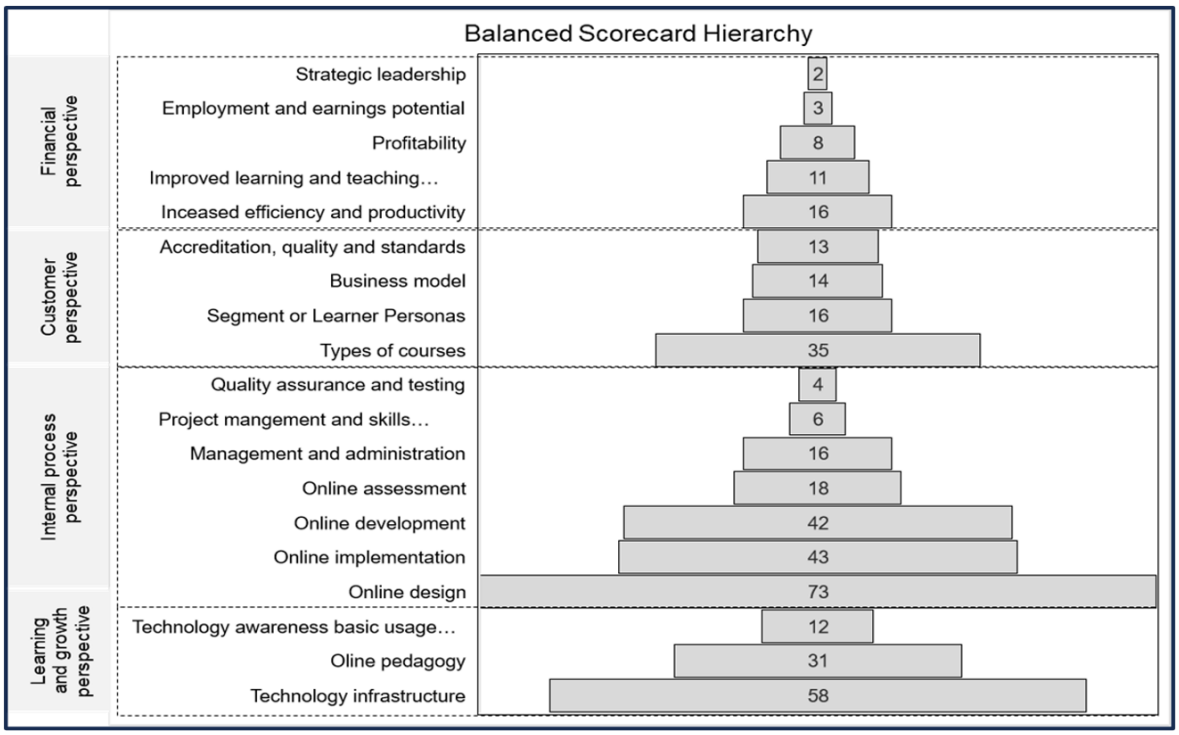
Most responses were accumulated in the internal process perspective cluster. The ADDIE systemic design model focuses specifically on learning design processes, hence the skewed graph towards the internal process perspective. It is, however,

important to note that learning with technology not only focuses on optimising processes, but important structural components of the learning and growth perspective need to be in place to ensure operationalisation of learning design processes.

It is further observed that, in the present study, strategic leadership did not play a strong role in driving a strategy towards learning with technology. It could be inferred that technology decisions are strongly influenced by their operational applicability and relevance. The role of strategic leadership in technology decisions for learning with technology is an area that could be explored in future research.

Figure 4-8

Hierarchy of responses in cluster categories



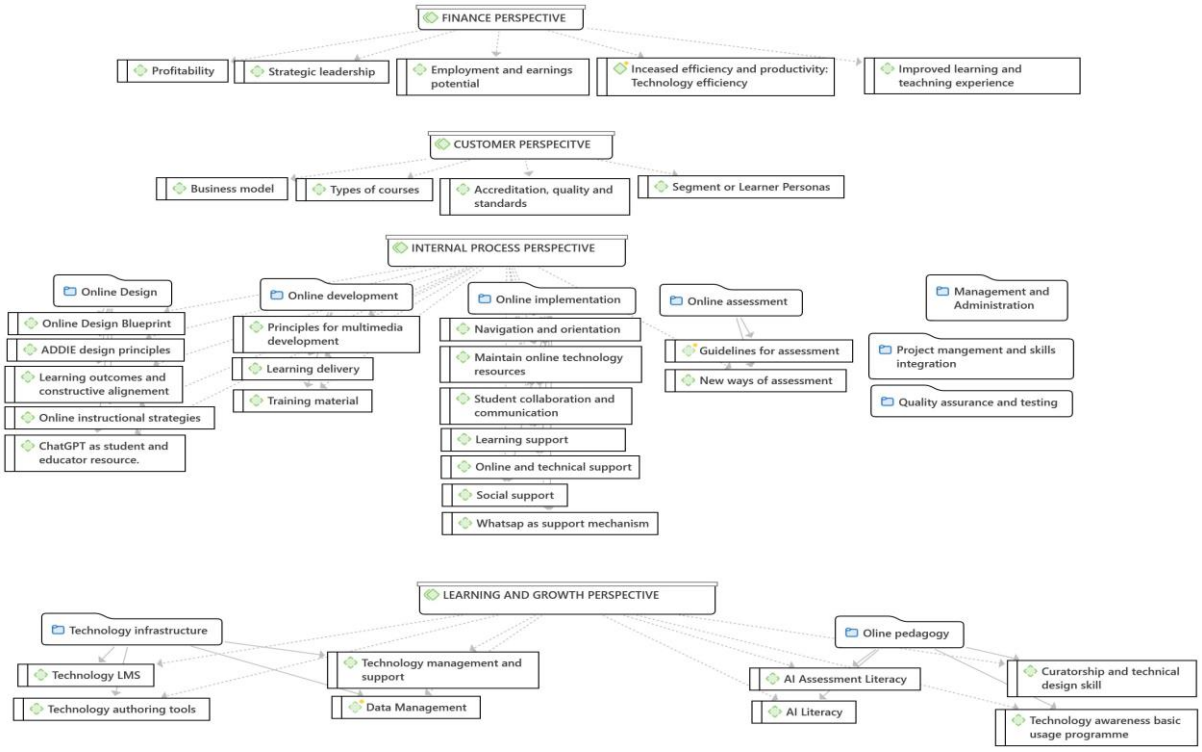
4.4.4 Visual BSC Map

The visual BSC map in Figure 4.9 is a network diagram constructed with Atlas.ti, based on the relationships between the cluster categories and the themes identified during data analysis. This figure answers secondary research question b) and illustrates how all the elements of the overall strategy map influence each other and fit together conceptually.

The figure presents a comprehensive picture of how all cluster categories and themes relate to each other. All the cluster categories with their related themes are discussed in Section 4.3. The codebook in Annexure F gives a detailed description of cluster categories, themes and concepts identified during data analysis.

Figure 4-9

BSC Map



4.5 Focus areas for each perspective

Based on the analysis in Section 4.4 the following focus areas per perspective were identified. These focus areas were abstracted from the analysis on themes with the highest number of responses (Section 4.4.1) and themes mentioned by five or more of the participants (Section 4.4.2). The aim was further to identify at least two focus areas per perspective.

Financial perspective:

a) Financial - Optimise profitability through the diversification of income streams and the management of infrastructure and operational cost.

b) Non-financial - Improve the learning and teaching experience through optimising efficiencies and productivity by using ed-tech technologies.

Customer perspective:

a) Develop an optimal basket of blended learning interventions through a centralised design unit.
b) Ensure comprehensive analysis of student personas and student journeys based on unique technology profiles and other student analytics.

Process perspective:

a) Develop an online design blueprint, incorporating design principles, instructional strategies, and constructive alignment of learning objectives and outcomes with the use of ed-tech tools and instruments.
b) Develop learning materials based on principles for multi-media development for optimal delivery across different modes (e.g., synchronous, asynchronous, online, and face-to-face).
c) Implement learning interface according to principles of navigation and support (learner, social and technical).

Learning and growth perspective:

a) Plan for the optimal technology architecture (LSM and stand-alone tools and components) and ensure continuous support and management of the platform.
b) Continuous professional development in terms of an online pedagogy that includes instructional design skills, writing skills, technical design skills, curriculum design skills. AI literacy and AI assessment literacy as part of the continuous professional development.
c) Develop components for a basic technology usage and skills program for learners and educators involved in learning with technology.

4.6 Evaluation of the framework

DSR requires the development and evaluation of an artefact during the design cycle. Figure 4-1 indicates how this second phase of Delphi integrates with the overall research design. The design of the final artefact is documented in Chapter 5. At this point, it is important to note that DSR develops through iterative design cycles.

For the second phase of Delphi, a first draft of the final artefact was developed. The artefact was a framework documented in Chapter 5 as a strategy development framework for learning with technology. Please also refer to Section 1.7 for a discussion of the progression of this study through the different DSR cycles.
The artefact was presented to participants through a video presentation on YouTube. Participants evaluated the framework by means of a structured questionnaire on Google Forms. The Questionnaire is attached as Annexure D, and Chapter 3, Section 3.10.2 discusses the questionnaire and analytical process that were followed. The responses of participants were also correlated with the role that they play in their organisations as well as the type of organisations they come from. This diversity contributed to rich insights in terms of the evaluation of the framework. The participant profiles were discussed in Section 3.8.

The overall framework was evaluated in terms of its fitness and utility in its environmental context. The participants were asked to rate their agreement in terms of the proposed operational focus areas of the strategy map constructed from their input and participation in the interviews in phase 1.

Participants were requested to rate certain statements in terms of a 4-point Likert scale (Allen & Seaman, 2007: p 64). The data from the scales were interpreted through descriptive analytics, mostly through summation of scores. The analysis of agreement in terms of operational focus areas was calculated through mean or average scores.

4.6.1 Fitness of the framework

The fitness of the framework refers to the strategic importance of the framework.
Participants were asked to rate their agreement with the statement in terms of a 4-point Likert scale. The first statement was: *The proposed model makes sense in terms of its strategic importance. It is clear and understandable.*

Figure 4-10 indicates that although 4 of the 5 participants agreed that the framework makes conceptual sense on a strategic level, one participant did not agree. The second statement in terms of strategic fitness was: *The model can be adapted to the context in which it is applied. It is maintainable and transferable.* This statement

resonated strongly with participants as reflected in the graph in Figure 4-11. Four participants agreed and one participant chose to agree with the statement strongly.

Figure 4-10

Strategic importance of the framework

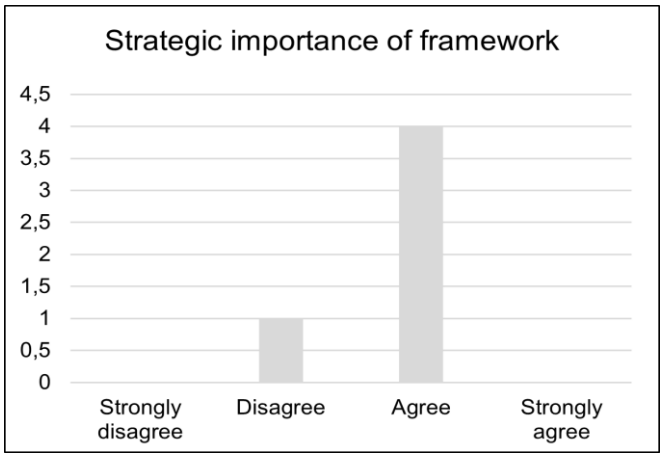
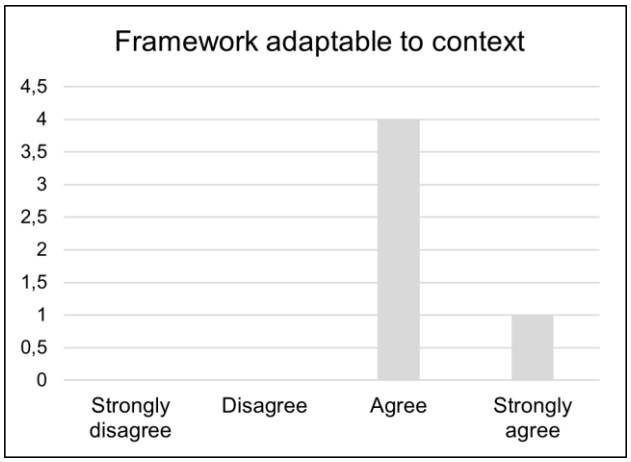


Figure 4-11

Framework adaptable to context



4.6.2 Utility of the framework

The utility of the framework refers to the usability of the framework in an operational context. The first statement in terms of framework utility was: *The model can be operationalised to contribute to operational effectiveness and efficiencies.* Three participants agreed that the framework contributes to operational effectiveness and

efficiencies, while two participants indicated that they strongly agreed as indicated in Figure 4-12.

The second statement in terms of framework utility was: *The model contains sufficient levels of detail (Not too high level, not too granular).* All participants agreed that the framework was sufficient in terms of the level of detail that it contains. This unanimous agreement is indicated in Figure 4-13.

Figure 4-12

Framework contributes to operational effectiveness and efficiencies

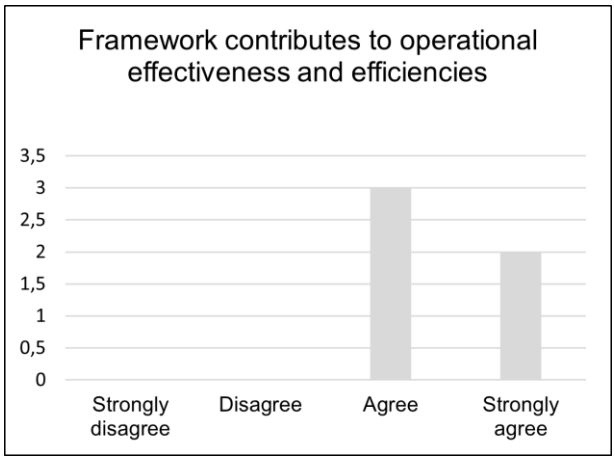
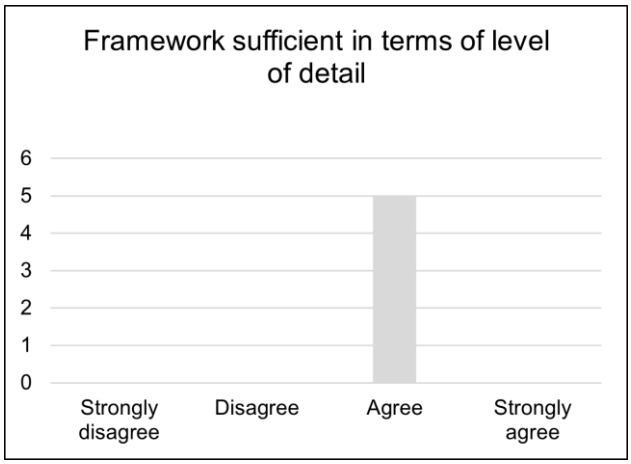


Figure 4-13

Framework sufficient in terms of detail



4.6.3 Comments about the framework

Participants were asked two open-ended questions. Firstly, in terms of the completeness of the model: *Are there any elements that have been omitted and that you would like to add to the model?*

Two participants indicated that the framework does not sufficiently reflect the requirements for inclusivity and accessibility. Another participant mentioned that special needs education was not included in the model. These comments link to some limitations of the model highlighted in Chapter 5, Section 5.4

One respondent mentioned that the model does not specifically mention mobile learning and micro-learning and that just-in-time learning was also not mentioned. The participant also elaborated that the framework was presented at a very high level and that the intricate details of every dimension were not clear.

The researcher would like to link the general comments received in this section to an observation that was made in Section 4.3.3 of this chapter. A wide variety of instructional strategies were mentioned by all the participants during the interviews of phase 1, although there is a lack of knowledge of how to use technology in line with these strategies for the optimal benefit of all. The intricate details of the model, although not presented in sufficient detail in the PowerPoint presentation are discussed in Chapter 5, Section 5.3.5.

The second open-ended question concerned any redundancies in the framework. The question was: *Are there unnecessary elements that can be omitted?* One participant mentioned that income generation is not always permitted in the education sector and that the objective of profitability is context-bound. Another participant mentioned that the framework could easily become prescriptive and technically complex.

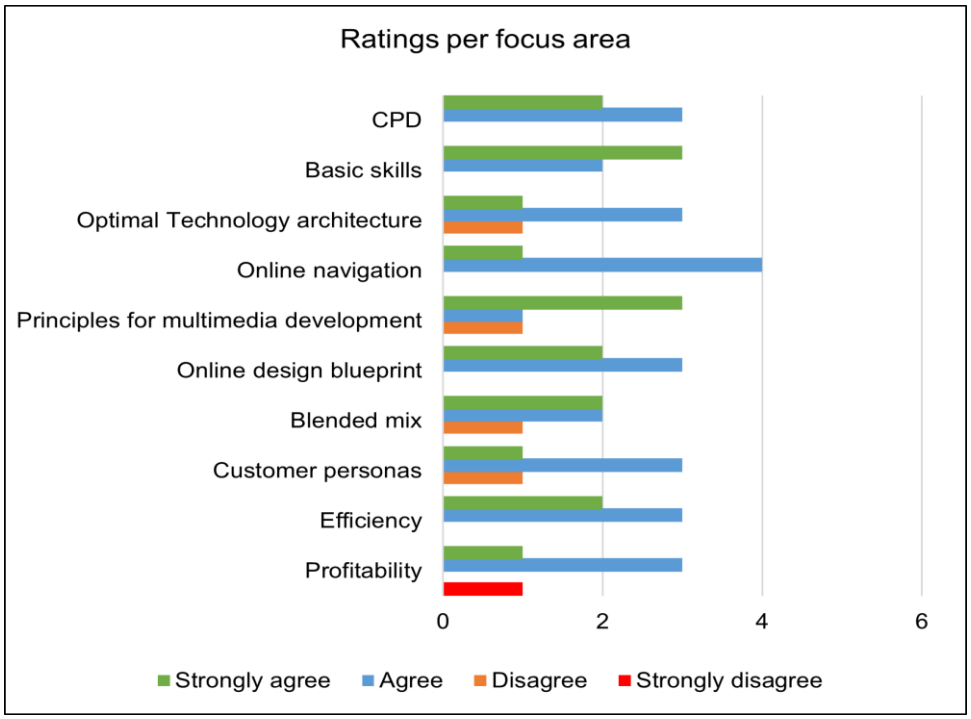
4.6.4 Ratings in terms of focus areas

Participants were asked to indicate agreement in terms of the focus areas, identified in Section 4.5 of this chapter. The responses for each focus area were summated by allocating a numerical value to the responses. The numerical values were

allocated as follows: strongly disagree, 1; disagree, 2; agree, 3 and strongly agree, 4. The average values were then used to rank the focus areas in terms of importance. Figure 4-14 indicates the number of ratings in the different categories of the Likert scale, namely, “strongly disagree”, “disagree”, “agree”, and “strongly agree” (Allen & Seaman, 2007: p 64).

Figure 4-14

Ratings per focus area



Although there was general agreement in terms of the identified focus areas, three discrepancies emerged. One participant strongly disagreed about profitability as a key focus area. The participant also mentioned that profitability is not a requirement and profit is often not allowed in some educational sectors.

One participant did not agree that customer personas play a role in the overall framework. Further analysis indicated that the function of the business in which the participant is situated influenced this opinion. The business of this participant sells off-the shelf solutions to specific targeted populations and the business is all about marketing and sales of learning interventions. There were, however, some discrepancies, in that this participant did mention specifically that generational

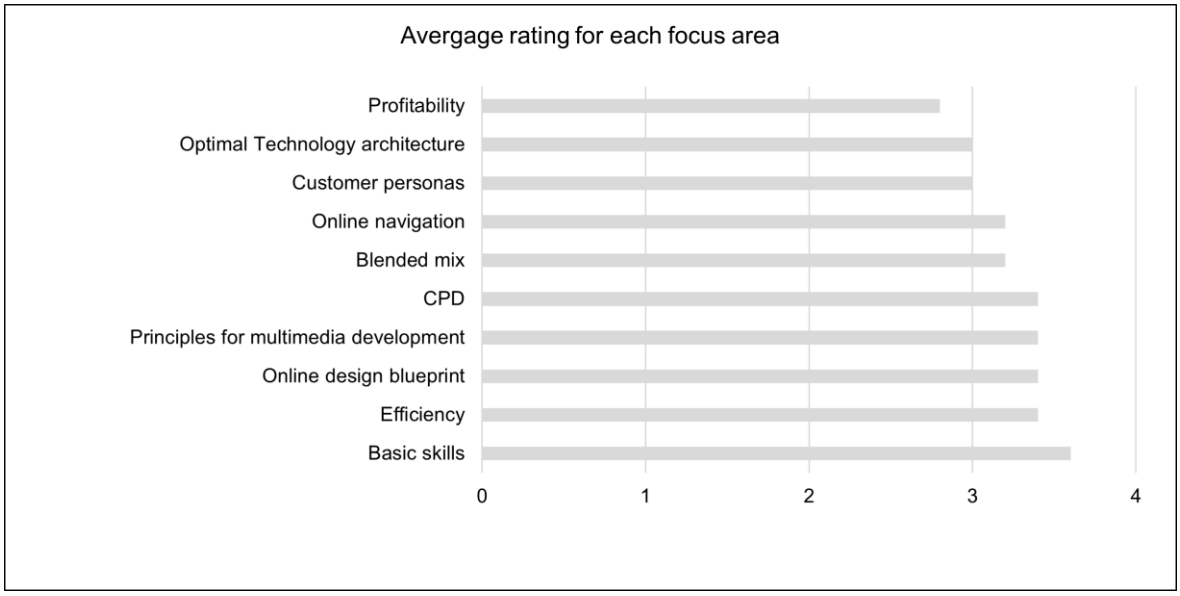
differences play an important role in how learners interact with learning materials. The aspect of generational differences is one of the components of customer personas discussed in Section 5.3.5.

One participant mentioned that a blended mix of learning solutions and a technology map is not a focus area of the overall framework. Further analysis indicated that this participant works in a setting where training interventions are delivered based on a set of unique requirements of a client, and the training intervention needs to adapt to the client's technology infrastructure. The participant in her unique setting does not therefore have to develop an optimal mix of blended interventions beforehand and does not need a technology infrastructure with an LMS, but can design learning interventions with available open-source technology.

The focus areas were ranked in terms of the levels of agreement indicated by participants. The ranking of the different focus areas is reflected in Figure 4-15. The values were calculated as an average of all responses.

Figure 4-15

Average rating for each focus area



The areas where there were some disagreements were related to profitability, an optimal technology architecture roadmap and customer personas. The strongest

agreement was in terms of the need to increase basic technology literacy of students and educators, with an average rating of 3,6. Other areas, with strong agreement, with an average rating of 3,4 were continuous professional development in terms of an online pedagogy, and the need for principles in terms of multimedia design. Other focus areas with an average rating of 3,4 were an online design blueprint, and an improvement in learning and teaching experiences through efficiencies and productivity of ed-tech technologies.

4.6.5 Overall findings in terms of the framework

Participants highlighted some areas that were not included in the framework. This is specifically related to inclusivity and accessibility and the inclusion of special needs learning. The researcher acknowledges that the framework assumes that this strategy map will be applicable to areas where both students and educators do have sufficient access to technology infrastructure.

The complexities associated with an absence of technology infrastructure, or limited access to technology, could however be analysed through the same process framework. The principles and framework of the BSC can then be used to create a unique strategy map with a customised objective to understand the complexities associated with learning with technology in the context of limited access and inclusivity. The picture might look significantly different because of the external realities and internal capabilities driving strengths, weaknesses opportunities and threats. The same argument applies to special needs education. The strategy process framework is discussed in Chapter 5.

The areas of disagreement provide important input in terms of the overall characteristics of the framework. It clearly indicates that the type of business and the role that the participant plays in the business influenced opinions in terms of focus areas. It is acknowledged that the framework cannot be everything to everyone but needs to specify the requirements for openness and adaptability to different types of businesses, different types of courses or learning interventions, different types of infrastructure or even the role that participants play in the business context, e.g., financial decision maker, instructional designer or technology architect.

The openness and adaptability of the framework is, however, a key characteristic of the framework. The unique elements to be included in the overall strategy map will depend on the type of business or educational institution and its business objectives in terms of customer segmentation, service offerings and profitability. The details of the strategy map are therefore context-dependent.

4.7 Summary

The analysis of the data provided empirical evidence that the findings correlate strongly with the literature analysis. The findings provided all the elements to be considered in an overall strategy map and highlighted how these elements influence each other in a visual map of the proposed BSC for learning with technology. Based on the analysis of the intensity of different categories their relative influence in the overall BSC, focus areas per perspective were identified. The thematic analysis of the first phase provided input to a strategic framework that was presented to the Delphi panel members in a video presentation.

This chapter also discussed the evaluation of the strategic framework that was developed. Analysis indicated that most participants agreed that the conceptual framework has strategic importance and that it is adaptable to its context. Participants also agreed that the framework contributes to operational efficiencies and effectiveness and was sufficient in terms of the level of detail. Participants agreed that the most important focus areas of the framework were the need to increase basic technology literacy of students and educators. Other areas were continuous professional development in terms of an online pedagogy; the need for principles in terms of multimedia design; an online design blueprint: and an improvement in learning and teaching experiences through efficiencies and productivity of ed-tech technologies.

The findings of this chapter provide insights in terms of the overall characteristics of the framework and its applicability in different contexts. The details of the framework are described in Chapter 5.

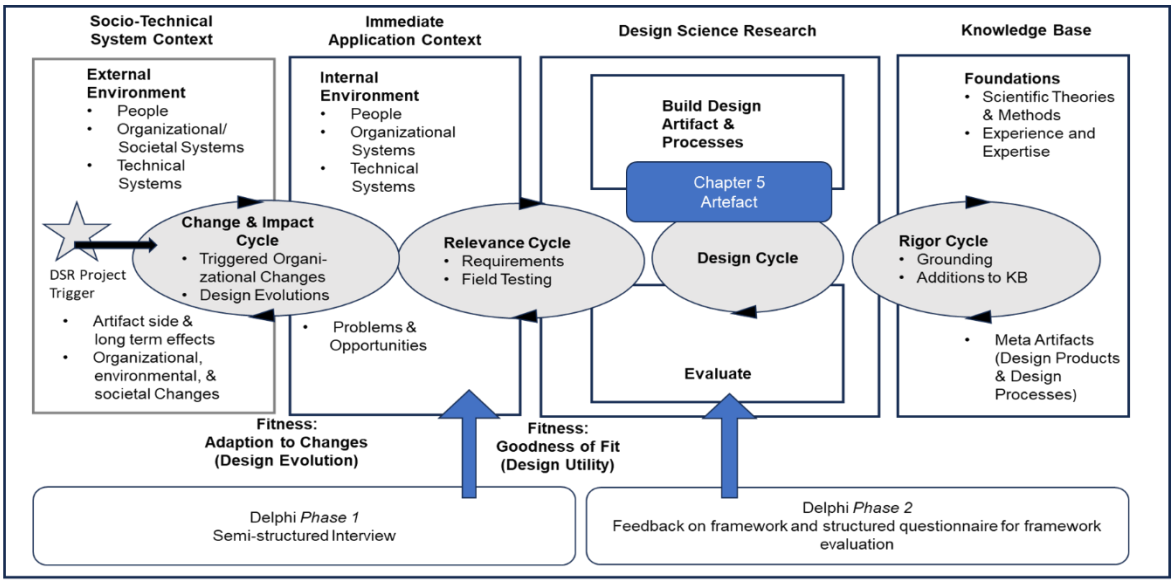
5. CHAPTER 5: A STRATEGY DEVELOPMENT FRAMEWORK FOR LEARNING WITH TECHNOLOGY

5.1 Introduction

This chapter presents the artefact produced during the design cycle of the integrated DSR and Delphi process. This chapter fits into the research design as illustrated in Figure 5-1.

Figure 5-1

The artefact as product of the integrated DSR and Delphi process



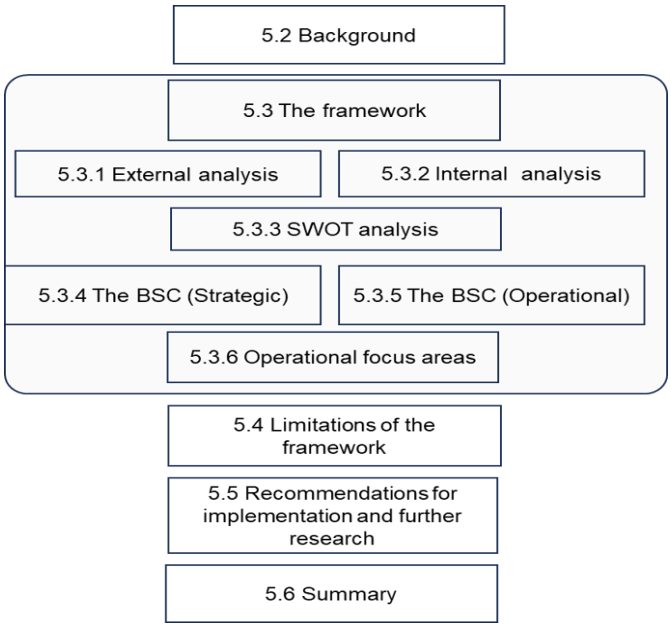
Note: Adapted from "A four-cycle view of Design Science Research" reprinted from A four-cycle model of IS design science research: capturing the dynamic nature of IS artefact design. By Drechsler, A., & Hevner, A.(2016), In Breakthroughs and Emerging Insights from Ongoing Design Science Projects: Research-in-progress papers and poster presentations from the 11th International Conference on Design Science Research in Information Systems and Technology (DESRIST) 2016. St. John, Canada, 23-25 May (p5). Copyright (2016) by The Author(s).

This chapter elaborates on the research findings. The overall intent is to integrate the research findings from both the questionnaires and structured surveys (discussed in Chapter 4) with findings from the literature and key constructs of the theoretical models used (discussed in Chapter 2). Summaries from the previous chapters are used in this chapter to demonstrate how a strategy development framework for learning with technology would work in practice. Figure 5-2 illustrates how the different sections follow in a logical sequence. The chapter starts with background to the framework and reiterates the research aim and questions. It also discusses the situational context in which strategy development occurs (Section

5.2). The framework (Section 5.3) illustrates the analytical processes that were used in the development of a strategy map in the form of a BSC.

Figure 5-2

Chapter outline



The analytical processes and strategy map with operational focus areas, are combined in a conceptual process framework. The BSC is presented as a strategy map and unpacked in terms of the detail elements. The strategy map correlates with the output of Section 4.4.4. It continues with a discussion of the characteristics of the framework with specific reference to its applicability to practice in a real-world context (Section 5.3). The chapter concludes with limitations of the framework (Section 5.5), recommendations for implementation and further research (Section 5.6) and a summary of the chapter (Section 5.7)

5.2 Background

5.2.1 The research problem, aim and questions

Emerging technologies are a catalyst for educational innovation with the potential to radically transform education. Technology innovations need to “improve the productivity and efficiency of learning and the quality of learning” (Serdyukov, 2017: p.12). The oversupply and proliferation of technological advances emerges in hype cycles but adoption and performance of these technologies lag after a significant

time lapse (Linden & Fenn, 2003). A good strategy informs good technology choices and contributes to significant business performance (Zahra & Covin, 1993). A strategic framework is, however, required to guide strategic and operational decision-making in terms of educational technology adoption and implementation.

The aim of this study is to provide a strategic framework that will highlight the multiple factors that contribute to the effective implementation of emerging technologies in learning on both a strategic and operational level. This framework attempts to outline critical elements associated with operational business performance when learning with technology.

Through a comprehensive literature search and qualitative investigations through interviews and questionnaires, the researcher aimed to answer the research questions of the study. The primary research question is: “How does strategy development occur through the dynamic interaction of strategy with learning, and technology integration?” In order to answer the question, the researcher looked for answers to the following secondary research questions: a) What are the elements to consider in a strategy map for learning with technology? and b) How do these elements influence each other in the overall strategy map?

The findings for research question a) are illustrated in the discussion on the elements of the BSC in Section 5.3.5. The findings for research question b) are illustrated with a hypothetical strategy map in Section 5.3.4. All the findings were integrated in a strategy development framework illustrated through the strategy development framework (Section 5.3) and the characteristics of the framework (Section 5.4).

5.2.2 Strategy development in its situational context

After reflecting on the main research question: How strategy development occurs through the dynamic interaction of technology with learning; it was clear to me that the complexities of strategy development need to be discussed in more detail.

Strategy development incorporates multiple role-players on different levels in an organisation and involves complex decision-making capabilities, with an analysis of

various components influencing the overall strategy. The purpose of a strategy is essentially to develop a plan of action to outwit competition in the context of external influences and internal capabilities (Mintzberg, 1987).

The strategy implementation framework of Okumus (2001), illustrates how strategy implementation requires the interplay of variables on different levels of complexity, considering the external environmental dynamics, the organisational context and ongoing strategic processes such as operational planning, resource allocation, monitoring and feedback. In this complex environment of strategy translation and implementation, leadership is the most important driver of successful strategy implementation (Jooste & Fourie, 2009).

Strategy formulation and implementation develops through various stages of strategy development. The process starts with strategic analysis, continues through strategy formulation, and then drives outcomes through decision-making and implementation (Fuertes et al., 2020). The implementation effort requires the resolution of functional conflicts, resource allocation, involvement of leadership and development of the capabilities required for implementation (Noble, 1999).

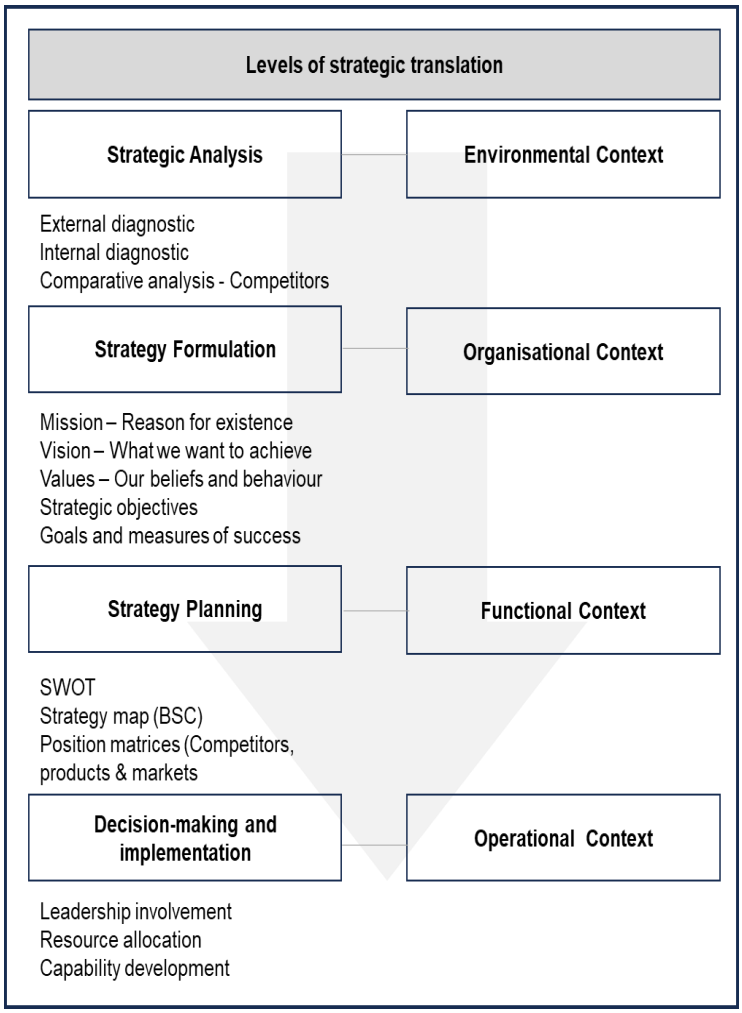
Since strategy development occurs in organisations as a hierarchical process, it is important to locate this framework in a conceptual hierarchical process. This will also make it easier to anticipate the applicability of the strategy development framework for learning with technology in an organisational context. The author constructed a visual representation of the different elements of strategy formulation based on the work of the authors discussed in this section (i.e.,Collis & Rukstad, 2008; Fuertes et al., 2020; Noble, 1999; Okumus, 2001) to illustrate how different strategy components fit together in a strategy process.

Figure 5-2 illustrates that strategy development starts with an analysis of the external and internal dynamics in the environmental context. A strategy is then formulated for the organisational context and incorporates aspects such as mission, vision, values, strategic objectives, and business goals. The mission, values and vision of a strategy are often philosophical components in an overall strategy plan. The actual plan highlights the scope in terms of markets, customers and products,

and the sources of competitive advantage. These sources of competitive advantage are the operational components that move the productivity frontier outwards (Collis & Rukstad, 2008; Porter, 1996).

Figure 5-3

Levels of strategic translation



The next level of strategy planning focuses on the functional context and operational environment, and results in a SWOT analysis and a strategy map in the form of a BSC. The BSC translates elements from the overall strategy into critical performance elements in different perspectives and support other strategy documents and statements (Collis & Rukstad, 2008; Porter, 1996).

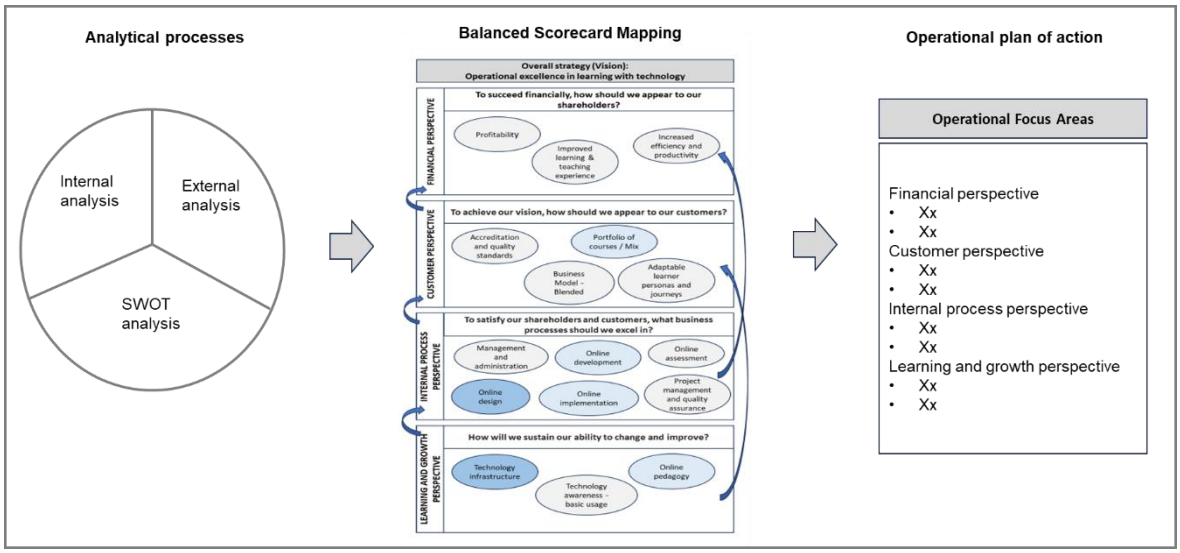
The BSC is effective as a strategy tool within a strategy process. It is, however, not a tool to formulate strategy but rather to operationalise strategic direction and drive strategy implementation (Tapinos et al., 2011). The last phase is the implementation of the plan and involves resource allocation and capability development.

5.3 The strategy development framework

The researcher combined various analytical and conceptual processes to find answers to the research questions. These analytical and conceptual processes crystallised in a framework that could be beneficial in other similar research environments related to technology in learning. The framework in Figure 5-4 illustrates how the researcher used analytical processes to develop a BSC strategy map and to identify operational focus areas related to this study.

Figure 5-4

The strategy development framework



The framework starts with analysing the complex dynamics in the internal and external environment and then combines them in a high-level SWOT analysis. Key findings form the analysis phase are then mapped according to important elements for each perspective of the BSC. The high-level conceptual picture of all the elements of the BSC represents a strategy map. After analysis and consideration of the importance of these elements, the operational focus areas emerge.

This process will typically happen in a business environment through the involvement of various role players at various levels in a group session. For the purpose of this study, the Delphi technique was used. Individual participants were interviewed, and individual contributions were translated through thematic analysis to construct the BSC. The individual contributions were also analysed to identify operational focus areas for learning with technology.

For the purposes of this study, the processes are practically demonstrated through the analysis and findings documented in earlier chapters of this thesis. The external analysis (Section 5.3.1), and internal analysis (Section 5.3.2) were discussed in Chapter 2, and the BSC (Sections 5.3.4 – 5.3.5) and operational focus areas (Section 5.3.6) were discussed in Chapter 4.

5.3.1 External analysis

The Gartner hype cycle for Education 2023 (Gartner Inc., 2023) is used as the dominant framework for external analysis. Some of the themes are then contextualised further in terms of its position on the hype cycle.

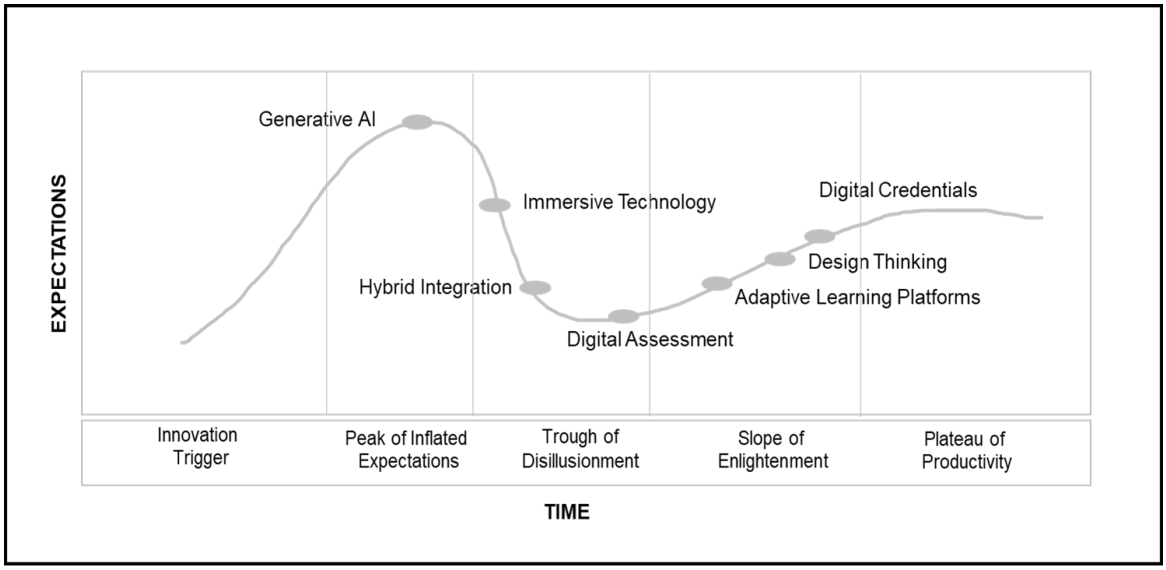
5.3.1.1 The Gartner hype cycle

The external analysis focuses mainly on the Gartner hype cycle in education as a key driver for further analysis (Gartner Inc., 2023). Further investigation is then required in terms of the different emerging themes and their relative position on the hype curve.

The Gartner hype cycle is illustrated in Figure 5-5: the first part of the hype cycle represents initial overenthusiasm about an emerging technology, driven by media perception and expectation of market players regarding potential prospects of the new technology, while the second part represents actual adoption and performance gains. The hype cycle provides a snapshot of the relative maturity of a technology in each context as it progresses through phases of inflated expectation, disillusionment, and enlightenment, to eventual productivity. Organisations should guard against overinvestment in the early stages of the hype cycle but should also not ignore potential benefits in the long run.

Figure 5-5

Themes from the hype cycle for Higher Education 2023



Note. Adapted from "Hype cycle in education 2023" reprinted from Hype Cycle for Higher Education 2023, by R.Yanckello, 2023, Gartner. Copyright (2022) by Gartner, Inc. and/or its Affiliates.

5.3.1.2 Key trends analysed from the Gartner hype cycle.

The following key trends as indicated in Table 5-1 were derived from the Gartner hype cycle for Education 2023 (Gartner Inc., 2023) and were also analysed further through other sources.

Table 5-1

Key trends in technology emergence

Trend	Comments	Position on hype curve
Generative AI	The recent boom in generative AI made educators acutely aware of the need for new competency frameworks to prepare learners to thrive in an AI powered world. Professional capacity building to acquire skills in using AI in instructional activities and assessment practices that will improve student learning (Baidoo-Anu & Owusu Ansah, 2023; Pedró, 2019)	Peak of inflated expectation
Blended learning / hybrid integration	Blended learning has emerged as a dominant theme when designing learning environments and includes theories, methods, and technologies in synchronous and asynchronous environments (Cronje, 2020; Joosten et al., 2020; H. Singh, 2021; J. Singh et al., 2021).	Trough of disillusionment

Technology supported collaborative learning	A collaborative learning environment, facilitating interaction among peers and tutors, needs to consider design elements to integrate "cognitive presence, social presence, and teaching presence" effectively in a virtual learning environment. Online collaboration and support contribute to a sense of closeness and belonging in an online environment (Berry, 2019; Ferri et al., 2020; Garrison et al., 1999; Mishra et al., 2020; Rasheed et al., 2020; Vlachopoulos & Makri, 2019)	Trough of disillusionment
Immersive learning experiences (AR, VR, Simulation, Game based learning)	Immersive learning environments such as VR and gamification can have high entertainment value but require technical competence and engineering skills. Further research is required to determine the effectiveness of such learning environments (Baker, Bujak, & Demillo, 2012; Hamilton et al., 2021; Joosten et al., 2020; Vlachopoulos & Makri, 2019)	Trough of disillusionment
Adaptive learning/ Educational analytics	Adaptive learning puts the student and his/her unique characteristics, abilities, knowledge competencies and preferences at the centre of the learning experience (Muñoz et al., 2022). AI Powered adaptive learning systems collect data and analyse the behaviour of students. It will suggest an optimal learning route and learning material based on students' learning patterns and unique abilities (Alam, 2022). Adaptive learning technology requires a solid technology infrastructure that includes appropriate hardware, software, and internet connectivity for execution. The design of these systems needs to accommodate the complex requirements to be adaptable and responsive to individual learners. Real-time data challenges and the interoperability and integration complexity of LMS's remains a significant challenge (Muñoz et al., 2022).	Slope of enlightenment
Digital assessment	There is a strong need to develop and enhance online assessment strategies to accommodate the requirements of learning styles, learning outcomes, pedagogy, and delivery to assure academic integrity and security (García-Morales et al., 2021; Gaytan & McEwen, 2007).	Slope of enlightenment
Microcredentials	Discomfort about the implementation of micro credentials is a global concern. It could provide a new income stream for short courses but major uncertainty around stackable components in curriculum design, and specifically standardisation, validation, and accreditation in the context of a quality framework, remains (Kato et al., 2020; McGreal & Olcott, 2022).	Slope of enlightenment

5.3.2 Internal analysis

A strategic framework or roadmap for the deployment and integration of digital technologies needs to consider the core capabilities (Wu et al., 2008) required for learning with technology. Such a macro-level strategy for a digital eco-system incorporates all digital components such as hardware, software, applications, training modules, knowledge components and processes and must facilitate the integration and interoperability of emerging and legacy technology components (Uden et al., 2007). Data protection and information security, and system reliability and protection against viruses are important components of technical management and support (Almaiah et al., 2020).

Core capabilities to be included in the digital eco-system (based on e-learning hypercube model) of Wu et al. (2008) includes:

a) Technology infrastructure for communication and delivery: This capability involves network infrastructure, applications platforms, LMSs, TMLS and devices such as PC's and Tablets.
b) Technology for content development: Technology used for content creation, packaging, and delivery.
c) Capabilities to design learning environments: Learning and teaching theories, strategies, and methods for online learning; methods for collaborative learning and new evaluation and assessment methods for online learning environments.
d) Technology support to learners, instructors, and institutions.

5.3.3 SWOT analysis

Although the SWOT analysis is primarily a group activity involving representatives of different strategic and operational levels in an organisation, the researcher used it as a mechanism to plot the factors identified through the literature review in different categories of the SWOT matrix.

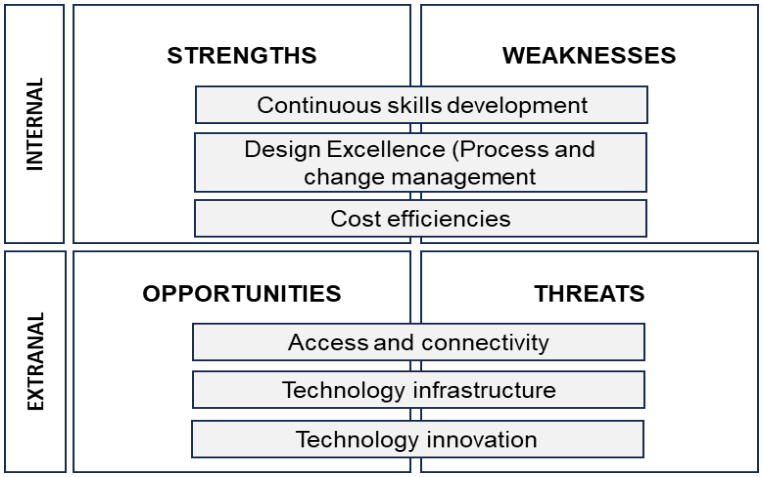
Since this analysis is not organisational specific, the SWOT analysis in Figure 5.6 indicates the relative position of the factors in an overall SWOT matrix. Some internal factors can be either a strength, or a weakness based on the current implementation of management control and rigour in a specific environment. The

external dynamics can be a threat to existence or provide valuable opportunities for new technological innovations.

The SWOT analysis was constructed from the analysis of challenges and recommendations in Section 2.6 of the literature. Factors driving internal efficiencies are related to cost efficiencies and productivity, design excellence in terms of emerging online environments, and the skills and capacity of learners and educators. External factors mainly concern factors related to technology infrastructure and access, as well as new innovations due to emerging technologies on the hype cycle.

Figure 5-6

SWOT Analysis



5.3.4 The BSC (Strategic)

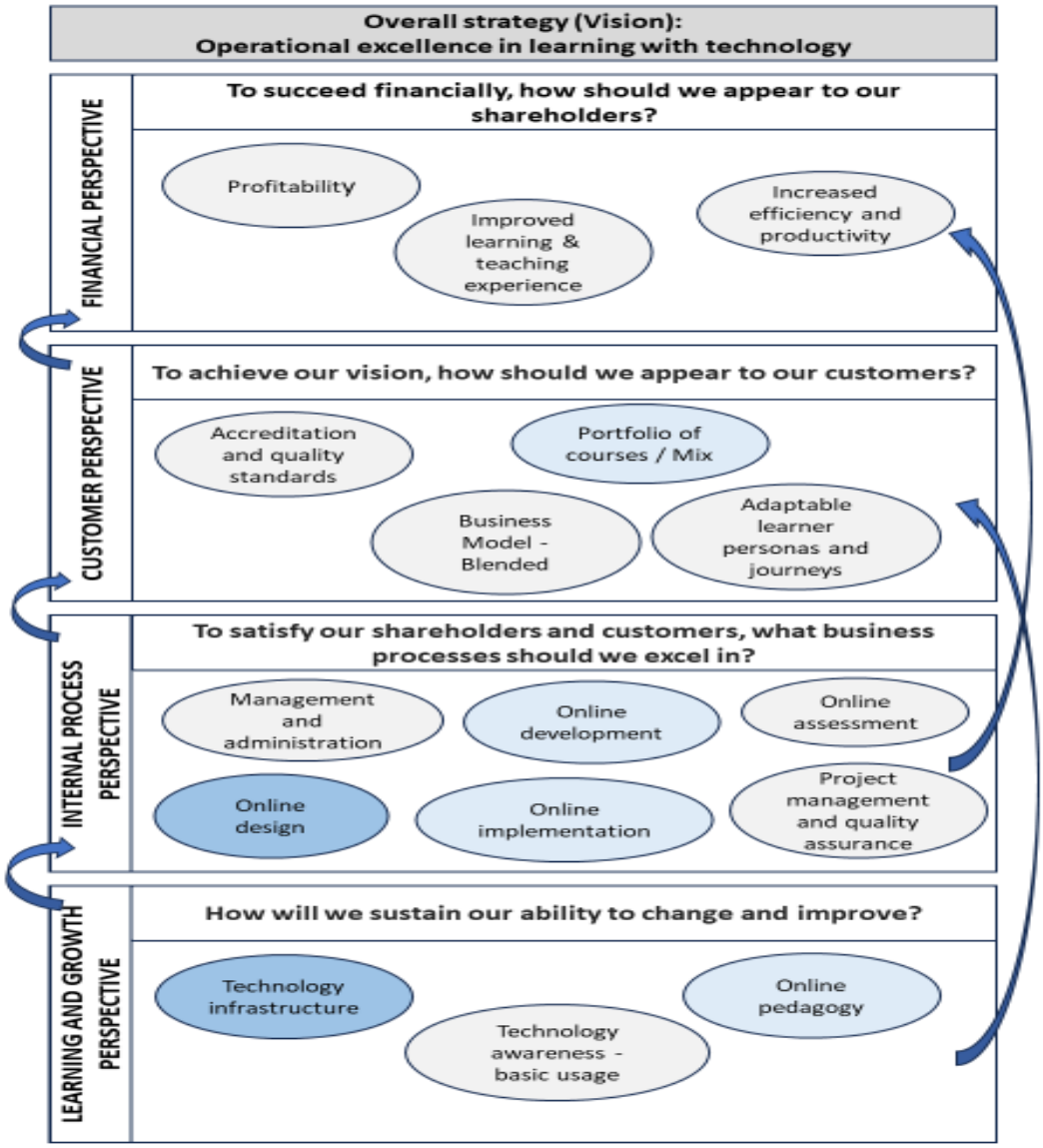
The BSC provides a comprehensive framework of critical areas in the business and how it links to a company's strategic vision and objectives as illustrated in Figure 5-7. The overall objective of "Operational Excellence in learning" was used as a strategic vision for this BSC.

The financial perspective contains traditional financial measures as well as measures related to shareholder value. Improved learning and teaching experience as well as increased efficiency and productivity in terms of learning have been added to the financial perspective due to the importance of these factors in a learning environment. The customer perspective includes measures that link directly

to the portfolio of learning interventions offered to specific student groups based on unique learner profiles. The internal process perspective focuses on core capabilities and related internal processes specifically related to learning design, delivery, and implementation. The learning and growth perspective builds capacity through initiatives in terms of continuous professional development and technology infrastructure that aim to improve performance in the financial, process and customer perspective.

Figure 5-7

The Strategic BSC



The guiding question for each perspective drives the activities and strategic objectives for each perspective in the context of the overall strategy. The impact of core capabilities in the learning and growth perspective on financial performance is not directly measurable. It does have a chain of causal relationships with critical aspects in the process and customer perspectives, leading to financial performance. Core output measures such as profitability and increased efficiency and productivity in learning are lagging indicators, while the leading indicators relate to the uniqueness of the business in terms of activities that will lead to profitability and the optimal mix of courses associated with specific online business models.

The BSC model provides an aggregated view of how these different elements influence each other in a causal way when linked to a single vision or strategic objective. In this strategy map, the arrows indicate the direction of causal influence. The colour of the bubbles indicates the intensity of the responses by participants who were interviewed. The light grey bubbles had the lowest number of mentions while the dark blue bubbles had the highest number of mentions. The BSC was constructed based on the work of Kaplan (2009) and Kaplan and Norton (1993, 1996, 2004).

5.3.5 The BSC unpacked (Operational)

In this section, every perspective of the BSC is unpacked, based on the core capabilities or elements associated with the leading question in each perspective. The elements are illustrated with bubbles and are coloured grey, light blue or dark blue in Figures 5.8-5.11. The colours indicate the number of mentions associated with each element. The grey bubbles accumulated between 2 and 30 mentions, the light blue bubbles between 31 and 50 mentions and the dark blue bubbles, more than 50 mentions.

5.3.5.1 The Financial perspective

The discussion on the financial perspective is based on Figure 5-8 and Table 5-2.

***Leading question*:** “To succeed financially, how should we appear to our shareholders?” (Kaplan, 2009: p 4). In a business environment, profitability and other financial measures are the ultimate lag factor of good practices. However, in a learning environment, improved learning through effective technology use, is the

ultimate lag factor. Because improved learning and increased efficiency and productivity are primary goals of operational excellence, the author decided to allocate these elements to the financial perspective.

The role and function of the training unit will also determine if the unit will have financial objectives or not. In some organisations, the unit will have a service delivery function to support other units in the organisation. This was also illustrated through some comments of the Delphi participants as reported in Chapter 4, Section 4.6. The individual roles of the people participating in a strategy session will determine the lenses through which they interpret the utility of the strategy map. The financial decision-maker might want to include some parameters to measure activities related to learning with technology.

Figure 5-8

BSC Financial perspective

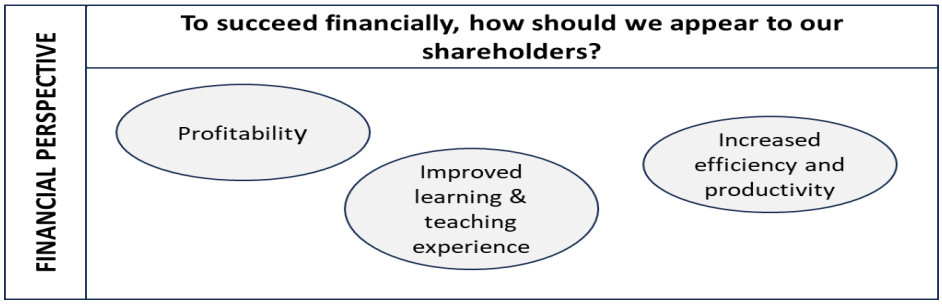


Table 5-2

Elements financial perspective

Theme	Description
Profitability	
Cost effective	Costs paid for new technology, hardware, software, and skills.
Diversified income	Online courses provide new income streams.
Improved learning and teaching experience	
Completion rate	Registered learners' complete programmes successfully in time
Student and lecturer satisfaction and engagement	Well-designed online teaching and learning contributes to satisfaction, happiness and engagement of students and lecturers
Unique learner experiences	How learners experience a specific technology or learning intervention.

Increased efficiency and productivity	
Improved learning outcomes	Improved learning outcomes as result of the use of technology.
Technology efficiency	Increased efficiencies in terms of cost of technology, time to develop resources and transferability or reusability of technology components.

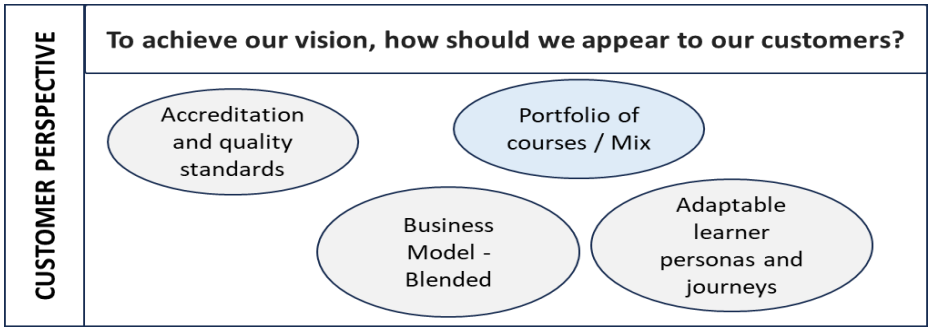
Table 5-2 contains a description of the different elements associated with each core capability. Key elements in the financial perspective, indicated with bubbles in Figure 5-8 are, profitability, improved learning and teaching experience and increased efficiency and productivity. Performance in these areas will lead to investments in educational technology by decision-makers.

5.3.5.2 The Customer perspective

The discussion on the customer perspective is based on Figure 5-9 and Table 5-3. ***Leading question:*** "To achieve our vision, how should we appear to our customers?" (Kaplan, 2009: p 4). The customer perspective involves important decisions in terms of a delivery model, the types of courses and segmentation of learner personas. Accreditation has a direct impact on the types of courses that can be sold to customers. It is also clear that generational differences influence the design of courses, while adaptive learning is emerging as an approach to provide multiple student journeys.

Figure 5-9

BSC Customer perspective



The bubbles in Figure 5-9 represent the different elements of this perspective. The different courses in an overall portfolio mix of courses were mentioned more than

any other category. Table 5-3 contains a description of the different elements associated with each core capability.

Table 5-3

Elements customer perspective

Theme	Description
Business Model	
Blended: Distance/online vs contact/face-to-face	Delivery mode of courses could include contact/face-to-face or distance/online delivery. Courses make use of synchronous and asynchronous components.
Centralised design unit	Design of digital learning components and learning strategies are done by a centralised unit. Design work can be outsourced, or skills are insourced to the unit.
Types of courses/ Portfolio Mix	
Accredited institutions - full qualifications	All educational institutions who are registered with relevant authorities to offer qualifications in line with a qualification's framework.
Compliance training	Compliance training is linked to compulsory regulatory knowledge in certain industries.
Industry specific training programs.	Training programmes are purposefully designed for specific roles in specific sectors or industries.
Micro credential linked to credits	Micro credential linked to credits.
Short course	Standardised short courses, transferable to different settings. Can be bought off-the-shelf.
Accreditation, quality and standards	
Accreditation bodies and standards	Bodies and authorities concerned with standards and accreditation of courses, e.g., SETA, QCTO, SAQA
Segment or learner personas	
Adaptive learning approach provides multiple student/ learning journeys	An adaptive learning approach enables a design for differentiated student journeys based on unique skills and performance.
Generational differences	Generational differences impact the speed of adoption of technology as well as the requirements for learning materials of different groups of learners.
Technology usage of students and lecturers should inform design	The technology literacy and usage patterns of students and lecturers are important determinants of how technology will be integrated in the learning experience. This should be incorporated in the analysis phase of the design process.

Feedback from Delphi participants indicated that the customer perspective should be adaptive to individual context. The customer in educational settings differs from the customer in corporate environments, and customer segmentation will depend on the unique characteristics of clients and customers. The customer requirements must therefore be interpreted for the unique contextual environment in which the BSC map will be applicable. This feedback from participants in terms of the

customer perspective were documented in Chapter 4, Section 4.6. The elements in this section, however, reflect generic components to be considered.

5.3.5.3 Internal process perspective

The internal process perspective is discussed with reference to Figure 5-10 and Table 5-4. ***Leading question:*** "To satisfy our shareholders and customers, what business processes should we excel in?" (Kaplan, 2009: p 4). The categories correlate strongly with the ADDIE design phases in an online environment. These categories are online design, online development, online implementation, and online assessment. Other themes such as management and administration, project management, and quality assurance align with aspects of organisational management. The bubbles in Figure 5-10 indicate that online design, online development, and online implementation elements received the highest number of mentions in this perspective.

Figure 5-10

BSC Internal process perspective

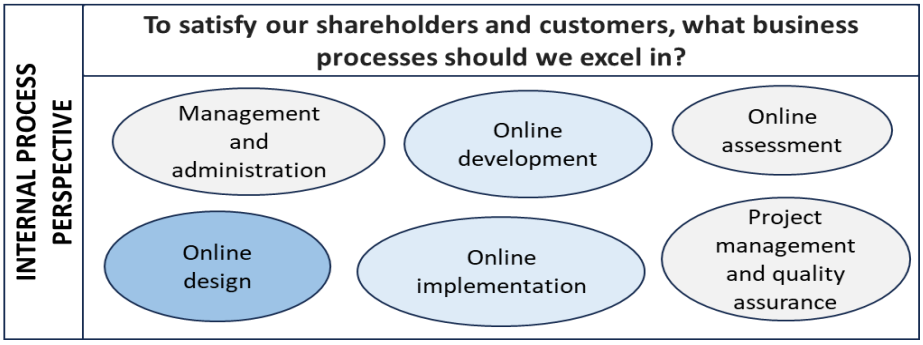


Table 5-4

Elements internal process perspective

Theme	Description
Online design	
Online design blueprint	An online design framework with all synchronous and asynchronous learning objects and settings for different learning models and methodologies.
Design principles for constructive alignment of learning objectives, strategies, and output.	ADDIE design principle of simplicity to accommodate decreasing attention span and need for excitement. Alignment of learning objectives, instructional media, activities, and assessment.

Online instructional strategies	Focus on the collaborative and social aspects of learning through project-based learning, on the job shadowing, or a community of inquiry/practice and peripheral participation. On the other hand, game-based learning, and digital badges are not that popular and expensive to develop. VR is used in specific settings such as the medical industry. Micro learning and micro credentials focus on specific practical skills learned in a short time frame. ChatGPT can be used by instructional designers and educators in the design and development of learning.
Online development	
Principles for multimedia development	Accommodate variety of formats and modalities. Technology design tools must be fit for purpose. Consider generational differences.
Learning delivery	Different variations of face-to-face, blended, online vs offline, synchronous vs asynchronous. It can also include virtual spaces and online workshops. Smartphones are often used as delivery mechanism.
Training material	Training material can vary from textbooks to downloadable digital documents, videos, job aids, URLs, and websites. Training material must be fit for purpose in terms of the learner personas.
Online implementation	
Navigation and orientation	Key information to provide online is study guide; learning objectives and module outcomes; how long each module will take (chunking); a to-do list with all activities, sessions, resources and assignments; Assessments and key dates; Names and contact details of lecturers; Feedback on progress; Announcements. Ensure transparency and consistency in learner experience.
Provide technical help and support and maintain online technology resources	Help and support students and educators in terms of technical issues. Create a knowledge bank of reusable knowledge components. Provide additional resources for differentiated learning within a student persona.
Student collaboration and communication, social support and WhatsApp	Ensure clear communication to students and enable collaboration and group work. Support from peer groups and group leaders. WhatsApp group to help with encouragement, social support, learning by peripheral participation. It creates cohesion and reduces fear.
Learning support	Provide practical support in terms of learning methods and learning material. Provide feedback and scaffold learning support.
Online assessment	
Guidelines for assessment	Policies, guidelines, and applications to ensure authenticity.
New ways of assessment	Authentic online assessment needs to look at portfolios of evidence in the digital world but also needs to include higher order skills. Clarity is required in terms of assessing work done with the help of AI.
Stakeholder management and administration	
Stakeholder involvement in change management	Leadership and decisionmakers need to be involved when new technology is implemented; that way they can ensure support to all staff.
Student Management and Administration	Analytics of student data and impact assessments ensure monitoring and evaluation.
Project management and Quality assurance	
Project management	Instructional design involves project management to incorporate different skills such as subject matter experts, instructional designers, ed-tech specialists and academic advisors.
Testing and checking	Quality assurance of work done.

Table 5-4 contains a description of the different elements associated with each core capability. The most important themes in this perspective are the need for design principles and guidelines in terms of instructional strategies, linked to a design blueprint; the need for principles and guidelines in terms of multimedia development; delivery on the learning platform through excellence in navigation, orientation, and support; and guidelines for assessment.

This perspective is also open for adaption to the situational context. The elements to be included will vary if the design team is situated in an organisation or institution with state-of-the-art design tools and an LMS infrastructure, or if the instructional designer is a freelance consultant. A freelance consultant might prefer to work with available open-source technologies, and design will be less governed through design principles and blueprints. This was also highlighted in feedback from Delphi participants in Chapter 4, Section 4.6.

5.3.5.4 Learning and growth perspective

The learning and growth perspective is discussed with reference to Figure 5-11 and Table 5-5. ***Leading question:*** "How will we sustain our ability to change and improve?" (Kaplan, 2009: p 4). This cluster of themes deals primarily with building capacity for future growth and development. It focuses broadly on technology infrastructure and skills development. In Figure 5-11 elements related to the technology infrastructure accumulated the highest number of mentions, followed by an online pedagogy and a basic technology literacy programme.

Figure 5-11

BSC Learning and growth perspective

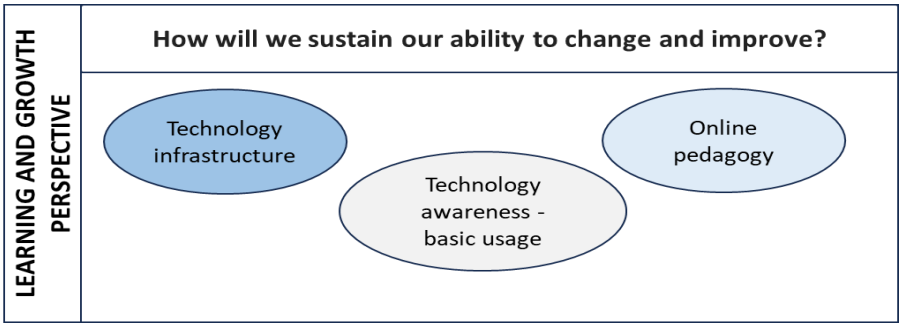


Table 5-5 contains a description of the different elements associated with each core capability. The technology infrastructure includes themes related to LMSs, technology authoring tools, data management, and technology management and support. An online pedagogy refers to aspects related to continuous professional development including digital assessment literacy and AI literacy. A basic technology usage programme can benefit learners and educators.

Table 5-5

Elements Learning and growth perspective

Theme	Description
Technology infrastructure	
Technology LMS	Most Learning Management Systems come with a standardised toolbox of design tools and instruments. Some standalone tools can be integrated.
Technology authoring tools	Wide variety of design tools: Microsoft Suite, Google Suite, Adobe reader, Articulate, Grammarly, Quilbot, Camtasia, Captivate, Storyline 360, Kahoot and other gaming platforms, reflection tools and ChatGPT.
Data Management	Document management and protection on a shared drive.
Technology management and support	Management and support of all strategic and operational technology components.
Online pedagogy	
Oline pedagogy	Instructional designers need to have knowledge of curriculum design and educational technology tools as well as good writing skills. Focus should be on continuous professional development in terms of an online pedagogy.
AI Literacy	Teach students the ethical use of AI technologies.
AI Assessment Literacy	Rethink the assessment of digital assignments as well as assessment considering AI.
Technology awareness basic usage program	
Technology awareness basic usage programme	Learners and educators lack sufficient digital literacy. Rethink what technology knowledge should be acquired to use ed tech tools efficiently. Equip learners and educators with basic technology usage knowledge and skills.

Once again, the elements to be included aim for a holistic and complete picture of what the strategy should incorporate. As with the other perspectives, the unique context of an organisation in terms of infrastructure and skills development will determine the elements to include in the overall map. The technical complexities will also vary in different organisations.

5.3.6 Operational focus areas

The leading questions for each perspective contributed to the identification of core capabilities and key elements in each perspective. Table 5-6 highlights the operational focus areas that were identified for each perspective. This could also be the tactical plan of action.

Table 5-6

Operational focus areas

Perspective	Operational focus areas
Financial perspective	1) Financial - Optimise profitability through the diversification of income streams and the management of infrastructure and operational cost. 2) Non-financial - Improve the learning and teaching experience through efficiencies and productivity of ed-tech technologies.
Customer perspective	1) Provide an optimal basket of blended learning interventions. 2) Understand student personas and journeys based on unique technology profiles and other student analytics.
Process perspective	1) Develop an online design blueprint, incorporating design principles, instructional strategies, and constructive alignment of learning objectives and outcomes with the use of edtech tools and instruments. 2) Develop learning materials based on principles for multi-media development for optimal delivery across different modes (e.g., synchronous, asynchronous, online and face-to-face). 3) Implement learning interfaces according to principles of navigation and support (learner, social and technical).
Learning and growth perspective	1) Plan for the optimal technology architecture (LSM and stand-alone tools and components) and ensure continuous support and management of the platform. 2) Continuous professional development in terms of an online pedagogy that includes instructional design skills, writing skills, technical design skills, curriculum design skills. AI literacy and AI assessment literacy as part of the continuous professional development. 3) Provide basic technology usage and skills programmes for learners and educators involved in learning with technology.

5.4 Characteristics of the strategy development framework

The framework development process was guided by design principles such as the overall objective or intent of the framework, concepts like rapid prototyping modularity and plasticity in design thinking, and the different levels of strategic translation in a work environment.

5.4.1 Overall intent driving the framework.

The primary goal of this framework is to improve operational excellence in learning with technology. This was also the primary goal of technology according to CIOs from institutional learning organisations (Gartner Inc., 2022).
The intent is further to ensure constructive alignment between learning objectives, educational technology and its affordances, instructional strategies and learning outcomes. Investment decisions regarding new technology requires an understanding of how tools can be used with effective instructional approaches and methods to maximise "productivity of learning and increased cost and time efficiency" (Serdyukov, 2017: p17).

5.4.2 Applicability in organisational context – operational

It is important to note that the proposed strategy development framework as output of this study is intended to have practical value on an operational level in support of an overall strategy. The strategy map is translated from strategic objectives and themes in an organisational context as discussed in Section 5.2.2. The applicability of the framework is therefore concentrated on an operational level with a specific focus of improving efficiencies.

The strategy development framework will therefore be useful in a corporate environment or educational institution, specifically for an educational design unit or team of instructional designers who are embracing new technological advancements in their field of practice or operation. It is further suggested that it is designed as a group process with representation from different roles, such as, IT architecture, financial decision-makers, technical instructional designers, and educators to appreciate the potential richness of the framework in its totality. This follows from the findings documented in Chapter 4, Section 4.6.5.

Strategy development is all about insights in how to create more value for the company. These insights in production and delivery are often in the hearts and minds of operating managers who are involved in daily activities of the business. A winning strategy incorporates these insights and allows strategy development to follow a messy, iterative, bottom-up process. (Cambell and Alexander, 1997).

5.4.3 Design thinking and rapid prototyping

The framework incorporates complex systemic processes and environmental dynamics in different iterative and practical innovative cycles. This allows for its adaptability and sustainability when future technological trends emerge. The principles of rapid prototyping are also integral to the model. Rapid prototyping allows for parallel cycles of research, design, development, and implementation of modular components. Modularity allows changes to a segment or unit without affecting the unit as a whole. Plasticity refers to time and cost efficiency of such changes. The approach is feasible and compatible with real-world design processes. (Brown, 2008; Tripp & Bichelmeyer 1990).

5.4.4 Open and adaptive to environmental context

Different types of strategy models further give a perspective on how strategy development occurs. Three different types of strategy models exist, namely linear, adaptive, and interpretive. The researcher resonates with the characteristics of the adaptive model as it aligns with the intent of this research.

The adaptive model is situational and can vary depending on the context. It continuously monitors the external environment and assesses internal conditions in order to match capabilities to opportunities and threats. It is an open and dynamic process, consisting of conceptual and analytical exercises, and it is not only the responsibility of top management, but leaders on all levels, to contribute to strategy development (Chaffee, 1985).

5.5 Limitations of the framework

The researcher has worked in a strategy environment in a large corporate organisation for almost ten years and would like to highlight the limitations inherent in the proposed strategy development framework.

Strategy development is complex and involves many role-players from different levels in an organisation. A good strategy will include a competitor analysis with a benchmarking exercise in terms of how internal capabilities compare with those of competitors. This framework does not focus on the position or capabilities of

competitors, but specifically on improving one's own capabilities through internal efficiencies.

The analysis of an external environment could include many determinants. For this study, technology and internal capabilities were the key driving forces of analysis, and that is why the Gartner hype cycle for education was used as a dominant framework for external analysis.

The BSC as a strategy implementation tool needs to be translated from an overall business strategy and its strategic themes and objectives. This is also discussed in Section 5.2.2. Since operational excellence is a key theme in learning with technology, identified through the literature review, it was chosen as the hypothetical theme as a guiding principle for the strategy map.

Strategy development occurs through the collective intelligence created in group processes. In this research, the Delphi technique was used to gain insights from participants. The Delphi technique requires that the participants remain anonymous to each other, and no informal group interaction was allowed. The outcome could have been different if a team of people in the same organisation had gone through the same analytical and conceptual processes in a strategy development workshop.

Through the sampling process, a very homogenous group of participants was selected, based on the level of roles they occupied in different organisations. They did, however, come from different educational institutions and business environments, which allowed for variation in responses.

The strategy map did not make provision for challenges such as inclusivity and access to be included. Similarly, it did not include any requirements for special needs training.

5.6 Recommendations for implementation and future research

The researcher recommends the following research as a spin-off from this research report. The strategy development framework could potentially be tested as a case study in an educational institution or business environment with a team of

instructional designers or a design unit. The framework could differ if a larger sample was selected through a stratified sampling technique. A stratified sample would highlight intricate differences in different settings, e.g., tertiary institutions or corporate learning and development environments.

5.7 Summary

The strategy development framework suggests an approach that could be transferable to unique circumstances in a changing environment. An analysis of internal and external factors provides the context for analysing strengths and weaknesses in terms of opportunities and threats. The BSC gives a comprehensive picture of all factors to be considered strategically in terms of a company or institution's vision or objectives. The operational focus areas focus attention and future efforts to remain competitive and sustainable.

The characteristics of the framework highlight the dynamics of the complex strategy environment and processes that contribute to the overall effectiveness of the framework.

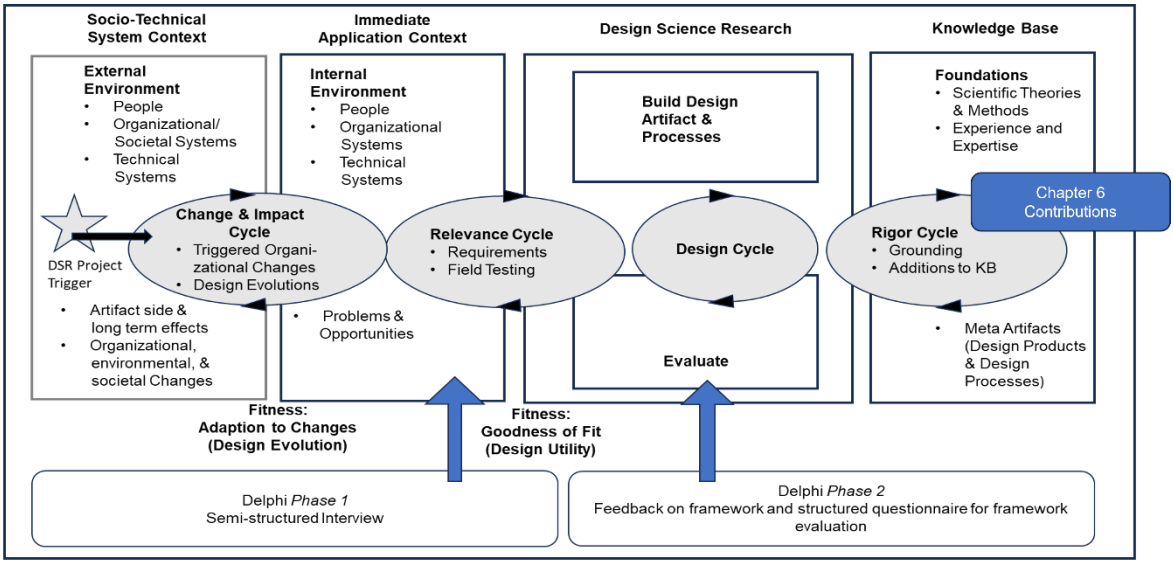
6. CHAPTER 6: CONCLUSION

6.1 Introduction

This chapter links to the rigour cycle of the integrated DSR and Delphi process and elaborates on the contributions to the knowledge base as indicated in Figure 6.1

Figure 6-1

Knowledge contribution as part of the integrated DSR and Delphi process



Note: Adapted from "A four-cycle view of Design Science Research" reprinted from A four-cycle model of IS design science research: capturing the dynamic nature of IS artefact design. By Drechsler, A., & Hevner, A.(2016), In Breakthroughs and Emerging Insights from Ongoing Design Science Projects: Research-in-progress papers and poster presentations from the 11th International Conference on Design Science Research in Information Systems and Technology (DESRIST) 2016. St. John, Canada, 23-25 May (p5). Copyright (2016) by The Author(s).

This chapter presents the summary of findings of this study, followed by what we have learned. Recommendations for future research are discussed, and a closing summary of the study concludes this chapter.

6.2 Summary of findings

This section deals with how the research questions were answered, and some gaps in existing research. It elaborates on the contributions made to theory and practice and how they can be applied in a real-world context.

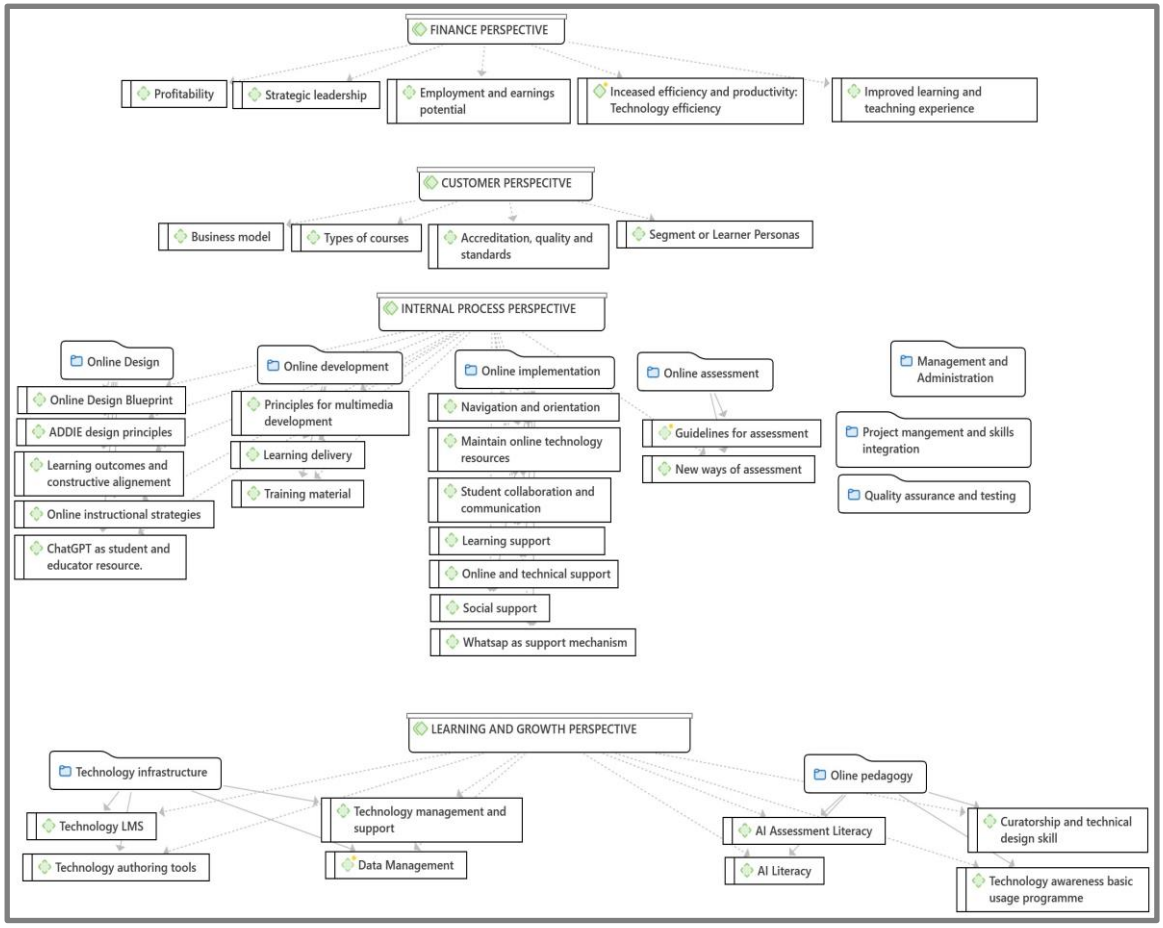
6.2.1 How were the research questions answered?

The aim of the research was to provide a strategic framework that will highlight the multiple factors that contribute to the effective implementation of emerging technologies in learning on both a strategic and operational level.

The secondary research questions were answered through a BSC presented as a strategy map. The questions looked at: a) the elements to consider in a strategy map for learning with technology; and b) how the elements influence each other in the overall strategy map.

Figure 6-2

Hypothetical strategy map for learning with technology



The strategy map can be presented as the image in Chapter 5, Section 5.3.4, but for the purposes of this summary of findings, the more detailed conceptual version of the strategy map is presented. The detailed strategy map emerged through

thematic analysis in Chapter 4, Section 4.4.4, and is presented in Figure 6-2. The hypothetical strategy map includes all the elements per perspective as well as the themes supporting those elements. The individual elements are discussed in Chapter 5, Section 5.3.5. This picture gives a first impression of how the elements fit together in an integrated strategy map. These elements can function as placeholders during a strategy development process. The elements might change during group strategy planning sessions, to adapt the strategy map to an individual context.

The primary research question was: “How does strategy development occur through the dynamic interaction of technology with learning?” The primary research question was answered through the development of a strategy development framework, as was discussed in Chapter 5.

Figure 6-3

Study contribution – The strategy development framework

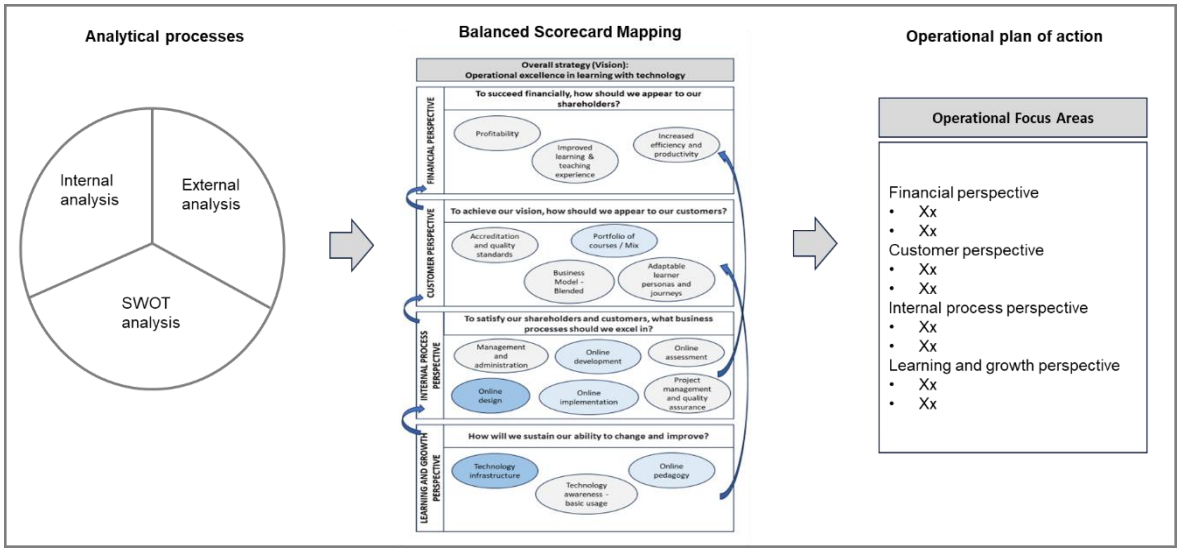


Figure 6-3 highlights the analytical and conceptual processes in the strategy development framework. It starts with an analysis of the internal and external environment of learning with technology. The Gartner Hype Cycle for Education (Gartner Inc., 2023) is the dominant framework for the external analysis, while core capabilities in a technical eco-system are used to analyse the internal environment. The SWOT analysis brings the internal and external environments together through

identifying potential opportunities and threats for learning with technology. The elements identified in the internal and external environment are then mapped through a conceptual process in the categories of the BSC. The BSC is however translated from other strategy documents in an organisation that clarify the vision, mission, strategic themes, market segments and products and services that will determine the competitive advantage of an organisation. For the purpose of learning with technology, the theme of operational excellence was chosen as a guiding theme for the different perspectives. The guiding question for each perspective then determines how individual elements are allocated in the overall strategy map. (This is discussed in Chapter 2, Section 2.7.1; Chapter 4 Section, Section 4.3; and Chapter 5, Section 5.3.5) Individual elements then determine the operational focus areas and tactical plan of action.

The strategy development framework defined some characteristics that guide implementation in a practical context. These characteristics include the strategic intent and the situational context within the hierarchical strategy development process. This study chose operational excellence as intent, and strategy implementation on an operational level through a BSC map as level of practice. Rapid prototyping provides for flexibility in terms of individual components in the overall framework. Finally, the framework is open and adaptive and can be modified to fit any environment of learning with technology. It is responsive to changes in technological and other business changes. It will be ideal in a group context where the collective intelligence of group members can contribute to the richness of individual elements in the overall map and plan.

6.2.2 Gaps in existing research

The gaps in existing research are highlighted in Chapter 2, Section 2.1.4. Literature search processes highlighted that there is a gap between strategy, new technology, evaluation, and theory and practice.

Although there is substantial research in terms of new emerging technologies such as chatbots, AIED, online assessment and AR, all these research reports focus only on the individual components of this study. There are limited reports on how these emerging technologies impact strategy processes.

Strategy processes and the BSC are not well researched or adopted in educational settings, and not to the same extent as in business environments.

6.2.3 Contribution to theory and practice

This study made the following contributions:

a) A strategy development framework for learning with technology. The contribution enhances theories around the analytical and conceptual processes when planning and implementing new emerging technologies in learning.
b) A hypothetical strategy map for learning with technology. The strategy map can be applied in the contextual environment as was demonstrated by the application of the framework in Chapter 5, Section 5.4
c) The study also highlighted the current focus areas for operational excellence in learning with technology as was demonstrated in Chapter 5, Section 5.3.6.

6.2.4 Contribution to DSR

The contribution to DSR can be classified in five different genres such as “information systems design theory, design-oriented research, explanatory design theory and action design research and design science methodology” (Peffers et al., 2018: p.132). This study contributes in terms of design science methodology.

The research demonstrated that the pragmatist philosophy in information systems research can be effectively transposed to educational research. The focus of the research was a specific problem identified in a metacontextual and interdisciplinary environment where learning with technology was contextualised in a business environment. The DSR process methodology provided a high-level roadmap for the integration of the Delphi technique and the use of various qualitative instruments in the research design. The DSR process was flexible but not constrained by design rigour. The theories of learning design, the BSC, and other strategy processes were purposefully integrated to create a generalisable artefact, in this case in the form of a process framework, with applicability to multiple contexts of learning with technology. The artefact evaluation demonstrated its utility in context.

The DSR knowledge contribution can be classified as an exaptation (Gregor & Hevner, 2013), since known solutions in a business environment were successfully adopted and extended to provide a solution in a complex environment of learning with technology.

6.2.5 Application of findings in the real world

The characteristics of the strategy development framework make the framework responsive and adaptive to any context of learning with technology. This context can be a business environment, a learning and development unit of an organisation, or the learning development unit of an educational institution. It is flexible enough to include role players on different levels of an organisation as well as members from different functions such as Finance, Technology, Human Resources, and instructional designers.

The strategy development framework provides guidelines in terms of the analytical and conceptual processes to analyse the environment and to map determinants of the environment in a conceptual strategy map to derive operational focus areas. The hypothetical strategy map provides a comprehensive picture of potential elements to consider when developing a customised strategy map. Details in the map can be utilised as placeholders when drafting a specific strategy map.

Operational focus areas identified as part of this study, give an indication of current burning issues in learning with technology. These focus areas are: improve the learning and teaching experience through efficiencies and productivity of ed-tech technologies; understand student personas and journeys based on unique technology profiles and other student analytics; the need for principles in terms of multimedia design; an online design blueprint; and implementation of learning interfaces according to principles of navigation and support. Lastly, continuous professional development in terms of an online pedagogy and an increase in basic technology literacy of students and educators.

6.3 Lessons learned from methodological choices.

This section deals with some lessons learned in terms of the theoretical framework, research design and sampling strategy.

6.3.1 Theoretical framework

The BSC and ADDIE systemic design paradigm was used as a theoretical framework for this study. The researcher worked in a strategy environment for more than 10 years and intuitively knew how the analytical processes would lead to a conceptual outcome. The inclusion of strategy concepts, processes and tools in the theoretical framework could have contributed to enhanced theoretical depth and richness in terms of strategy development in educational institutions. The outcome of the study does, however, provide a practical solution to a complex problem on the appropriate level of application in an organisational context.

6.3.2 Research design

The study integrated DSR with a modified Delphi technique. A small number of participants were involved in two phases of research. The first phase was a semi-structured online interview and during the second phase, participants had to complete an online questionnaire on Google Forms. Although the process was designed in this way to ensure continuation in terms of the theoretical development of the strategy development framework, the researcher found that there was some dissonance between individual contributions and the evaluation of the framework. The researcher also found that the two phases of research were too time-consuming for participants, and two of the participants opted to discontinue participation in the second phase. This is discussed in Chapter 4, Section 4.6.

An alternative approach could have been to use a focus group during the first phase of information gathering, and to evaluate the artefact, in this case the strategy development framework, through a case study in a specific environment, considering the benefits and draw backs of the different qualitative instruments.

6.3.3 Sampling

The study used purposeful sampling based on specific criteria because of the theoretical nature of the research. The challenge, however, is that the strategic competence of individual participants could not have been estimated beforehand. The researcher dealt with this by translating responses in terms of strategy development. The outcome of the study is focused primarily on an operational level, which gives an indication of the level that respondents are operating on. The

respondents were concentrated on a level of strategy development and implementation.

Participants, functioning in higher organisational levels, and therefore with a more developed level of strategic competence, would have responded in a different way and the research results would then have been different, perhaps focusing on scenarios and possible futures.

6.4 Recommendations

From the empirical results of this study, recommendations to benefit practice can be highlighted. This study also provides some background on other aspects that could be explored to understand strategy in education, decision-making in terms of technological investments, and pedagogical implications.

6.4.1 Implications for practice

The current focus areas of learning with technology identified through this research indicated the needs and requirements for practice in Chapter 4, Section 4.6.4. There is an opportunity to develop some of these constructs through research. These constructs are programmes for basic technology literacy for educators and learners; continuous professional development of an online pedagogy; development of a basic design blueprint for online learning; and guidelines for multi-media design of learning materials.

6.4.2 Strategy research

A gap in research related to strategy processes in education was identified in Chapter 2, Section 2.1.3. This could include attitudes towards strategy development, processes, tools, and techniques. There is an opportunity to further explore the possible futures of technology transformation in education, maybe from a global perspective and how it will impact national policies on technology in education, locally in South Africa. This transformation is influenced by access to electricity and telecommunications infrastructure as discussed in Chapter 2, Section 2.6.1 and may result in different models of transformation in developing and developed countries.

The advent of generative AI may require an enhancement to skills development frameworks for educational settings and business environments. The specific elements of those frameworks need to be determined through further research and were discussed in Chapter 2, Section 2.1.2.

6.4.3 Technological implications of educational technology

Further research is required to understand the complex interaction of technology investments in the face of disruptive innovation. An understanding of this complex trade-off between short-term performance and long-term sustainability can benefit financial decision-makers as discussed in Chapter 1, Section 1.1.

6.4.4 Pedagogical implications

AI and online pedagogies need continuous enhancement and improvement as discussed in Chapter 2, Sections 2.6.4 and 2.6.7. Various shortcomings have emerged in terms of ethical applications and assessments. Some developments in these areas are fragmented, and a holistic approach could be beneficial to practice.

6.5 Closing summary

The aim of the research was to provide a strategic framework to highlight the multiple factors that contribute to the effective implementation of emerging technologies in learning on both a strategic and operational level.

The study used the theoretical framework of the BSC to guide the analysis and presentation of research findings. The research design integrated the cycles of DSR with a modified Delphi technique. Design thinking guided the development of research through the different cycles and Delphi stages. A Delphi panel participated during the analysis phase through a semi-structured interview in phase 1 of the research, and also evaluated the designed artefact in phase 2 of the research through a structured questionnaire.

The research explored how strategy development occurs through the dynamic interaction of strategy with learning, and technology integration. To this end, the strategy development framework suggests an approach that could be transferable to unique circumstances in a changing environment. An analysis of internal and

external factors provides the context for analysing strengths and weaknesses in terms of opportunities and threats. The BSC gives a comprehensive picture of all factors to be considered strategically in terms of a company or institution's vision and objectives. Developing the BSC leads to identification of operational focus areas and tactical plans. The strategy development framework defines some characteristics that guide implementation in a practical context. These characteristics include the strategic intent and the situational context within the hierarchical strategy development process. This study chose operational excellence as intent, and strategy implementation on an operational level through a BSC map as level of practice. Rapid prototyping provides for flexibility in terms of individual components in the overall framework. Finally, the framework is open and adaptive and can be modified to fit any environment of learning with technology. It is responsive to changes in technological and other business changes. It would be ideal in a group context where the collective intelligence of group members can contribute to the richness of individual elements in the overall map and plan.

The study further analysed the key elements of a strategy map for learning with technology and how these elements influence each other within the overall strategy map. A hypothetical strategy map for learning with technology, was developed, based on the conceptual foundations of the BSC. It frames all the elements per perspective as well as the themes supporting those elements, to provide an integrated picture of how all the elements fit together. These elements can function as placeholders during a strategy development process. The elements might change to adapt the strategy map to an individual context.

Operational focus areas for learning with technology were identified during this analysis and comprise: improve the learning and teaching experience through efficiencies and productivity of ed-tech technologies; understand student personas and journeys based on unique technology profiles and other student analytics; the need for principles in terms of multimedia design; an online design blueprint; implementation of learning interfaces according to principles of navigation and support; continuous professional development in terms of an online pedagogy; and lastly, an increase in basic technology literacy of students and educators.

To conclude, this study made the following contributions:

- A strategy development framework for educational technology that enhances theories around the analytical and conceptual processes when planning and implementing new emerging technologies in learning.
- A hypothetical strategy map for learning with technology that can be applied in a dynamic context.
- The study also highlighted the current focus areas for operational excellence in learning with technology.

7. LIST OF REFERENCES

Alam, A. (2022). Employing Adaptive Learning and Intelligent Tutoring Robots for Virtual Classrooms and Smart Campuses: Reforming Education in the Age of Artificial Intelligence. *Lecture Notes in Electrical Engineering*, *914*. https://doi.org/10.1007/978-981-19-2980-9_32

Allen, I. E., & Seaman, C. A. (2007). Likert scales and data analyses. In *Quality Progress* (Vol. 40, Issue 7).

Allen, W. C. (2006). Overview and Evolution of the ADDIE Training System. *Advances in Developing Human Resources*, *8*(4). https://doi.org/10.1177/1523422306292942

Almaiah, M. A., Al-Khasawneh, A., & Althunibat, A. (2020). Exploring the critical challenges and factors influencing the E-learning system usage during COVID-19 pandemic. *Education and Information Technologies*, *25*(6). https://doi.org/10.1007/s10639-020-10219-y

Anderson, C. (2010). Presenting and evaluating qualitative research. *American Journal of Pharmaceutical Education*, *74*(8).

Arifin, S. R. M. (2018). Ethical considerations in qualitative study. *International Journal of Care Scholars*, *1*(2).

Avella, J. R. (2016). Delphi panels: Research design, procedures, advantages, and challenges. *International Journal of Doctoral Studies*, *11*. https://doi.org/10.28945/3561

Ayu, M. (2020). Online Learning: Leading e-Learning at Higher Education. *The Journal of English Literacy Education: The Teaching and Learning of English as a Foreign Language*, *7*(1). https://doi.org/10.36706/jele.v7i1.11515

Baidoo-Anu, D., & Owusu Ansah, L. (2023). Education in the Era of Generative Artificial Intelligence (AI): Understanding the Potential Benefits of ChatGPT in Promoting Teaching and Learning. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4337484

Baker, P. M. A., Bujak, K. R., & DeMillo, R. (2012). The evolving university: Disruptive change and institutional innovation. *Procedia Computer Science*, *14*, 330–335.

Baker, P. M. A., Bujak, K. R., & Demillo, R. (2012). The evolving university: Disruptive change and institutional innovation. *Procedia Computer Science*, *14*(Dsai), 330–335. https://doi.org/10.1016/j.procs.2012.10.037

Balakrishnan, R., & Das, S. (2020). How do firms reorganize to implement digital transformation? *Strategic Change*, *29*(5). https://doi.org/10.1002/jsc.2362

Battou, A., Baz, O., & Mammass, D. (2016). Learning Design Approaches for Designing Virtual Learning Environments. *Communications on Applied Electronics*, *5*(9). https://doi.org/10.5120/cae2016652369

Beard, D. F. (2009). Successful Applications of the Balanced Scorecard in Higher Education. *Journal of Education for Business*, *84*(5). https://doi.org/10.3200/JOEB.84.5.275-282

Berry, S. (2019). Teaching to connect: Community-building strategies for the virtual classroom. *Online Learning Journal*, *23*(1). https://doi.org/10.24059/olj.v23i1.1425

Bogdan, R., & Biklen, S. K. (2007). Foundations of Qualitative Research for Education. *Qualitative Research for Education*, *4*.

Brown, M., Nic Giolla Mhichil, M., Beirne, E., & Mac Lochlainn, C. (2021). The global micro-credential landscape: Charting a new credential ecology for lifelong learning. *Journal of Learning for Development*, *8*(2). https://doi.org/10.56059/jl4d.v8i2.525

Brown, T. (2008). Design Thinking By Tim Brown. *Harvard Business Review*, *86*(6).

Budoya, C. M., Kissaka, M. M., & Mtebe, J. S. (2019). Instructional design enabled Agile Method using ADDIE Model and Feature Driven Development method. *International Journal of Education and Development Using Information and Communication Technology (IJEDICT)*, *15*(1).

Burgelman, R. A., Christensen, C. M., & Wheelwright, S. C. (2004). *Strategic Management of technology and innovation* (Fourth Edition). McGraw-Hill/Irwin.

Chaffee, E. E. (1985). Three Models of Strategy. *Academy of Management Review*, *10*(1). https://doi.org/10.5465/amr.1985.4277354

Checa, D., & Bustillo, A. (2020). A review of immersive virtual reality serious games to enhance learning and training. *Multimedia Tools and Applications*, *79*(9–10). https://doi.org/10.1007/s11042-019-08348-9

Chen, S. H., Yang, C. C., & Shiau, J. Y. (2006). The application of balanced scorecard in the performance evaluation of higher education. *TQM Magazine*, *18*(2). https://doi.org/10.1108/09544780610647892

Clason, D. L., & Dormody, T. J. (1994). Analyzing Data Measured By Individual Likert-Type Items. *Journal of Agricultural Education*, *35*(4). https://doi.org/10.5032/jae.1994.04031

Collins, C. S., & Stockton, C. M. (2018). The Central Role of Theory in Qualitative Research. *International Journal of Qualitative Methods*, *17*(1). https://doi.org/10.1177/1609406918797475

Collis, D. J., & Rukstad, M. G. (2008). Can you say what your strategy is? *Harvard Business Review*, *86*(4).

Connelly, L. M. (2014). Ethical considerations in research studies. *Medsurg Nursing*, *23*(1).

Cope, B., Kalantzis, M., & Searsmith, D. (2021). Artificial intelligence for education: Knowledge and its assessment in AI-enabled learning ecologies. *Educational Philosophy and Theory*, *53*(12). https://doi.org/10.1080/00131857.2020.1728732

Creswell, J., & Poth, C. (2016). Second Edition QUALITATIVE INQUIRY& RESEARCH DESIGN Choosing Among Five Approaches. In *SAGE Publications* (Vol. 3).

Cronje, J. C. (2008). Who Killed e-learning? *Instructional Technology Forum*.

Cronje, J. C. (2020). Towards a new definition of blended learning. *Electronic Journal of E-Learning*, *18*(2). https://doi.org/10.34190/EJEL.20.18.2.001

Dalkey, N. (1969). An experimental study of group opinion: The Delphi method. *Futures*, *1*(5). https://doi.org/10.1016/S0016-3287(69)80025-X

Dalkey, N., & Helmer, O. (1963). An Experimental Application of the DELPHI Method to the Use of Experts. *Management Science*, *9*(3). https://doi.org/10.1287/mnsc.9.3.458

Dill, D. (2009). Quality Assurance in Higher Education – Practices and Issues. In *International Encyclopaedia of Education, Third Edition*. https://doi.org/10.1016/B978-0-08-044894-7.00833-2

Dong, J. Q. (2021). Technological choices under uncertainty: Does organizational aspiration matter? *Strategic Management Journal*, *42*(5). https://doi.org/10.1002/smj.3253

Donmez, M., & Cagiltay, K. (2016). A review and categorization of instructional design models. *E-Learn: World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education. Washington, DC, United States, November 14-16*, *November 2016*.

Drechsler, A., & Hevner, A. (2006). A four-cycle model of IS design science research: capturing the dynamic nature of IS artifact design. *University College Cork, Ireland*.

Driscoll, M. (2002). Blended learning: Let's get beyond the hype. *E-Learning*.

Durak, G., & Ataizi, M. (2016). The ABC's of Online Course Design According to Addie Model. *Universal Journal of Educational Research*, *4*(9). https://doi.org/10.13189/ujer.2016.040920

Dziuban, C., Graham, C. R., Moskal, P. D., Norberg, A., & Sicilia, N. (2018). Blended learning: the new normal and emerging technologies. *International Journal of Educational Technology in Higher Education*, *15*(1). https://doi.org/10.1186/s41239-017-0087-5

Elloumi, P. (2004). 3. Value Chain Analysis: A strategic Approach to online learning. *Theory and practice of online learning* (Vol. 52, Issues 3–4).

Feilzer, M. Y. (2010). Doing mixed methods research pragmatically: Implications for the rediscovery of pragmatism as a research paradigm. *Journal of Mixed Methods Research*, *4*(1). https://doi.org/10.1177/1558689809349691

Ferri, F., Grifoni, P., & Guzzo, T. (2020). Online learning and emergency remote teaching: Opportunities and challenges in emergency situations. *Societies*, *10*(4). https://doi.org/10.3390/soc10040086

Fiock, H. S. (2020). Designing a community of inquiry in online courses. *International Review of Research in Open and Distance Learning*, *21*(1). https://doi.org/10.19173/irrodl.v20i5.4383

Flick, U., Kardorff, E. Von, & Steinke, I. (2004). What is Qualitative Research? An Introduction to the Field. *A Companion to Qualitative Research*, *May*.

Fuertes, G., Alfaro, M., Vargas, M., Gutierrez, S., Ternero, R., & Sabattin, J. (2020). Conceptual Framework for the Strategic Management: A Literature Review - Descriptive. *Journal of Engineering (United Kingdom)* (Vol. 2020). https://doi.org/10.1155/2020/6253013

Gamage, K. A. A., de Silva, E. K., & Gunawardhana, N. (2020). Online delivery and assessment during COVID-19: Safeguarding academic integrity. *Education Sciences*, *10*(11). https://doi.org/10.3390/educsci10110301

García-Morales, V. J., Garrido-Moreno, A., & Martín-Rojas, R. (2021). The Transformation of Higher Education After the COVID Disruption: Emerging Challenges in an Online Learning Scenario. *Frontiers in Psychology* (Vol. 12). https://doi.org/10.3389/fpsyg.2021.616059

Garrison, D. R., Anderson, T., & Archer, W. (1999). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, *2*(2–3), 87–105.

Gartner Inc. (2022). *Hype Cycle for Higher Education, 2022*.

Gartner Inc. (2023). *Hype Cycle for Higher Education, 2023*.

Gaytan, J., & McEwen, B. C. (2007). Effective online instructional and assessment strategies. *International Journal of Phytoremediation*, *21*(1). https://doi.org/10.1080/08923640701341653

Grant, C., & Osanloo, A. (2014). Understanding, selecting, and integrating a theoretical framework in dissertation research: Creating the blueprint for your "house." *Administrative Issues Journal*, *4*(2), 12–26.

Gregor, S., & Hevner, A. R. (2013). Positioning and presenting design science research for maximum impact. *MIS Quarterly: Management Information Systems* (Vol. 37, Issue 2). https://doi.org/10.25300/MISQ/2013/37.2.01

Guangul, F. M., Suhail, A. H., Khalit, M. I., & Khidhir, B. A. (2020). Challenges of remote assessment in higher education in the context of COVID-19: a case study of Middle East College. *Educational Assessment, Evaluation and Accountability*, *32*(4). https://doi.org/10.1007/s11092-020-09340-w

Guba, E. G., & Lincoln, Y. S. (2001). GUIDELINES AND CHECKLIST FOR CONSTRUCTIVIST (FOURTH GENERATION) EVALUATION. *Evaluation*, *November*.

Gustafson, K. L., & Branch, R. M. (1997). *Survey of Instructional Development Models.pdf* (pp. 3–108).

Gütl, C., & Chang, V. (2008). Ecosystem-based theoretical models for learning in environments of the 21st century. *International Journal of Emerging Technologies in Learning*, *3*(1). https://doi.org/10.3991/ijet.v3i1.742

Hamel, G., & Prahalad, C. K. (1994). *Competing for the future*. Harvard Business School Press, Boston, Massachusetts and Tata McGraw-Hill.

Hamilton, D., McKechnie, J., Edgerton, E., & Wilson, C. (2021). Immersive virtual reality as a pedagogical tool in education: a systematic literature review of quantitative learning outcomes and experimental design. *Journal of Computers in Education*, *8*(1). https://doi.org/10.1007/s40692-020-00169-2

Hammersley, M. (2013). *What is qualitative research?* Bloomsbury Academic.

Hammersley, M., & Traianou, A. (2012). Ethics and Educational Research. *London: British Educational Research Association*.

Hénard, F., & Mitterle, A. (2010). Governance and Quality Guidelines in Higher Education: A review of Governance Arrangements and Quality Assurance Guidelines. In *OECD*.

Hevner, A. R. (2007). A Three Cycle View of Design Science Research. *Scandinavian Journal of Information Systems*, *19*(2). https://doi.org/http://aisel.aisnet.org/sjis/vol19/iss2/4

Hevner, A. R., March, S. T., Park, J., & Ram, S. (2004). Design science in information systems research. *MIS Quarterly: Management Information Systems*, *28*(1). https://doi.org/10.2307/25148625

Hladchenko, M. (2015). Balanced Scorecard – a strategic management system of the higher education institution. *International Journal of Educational Management*, *29*(2), 167–176.

Hoepfl, M. C., & others. (1997). Choosing qualitative research: A primer for technology education researchers. *Volume 9 Issue 1 (Fall 1997)*.

Holmes, W., Bialik, M., & Fadel, C. (2023). *Artificial intelligence in education*. Globethics Publications.

Hrastinski, S. (2019). What Do We Mean by Blended Learning? *TechTrends*, *63*(5). https://doi.org/10.1007/s11528-019-00375-5

Hwang, G. J., & Chang, C. Y. (2023). A review of opportunities and challenges of chatbots in education. *Interactive Learning Environments* (Vol. 31, Issue 7). https://doi.org/10.1080/10494820.2021.1952615

Hwang, G. J., Xie, H., Wah, B. W., & Gašević, D. (2020). Vision, challenges, roles and research issues of Artificial Intelligence in Education. *Computers and Education: Artificial Intelligence*, *1*, 1–5. https://doi.org/10.1016/j.caeai.2020.100001

Hwang, G.-J., Xie, H., Wah, B. W., & Gašević, D. (2020). Vision, challenges, roles, and research issues of Artificial Intelligence in Education. In *Computers and Education: Artificial Intelligence* (Vol. 1, p. 100001). Elsevier.

Ipek, I., & Ziatdinov, R. (2017). New Approaches and Trends in the Philosophy of Educational Technology for Learning and Teaching Environments. *European Journal of Contemporary Education*, *6*(3), 381-389.

Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed Methods Research: A Research Paradigm Whose Time Has Come. *Educational Researcher*, *33*(7). https://doi.org/10.3102/0013189X033007014

Jooste, C., & Fourie, B. (2009). The role of strategic leadership in effective strategy implementation: Perceptions of South African strategic leaders. *Southern African Business Review*, *13*(3).

Joosten, T., Lee-McCarthy, K., Harness, L., & Paulus, R. (2020). Digital Learning Innovation Trends. *Online Learning Consortium*.

Kaplan, R. S. (2009). Conceptual Foundations of the Balanced Scorecard. In *Handbooks of Management Accounting Research* (Vol. 3). https://doi.org/10.1016/S1751-3243(07)03003-9

Kaplan, R. S., & Norton, D. P. (1993). Putting the Balanced Scorecard to Work. Harvard Business Review. *Harvard Business Review*, *27*(4).

Kaplan, R. S., & Norton, D. P. (1996). strategic learning & the balanced scorecard. *Strategy & Leadership* (Vol. 24, Issue 5). https://doi.org/10.1108/eb054566

Kaplan, R. S., & Norton, D. P. (2004). *COLLECTION (2. Putting the Balanced Scorecard to Work ;19. Measuring the Strategic Readiness of Intangible Assets; 35. Using the Balanced Scorecard as a Strategic Management System;49. Having Trouble with Your Strategy? Then Map It Focusing Your Organization on Strategy with the Balanced Scorecard), 2nd Edition*. www.hbr.org

Karathanos, D., & Karathanos, P. (2005). Applying the Balanced Scorecard to Education. *Journal of Education for Business*, *80*(4). https://doi.org/10.3200/JOEB.80.4.222-230

Kasneci, E., Sessler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., Gasser, U., Groh, G., Günnemann, S., Hüllermeier, E., Krusche, S., Kutyniok, G., Michaeli, T., Nerdel, C., Pfeffer, J., Poquet, O., Sailer, M., Schmidt, A., Seidel, T., … Kasneci, G. (2023). ChatGPT for good? On opportunities and

challenges of large language models for education. *Learning and Individual Differences* (Vol. 103). https://doi.org/10.1016/j.lindif.2023.102274

Kato, S., Galán-Muros, V., & Weko, T. (2020). The Emergence of Alternative Credentials. *OECD Education Working Paper Series*, *1*(OECD Education Working Paper No. 216).

Kelly, L. M., & Cordeiro, M. (2020). Three principles of pragmatism for research on organizational processes. *Methodological Innovations*, *13*(2). https://doi.org/10.1177/2059799120937242

Khalil, M. K., & Elkhider, I. A. (2016). Applying learning theories and instructional design models for effective instruction. *Advances in Physiology Education*, *40*(2). https://doi.org/10.1152/advan.00138.2015

Kirkpatrick, J., & Kirkpatrick, W. (2019). An introduction to the new world Kirkpatrick model. *Kirkpatrick Partners*.

Kivunja, C., & Kuyini, A. B. (2017). ERIC - Understanding and Applying Research Paradigms in Educational Contexts. *International Journal of Higher Education*, *v6*(n5).

Kurtz, C. F., & Snowden, D. J. (2003). The new dynamics of strategy: Sense-making in a complex and complicated world. *IBM Systems Journal*, *42*(3). https://doi.org/10.1147/sj.423.0462

Laanpere, M., Pata, K., Normak, P., & Põldoja, H. (2014). Pedagogy-driven Design of Digital Learning Ecosystems. *Computer Science and Information Systems*, *11*(1). https://doi.org/10.2298/CSIS121204015L

Lee, J., Lim, C., & Kim, H. (2017). Development of an instructional design model for flipped learning in higher education. *Educational Technology Research and Development*, *65*(2). https://doi.org/10.1007/s11423-016-9502-1

Lerner, A. L. (1999). Strategic Planning Primer for Higher Education. *College of Business Administration and Economics, California State University, Northridge*.

Linden, A., & Fenn, J. (2003). Understanding Gartner's hype cycles. *Strategic Analysis Report Nº R-20-1971. Gartner Research*, *May*.

Linstone, H. A., & Turoff, M. (Eds.). (1975). *The delphi method*. Addison-Wesley.

Lipponen, L. (2023). Exploring Foundations for Computer-Supported Collaborative Learning. *Computer Support for Collaborative Learning*. https://doi.org/10.4324/9781315045467-12

Low, J. (2000). The value creation index. *Journal of Intellectual Capital*, *1*(3). https://doi.org/10.1108/14691930010377919

Low, J., & Kalafut, P. C. (2002). *Invisible advantage. How Intangibles are Driving Business Performance* (1st ed.). Perseus.

Maatuk, A. M., Elberkawi, E. K., Aljawarneh, S., Rashaideh, H., & Alharbi, H. (2022). The COVID-19 pandemic and E-learning: challenges and opportunities from the perspective of students and instructors. *Journal of Computing in Higher Education*, *34*(1). https://doi.org/10.1007/s12528-021-09274-2

Mackenzie, N., & Knipe, S. (2006). Research dilemmas: Paradigms, methods and methodology. *Issues in Educational Research*, *16*(2).

March, S. T., & Smith, G. F. (1995). Design and natural science research on information technology. *Decision Support Systems*, *15*(4). https://doi.org/10.1016/0167-9236(94)00041-2

McGreal, R., & Olcott, D. (2022). A strategic reset: micro-credentials for higher education leaders. *Smart Learning Environments*, *9*(1). https://doi.org/10.1186/s40561-022-00190-1

Mercader, C., & Gairín, J. (2020). University teachers' perception of barriers to the use of digital technologies: the importance of the academic discipline. *International Journal of Educational Technology in Higher Education*, *17*(1). https://doi.org/10.1186/s41239-020-0182-x

Mintzberg, H. (1987). The Strategy Concept I: Five Ps For Strategy. *California Management Review*, *30*(1). https://doi.org/10.2307/41165263

Mishra, L., Gupta, T., & Shree, A. (2020). Online teaching-learning in higher education during lockdown period of COVID-19 pandemic. *International Journal of Educational Research Open*, *1*. https://doi.org/10.1016/j.ijedro.2020.100012

Mohamed Hashim, M. A., Tlemsani, I., & Matthews, R. (2022). Higher education strategy in digital transformation. *Education and Information Technologies*, *27*. https://doi.org/10.1007/s10639-021-10739-1

Moorhouse, B. L., & Wong, K. M. (2022). Blending asynchronous and synchronous digital technologies and instructional approaches to facilitate remote learning. *Journal of Computers in Education*, *9*(1). https://doi.org/10.1007/s40692-021-00195-8

Morgan, D. L. (2014). Pragmatism as a Paradigm for Social Research. *Qualitative Inquiry*, *20*(8). https://doi.org/10.1177/1077800413513733

Muñoz, J. L. R., Ojeda, F. M., Jurado, D. L. A., Peña, P. F. P., Carranza, C. P. M., Berríos, H. Q., Molina, S. U., Farfan, A. R. M., Arias-Gonzáles, J. L., & Vasquez-Pauca, M. J. (2022). Systematic Review of Adaptive Learning Technology for Learning in Higher Education. *Eurasian Journal of Educational Research*, *2022*(98). https://doi.org/10.14689/ejer.2022.98.014

Noble, C. H. (1999). Building the strategy implementation network. *Business Horizons*, *42*(6). https://doi.org/10.1016/S0007-6813(99)80034-2

Okoli, C., & Pawlowski, S. D. (2004). The Delphi method as a research tool: An example, design considerations and applications. *Information and Management*, *42*(1). https://doi.org/10.1016/j.im.2003.11.002

Okonkwo, C. W., & Ade-Ibijola, A. (2021). Chatbots applications in education: A systematic review. *Computers and Education: Artificial Intelligence* (Vol. 2). https://doi.org/10.1016/j.caeai.2021.100033

Okumus, F. (2001). Towards a strategy implementation framework. *International Journal of Contemporary Hospitality Management*, *13*(7). https://doi.org/10.1108/09596110110403712

Oliver, M., & Trigwell, K. (2005). Can 'blended learning' be redeemed? *E-Learning and Digital Media*, *2*(1), 17–26.

Onwuegbuzie, A. J., & Leech, N. L. (2007). A call for qualitative power analyses. *Quality & Quantity*, *41*(1), 105–121.

Ouyang, F., Zheng, L., & Jiao, P. (2022). Artificial intelligence in online higher education: A systematic review of empirical research from 2011 to 2020. *Education and Information Technologies*, *27*(6). https://doi.org/10.1007/s10639-022-10925-9

Pathak, V., & Pathak, K. (2010). Reconfiguring the higher education value chain. *Management in Education*, *24*(4), 166–171.

Pedró, F. (2019). *Artificial intelligence in education: challenges and opportunities for sustainable development*. UNESCO.

Peffers, K., Rothenberger, M., Tuunanen, T., & Vaezi, R. (2012). Design science research evaluation. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, *7286 LNCS*. https://doi.org/10.1007/978-3-642-29863-9_29

Peffers, K., Tuunanen, T., & Niehaves, B. (2018). Design science research genres: introduction to the special issue on exemplars and criteria for applicable design

science research. *European Journal of Information Systems* (Vol. 27, Issue 2). https://doi.org/10.1080/0960085X.2018.1458066

Peffers, K., Tuunanen, T., Rothenberger, M. A., & Chatterjee, S. (2007). A design science research methodology for information systems research. *Journal of Management Information Systems*, *24*(3). https://doi.org/10.2753/MIS0742-1222240302

Pelser, T., & Prinsloo, J. J. (2014). Technology management and the link with technology strategy and company performance. *Journal of Global Business and Technology*, *10*(2), 1–12.

Peterson, C. (2003). Bringing ADDIE to life: instructional design at its best. *Journal of Educational Multimedia and Hypermedia*, *12*(3).

Porter, M. E. (1985). Technology and Competitive Advantage. *Journal of Business Strategy* (Vol. 5, Issue 3). https://doi.org/10.1108/eb039075

Porter, M. E. (1996). Porter, M. E. (1996). What is Strategy? Harvard Business Review, 74(6), 61–78. *Harvard Business Review*.

Raffe, D. (2013). What is the evidence for the impact of National Qualifications Frameworks? *Comparative Education*, *49*(2). https://doi.org/10.1080/03050068.2012.686260

Rahi, S. (2017). Research Design and Methods: A Systematic Review of Research Paradigms, Sampling Issues and Instruments Development. *International Journal of Economics & Management Sciences*, *06*(02). https://doi.org/10.4172/2162-6359.1000403

Rahim, A. F. A. (2020). Guidelines for Online Assessment in Emergency Remote Teaching during the COVID-19 pandemic. *Education in Medicine Journal*, *12*(2). https://doi.org/10.21315/eimj2020.12.2.6

Rasheed, R. A., Kamsin, A., & Abdullah, N. A. (2020). Challenges in the online component of blended learning: A systematic review. *Computers and Education*, *144*. https://doi.org/10.1016/j.compedu.2019.103701

Razzouk, R., & Shute, V. (2012). What Is Design Thinking and Why Is It Important? *Review of Educational Research*, *82*(3). https://doi.org/10.3102/0034654312457429

Rocco, S. T., & Plakhotnik, S. M. (2009). Literature reviews, conceptual frameworks, and theoretical frameworks: Terms, functions, and distinctions. *Human*

Resource Development Review (Vol. 8, Issue 1). https://doi.org/10.1177/1534484309332617

Saunders, M. N. K., Lewis, P., & Thornhill, A. (2019). *Research Methods for Business Students (Eight Edition).* Pearson Education, UK

Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research methods for business students (Fifth Edition).* Pearson Education, UK.

Savenye, W. C., & Robinson, R. S. (2013). Qualitative research issues and methods: An introduction for educational technologists. *Handbook of Research on Educational Communications and Technology*, 1030–1056.

Serdyukov, P. (2017). Innovation in education: what works, what doesn't, and what to do about it? *Journal of Research in Innovative Teaching & Learning*, *10*(1), 4–33.

Sezer, B., Yilmaz, F. G. K., & Yilmaz, R. (2013). Integrating technology into classroom: the learner-centred instructional design. *International Journal on New Trends in Education and Their Implications October*, *4*(4).

Singh, H. (2021). *Building Effective Blended Learning Programs*. https://doi.org/10.4018/978-1-7998-7607-6.ch002

Singh, J., Steele, K., & Singh, L. (2021). Combining the best of online and face-to-face learning: Hybrid and blended learning approach for COVID-19, post vaccine, & post-pandemic world. *Journal of Educational Technology Systems*, *50*(2), 140–171.

Sousa, M. J., & Rocha, Á. (2019). Digital learning: Developing skills for digital transformation of organizations. *Future Generation Computer Systems*, *91*. https://doi.org/10.1016/j.future.2018.08.048

Sullivan, G. M., & Artino, A. R. (2013). Analyzing and Interpreting Data from Likert-Type Scales. *Journal of Graduate Medical Education*, *5*(4). https://doi.org/10.4300/jgme-5-4-18

Tapinos, E., Dyson, R. G., & Meadows, M. (2011). Does the Balanced Scorecard make a difference to the strategy development process? *Journal of the Operational Research Society*, *62*(5). https://doi.org/10.1057/jors.2010.99

Thompson, J. (2022). A Guide to Abductive Thematic Analysis. *Qualitative Report*, *27*(5). https://doi.org/10.46743/2160-3715/2022.5340

Timmermans, S., & Tavory, I. (2012). Theory construction in qualitative research: From grounded theory to abductive analysis. *Sociological Theory*, *30*(3). https://doi.org/10.1177/0735275112457914

Torraco, R. J., & Lundgren, H. (2020). What HRD Is Doing—What HRD Should be Doing: The Case for Transforming HRD. In *Human Resource Development Review* (Vol. 19, Issue 1). https://doi.org/10.1177/1534484319877058

Trilling, B., & Fadel, C. (2009). *21st century skills: Learning for life in our times*. John Wiley \& Sons.

Tripp, S. D., & Bichelmeyer, B. (1990). Rapid prototyping: An alternative instructional design strategy. *Educational Technology Research and Development*, *38*(1). https://doi.org/10.1007/BF02298246

Tuah, N. A. A., & Naing, L. (2021). Is Online Assessment in Higher Education Institutions during COVID-19 Pandemic Reliable? *Siriraj Medical Journal*, *73*(1). https://doi.org/10.33192/SMJ.2021.09

Tuck, R. (2007). *An introductory guide to national qualifications frameworks: Conceptual and practical issues for policy makers.* International Labour Organization.

Turnbull, D., Chugh, R., & Luck, J. (2021). Transitioning to E-Learning during the COVID-19 pandemic: How have Higher Education Institutions responded to the challenge? *Education and Information Technologies*, *26*(5). https://doi.org/10.1007/s10639-021-10633-w

Uden, L., Wangsa, I. T., & Damiani, E. (2007). The future of E-learning: E-learning ecosystem. *Proceedings of the 2007 Inaugural IEEE-IES Digital Ecosystems and Technologies Conference, DEST 2007*. https://doi.org/10.1109/DEST.2007.371955

van Eck, N. J., & Waltman, L. (2024). *VOSviewer Visualizing scientific landscapes*. Centre of Science and Technology Studies, Leiden University, The Netherlands. www.vosviewer.com

Van Maanen, J., Sørensen, J. B., & Mitchell, T. R. (2007). The interplay between theory and method. *Academy of Management Review*, *32*(4). https://doi.org/10.5465/AMR.2007.26586080

Varpio, L., Paradis, E., Uijtdehaage, S., & Young, M. (2020). The Distinctions Between Theory, Theoretical Framework, and Conceptual Framework.

Academic Medicine (Vol. 95, Issue 7). https://doi.org/10.1097/ACM.0000000000003075

Venable, J. R. (2006). The Role of Theory and Theorising in Design Science Research. *Proceedings of the 1st International Conference on Design Science in Information Systems and Technology (DESRIST 2006)*.

Vlachopoulos, D., & Makri, A. (2017). The effect of games and simulations on higher education: a systematic literature review. *International Journal of Educational Technology in Higher Education* (Vol. 14, Issue 1). https://doi.org/10.1186/s41239-017-0062-1

Vlachopoulos, D., & Makri, A. (2019). Online communication and interaction in distance higher education: A framework study of good practice. *International Review of Education*, *65*(4). https://doi.org/10.1007/s11159-019-09792-3

vom Brocke, J., Hevner, A., & Maedche, A. (2020). *Introduction to Design Science Research*. https://doi.org/10.1007/978-3-030-46781-4_1

Wang, S., Christensen, C., Cui, W., Tong, R., Yarnall, L., Shear, L., & Feng, M. (2023). When adaptive learning is effective learning: comparison of an adaptive learning system to teacher-led instruction. *Interactive Learning Environments*, *31*(2). https://doi.org/10.1080/10494820.2020.1808794

Wu, J. H., Tennyson, R. D., Hsia, T. L., & Liao, Y. W. (2008). Analysis of E-learning innovation and core capability using a hypercube model. *Computers in Human Behavior*, *24*(5). https://doi.org/10.1016/j.chb.2008.02.008

Zahra, S. A., & Covin, J. G. (1993). Business strategy, technology policy and firm performance. *Strategic Management Journal*, *14*(6). https://doi.org/10.1002/smj.4250140605

Zhang, J., & West, R. E. (2020). Designing Microlearning Instruction for Professional Development Through a Competency Based Approach. *TechTrends*, *64*(2). https://doi.org/10.1007/s11528-019-00449-4

8. ANNEXURES

ANNEXURE A: LETTER OF CONSENT – INTERVIEWS

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Education

Consent letter- Individual participant

Dear Sir/Madam,

INVITATION TO PARTICPATE IN RESEARCH PROJECT –
The strategic dynamics of technology in instructional design.

I am currently enrolled for a PhD degree in Computer Integrated Education at the University of Pretoria. Part of the requirements for the awarding of this degree is the successful completion of a significant research project in the field of education.

The title of my approved research study is "**The strategic dynamics of technology in instructional design"**. The study is exploring how strategy development occurs through the dynamic interaction of learning design and delivery and technology integration. The study aims to develop a strategy map to guide strategic choices in terms of technology adoption and integration and will outline critical dimensions and associated success factors when evaluating operational business performance.

You are hereby invited to participate in this research project, which aims to understand:

- What is the current strategic landscape in terms of learning with technology and how does it impact the development and implementation of learning interventions?
- How does emerging technologies change business performance and operational excellence according to the perspectives of the Balanced Score Card? (Financial, Learning and Growth, Customer, Internal business /processes)
- What is the current strategic context in terms of driving forces of innovation and adoption?
- What are the critical success factors for learning with technology and what are the measures linked to these critical success factors?
- What is the anticipated impact of technology and what are the strategic choices to consider?

Below is the scope and responsibility of your participation.

To gather the information, required for this research, I request permission to invite you to participate in a semi-structured interview. This interview should take no longer than 60 minutes and will be conducted via an online platform such as Zoom or Microsoft Teams. The interview will be scheduled to be conducted at a convenient time for you. You are requested to invite another person (s) from your organisation/ institution to join you in this interview. It is requested that the person (s) in the interview meet some or all the following criteria.

- Must have knowledge and experience in the use of educational technology applications in the design of e-learning interventions, preferably a senior instructional designer.
- Must have the organisational responsibility of managing a learning design team or division and must be responsible for managing and integrating all subsystems such as budgeting, skills development and client relationship management.
- Must have strategy experience or must function in a specialist strategic advisory role.

We acknowledge that information of a strategic nature could be highly sensitive, and we encourage you to participate without revealing any specific projects or strategies that might impact your competitive position in the market.

Please understand that the decision for you to participate is completely voluntarily. Each participant will be free, at any stage during the process up to and including the stage at which they authenticate the transcript of their interview, to withdraw their consent to participate, in which case their participation will end immediately without any negative consequences. Any and all data collected from them up to that point in the study will then be dismissed.

All the information obtained during the research study will be treated confidentially. At no time will either you or your organisation be mentioned by name or identified by any manner whatsoever in the research report.

I would also like to request your permission to use your data, confidentially and anonymously, for further research purposes, as the data sets are the intellectual property of the University of Pretoria. Further research may include secondary data analysis. The confidentiality and privacy applicable to this study will be binding on future research studies.

At the end of the research study you will be provided with a copy of the research report containing both the findings of the study and recommendations. This research study presents a unique opportunity for you and your organisation to get involved in the process of research aimed at exploring the strategic dynamics of technology in instructional design. If you decide to participate in this research study, kindly complete the consent form attached.

Thanking you for your consideration to be part of this study.

Yours Sincerely

Jorietha Hugo
Student Researcher
University of Pretoria
Jorietha.Hugo@telkomsa.net
(082) 468 3024

Dr K. Moodley
Supervisor
University of Pretoria
kimera.moodley@up.ac.za
(012) 420 2855

LETTER of CONSENT

INDIVIDUAL PARTICIPANT

VOLUNTARY PARTICIPATION IN THE RESEARCH PROJECT ENTITLED:
The strategic dynamics of technology in instructional design

I, _____, hereby voluntarily and willingly agree to participate as an individual in the above-mentioned study introduced and explained to me by Jorietha Hugo currently a student enrolled for a PhD Degree in Computer Integrated Education at the University of Pretoria.

I further declare that I understand, as were explained to me by the researcher, the aim, scope, purpose, possible consequences and benefits and methods of collecting information proposed by the researcher, as well as the means by which the researcher will attempt to ensure the confidentiality and integrity of the information she collects.

_____ _____
Full name Signature

_____
Date

ANNEXURE B: LETTER OF CONSENT – QUESTIONNAIRES

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Education

Consent Letter

Dear Sir/Madam

INVITATION TO CONTINUE PARTICIPATION IN RESEARCH PROJECT: The strategic dynamics of technology in learning.

You have recently participated in an interview as part of the first round of research for my PhD study: *The strategic dynamics of technology in learning*. The study is exploring how strategy development occurs through the dynamic interaction of learning design and delivery and technology integration. The study aims to develop a strategy map to guide strategic choices in terms of technology adoption and integration and will outline critical dimensions and associated success factors when evaluating operational business performance.

The study to date has delivered the following:

A comprehensive literature review in terms of the external factors such as technology cycles, and the operationalisation of emerging technologies in learning. It has also investigated internal factors such as corporate value chain, digital ecosystems, and core capabilities. A SWOT analysis was done to identify challenges and recommendations in terms of learning with technology.

The results from the previous round of interviews were analysed through the lenses of ADDIE and the Balanced Score Card and a strategic framework was designed. This is akin to a strategy map with critical success factors and strategic objectives.

Scope of participation:

I would like to share the results with you in a video presentation, but also want to request your further participation in the form of a structured questionnaire. The questionnaire is an evaluation of the strategic framework that was designed as results of the first round of interviews, and findings from the literature review. The evaluation will require approximately 30 minutes of your time.

Please understand that the decision for you to participate is completely voluntarily. Each participant will be free, at any stage during the process up to and including the stage at which they authenticate the transcript of their interview, to withdraw their consent to participate, in which case their participation will end immediately without any negative consequences. Any and all data collected from them up to that point in the study will then be dismissed.

All the information obtained during the research study will be treated confidentially. At no time will either you or your organisation be mentioned by name or identified by any manner whatsoever in the research report.

I would also like to request your permission to use your data, confidentially and anonymously, for further research purposes, as the data sets are the intellectual property of the University of Pretoria. Further research may include secondary data analysis. The confidentiality and privacy applicable to this study will be binding on future research studies.

At the end of the research study, you will be provided with a copy of the research report containing both the findings of the study and recommendations. This research study presents a unique opportunity for you and your organisation to get involved in the process of research aimed at exploring the strategic dynamics of technology in learning. If you decide to participate in this research study, kindly complete the consent form attached.

Thanking you for your consideration to be part of this study.

Yours Sincerely

Jorietha Hugo
Student Researcher
University of Pretoria
Jorietha.Hugo@telkomsa.net
+ 27 (82) 468 3024

Prof Ronel Gallaghan
Supervisor
University of Pretoria
ronel.callaghan@up.ac.za
+27(12) 420 5521

LETTER of CONSENT

ORGANISATIONAL CONSENT

VOLUNTARY PARTICIPATION IN THE RESEARCH PROJECT ENTITLED:
The strategic dynamics of technology in instructional design

I, _____ the designated representative of _____
_____(Company Name) hereby voluntarily and willingly agree to participate as an organisation in the above-mentioned study introduced and explained to me by Jorietha Hugo currently a student enrolled for a PhD Degree in Computer Integrated Education at the University of Pretoria.

I further declare that I understand, as were explained to me by the researcher, the aim, scope, purpose, possible consequences and benefits and methods of collecting information proposed by the researcher, as well as the means by which the researcher will attempt to ensure the confidentiality and integrity of the information she collects.

_____ _____
Full name Signature

_____
Date

ANNEXURE C: RESEARCH INTERVIEW PROTOCOL

Interview Protocol: The strategic dynamics of technology in learning

Introductory discussion

Share details of the research topic, what the discussion will be about, how respondents can benefit and what is expected from them.

Confidentiality and anonymity

Ensure respondents that the identity of respondents (organisations) will not be shared. Refer to the letter of consent.

Questions

Question	Prompts
1. How does emerging technologies impact your organisation/business from a learning design and delivery perspective?	What are some of the anticipated changes in instructional design? How did the ADDIE process change? Who is driving these changes staff, clients, management?
2. Where is the biggest impact of new technology from a business perspective?	Financial? Customer expectations? Organisational capacity /Skills? Technology infrastructure? Leadership? Market leadership/ Competitiveness?
3. What are the challenges and barriers to technology adoption in your organisation/ business?	
4. Tell me about some of your success stories? What did your organisation/ business do right?	Innovative learning strategies? Skills of designers and facilitators?
5. Were there instances where your institution got it all wrong?	What are your areas of weakness? What areas need improvement?
6. How will your business / field change in the future?	Immediate 1-2 years? Midterm 3-5 years? Long terms 5-10 years?
7. What technologies will have the biggest impact and what will the scale of impact be?	Learning environments? AI? Gamification?
8. How is success measured?	Financial? Learners? Design? Processes? Technology?

Closing remarks

Ask permission for a follow-up interview if the interview was not completed in the allocated time.

Timeframe and contact details

Confirm timeframe for feedback and contact details of the interviewer.

ANNEXURE D: QUESTIONNAIRE

A: Please answer the following questions in terms of the model/strategic framework

3. Please rate the following questions in terms of the scale provided. Indicate with a "X"

		Strongly disagree	Disagree	Agree	Strongly agree
1.1	**Artifact fitness – Strategic level**				
a)	The proposed model makes sense in terms of its strategic importance. It is clear and understandable.				
b)	The model can be adapted to the context in which it is applied. It is maintainable and transferrable**.**				
1.2	**Artifact utility – Operational level**				
a)	The model can be operationalised to contribute to operational effectiveness and efficiencies.				
b)	The model contains sufficient levels of detail. (Not too high level, not too granular)				

4. On what level will you use the model in your organisation/institution? (Mark all applicable options)

	Level	Mark with a "X"
a)	Strategic	
b)	Management	
c)	Operational/ Practitioner	

5. Completeness of the model: Are there any elements that have been omitted and that you would like to add to the model?

---

6. Redundancies: Are there unnecessary elements that can be omitted?

B: Please rate the importance of the strategic objectives of the model in terms of the scale provided.

		Strongly disagree	Disagree	Agree	Strongly agree
1.	**Financial perspective**				
a)	Financial - Optimize profitability through *the diversification of income streams* and the management of infrastructure and operational cost				
b)	Non-financial - Improve the learning and teaching experience through *optimizing efficiencies and productivity through using ed-tech technologies.*				
2.	**Customer perspective**				
a)	Develop an optimal basket of *blended learning interventions* through a centralised design unit				
b)	Ensure comprehensive *analysis of student personas and student journeys* based on unique technology profiles and other student analytics				
3.	**Process perspective**				
a)	Develop and *online design blueprint*, incorporating design principles, instructional strategies, and constructive alignment of learning objectives and outcomes with the use of edtech tools and instruments				
b)	Develop learning materials based on *principles for multi-media development* for optimal delivery across different modes (synchronous, asynchronous, online, face-to-face etc.)				
c)	Implement learning interfaces according to *principles of navigation and support* (learner, social and technical)				
4.	**Learning and growth perspective**				
a)	Plan for the *optimal technology architecture* (LSM and stand-alone tools and components) and ensure continuous support and management of the platform.				
b)	*Continuous professional development* in terms of an *online pedagogy* which includes instructional design skills, writing skills, technical design skills, curriculum design skills. *AI literacy and AI assessment literacy* as part of the continuous professional development.				
c)	Develop components for a *basic technology usage and skills programme*. The programme is for learners and educators involved in learning with technology.				

ANNEXURE E: ADDIE

Sources:	(Durak & Ataizi, 2016)	(Khalil & Elkhider, 2016)	(Peterson, 2003)	(Lee & Kim, 2017)	(Sezer et al., 2013)	(Allen, 2006)
Analysis						
Needs Analysis	x					
Goals and objectives, what needs to be learned and what is known.		x	x	x		x
Standards, competencies, skills, knowledge and abilities.			x			x
Job performance requirements and task lists			x			x
Analyse learners	x			x		
Analyse student characteristics (demographics, age, gender, culture)					x	
Prior knowledge and experience (subject specific and technical/ online)					x	
Technical analysis				x		
Technical capabilities (Online/ blended)	x			x		
Equipment and devices	x					
Software, applications, bandwidth					x	
Access to technical support					x	
Online environment (logistics for instruction, participation, and assessment	x					
Content Analysis	x			x	x	
Define learning goals and objectives		x		x	x	
Instructional analysis (content, methods, and media)	x	x			x	

Design						
Content outline based on objectives and subobjectives	x		x	x	x	
Instructional strategy and online pedagogy		x	x	x	x	
Instructional methods and media		x	x			x
Communication factors (Interaction types: learner-content, learner to instructor, learner to learner)	x					
Design for scaffolding and interaction				x		
Support services (announcements, chat, messages)	x					
Course calendar and teaching of the course	x					
Course orientation and course structure design guide.				x		
Course content (resources and digital documents)	x					
Learning activities and exercises				x		
Assessment plan (process and forms)		x	x	x	x	
Technological substructure (connectivity, cameras)	x					
Evaluation system (security) for group tasks	x					
Online environment (software rights and licenses)	x					x
Develop						
Preparation of learning platform (software download and installation configuration settings, shaping interface for different modules)	x					
Develop course material (synchronous, asynchronous, interactive) - digital media and visual elements	x	x	x	x	x	x
Acquire existing course content					x	
Develop activities, assignments, projects, and tests		x				
Develop assessment items (traditional exams, rubrics for projects, papers, portfolios etc.)					x	
Develop reflection tasks/ platforms e.g., blogs				x		

Develop a prototype and test interaction and scaffolding				x		
Formative/summative assessment development	x			x		
Develop feedback systems	x	x				
Instructor's manual development				x		
Implementation						
Introduction and use of the system	x					
Course objectives and expectations on attendance and grades are clearly communicated		x				
Students clearly know where to find and when to submit course activities, assignments, and homework		x				
Supporting the learning environment: activity boards, logs announcements	x					
The instructional setting is conducive to learning and learners complete the course		x			x	
Enrichment of communication environment (interactions)	x					
Needed technology and equipment are available.		x				
Learners complete the course as designed					x	
Learners are assessed according by the designed assessments					x	
Instructor monitors, guides, and facilitates as learners complete the course					x	
Analyse and redesign - make necessary revisions			x			
Evaluation						
Formative- instruction effectiveness is monitored while being taught		x	x	x	x	x
Adjust instructional strategies according to students' interaction with the content, the instructor, and the peers					x	

Summative- overall course effectiveness is measured at course completion		x	x	x	x	x
Collect course feedback via online survey, email, or other media. Validate content accuracy and completeness, teaching methods, and communication approach, among others. Revise as necessary.	x				x	
Operational performance measures / Impact of course			x			x

ANNEXURE F: CODEBOOK THEMATIC ANALYSIS

1. Financial Perspective

Theme	Description	Comments: Quotes (Nr indicates nr of participant that the quote is linked to
Profitability		
Cost effective	Costs paid for new technology, hardware, software, and skills need to link to efficiencies.	1) "... if technology can work for us, then we are successful, if it can work for us in a cost-effective manner"
Diversified income	Online courses provide new income streams.	3) "We want to have larger classes, larger groups, we want more income." 1) " we are selling courses to make money."
Improved learning and teaching experience		
Completion rate and throughput	Registered learners complete programmes successfully in time	1)"... learner success, the ratio …that's the throughput ..."
Student and lecturer satisfaction and engagement	Well-designed online teaching and learning contributes to satisfaction, happiness and engagement of students and lecturers	2) "ROE … I'm talking from the heart…they are engaged…they can see that there is benefit. " 3) "Success of learning and teaching is measured by satisfaction and happiness."
Unique learner experiences	How learners experience a specific technology or learning intervention.	5) " How can technology improve the learning experience and which setting is best for that type of learning to happen?"
Increased efficiency and productivity		
Improved learning outcomes	Improved learning outcomes as result of the use of technology.	5) " We use technology to mediate or support the lecturer in their work, if it's showing an improvement in results, you know ultimately it has to have a positive impact." 7) " teaching at a module level... success if the technology helps addressing the outcomes."
Technology efficiency	Increased efficiencies in terms of cost of technology, time to develop resources and transferability or reusability of technology components.	1) " time of development" 2) "technology success is measured by the time that you gain the information..." 5) " higher education institutions can become more efficient and more effective, especially during these times of resource constraints" 5). " …how applicable is it across the institution ... how broadly can we apply it? Does it support our teaching and learning model ... cost price point is really important ….and can it be integrated with what we already have? "

Strategic leadership		
Strategic leadership	The ability to be forward looking, resilient and adaptable to technology changes.	5) "We have to encourage our staff and our students…we gonna work with technology and technology must serve us… we're gonna have to be patient and adaptive…resilient in that respect…"
Employment and earnings potential		
Earnings ability	The purpose of education is to increase earnings potential.	3) “Financial… in our context financially is important because you want people to be able to lead comfortable lives…”
	Market and job relevant education will increase employability.	3) ... would our students be appointed in jobs? 5) "how many of our graduates are getting meaningful employment?"

2. Customer Perspective

Theme	Description	Comments - Quotes (Nr indicates nr of participant that the quote is linked to
Business Model		
Blended: Distance/online vs contact/face-to-face	Delivery mode of courses could include contact / face-to-face or distance/online delivery. Courses make use of synchronous and asynchronous components.	1) " we offer distance and online delivery". 5) " But our distance is online distance, and our contact is blended contact"
Centralised design unit	Design of digital learning components and learning strategies are done by a centralised unit. Design work can be outsourced, or skills are insourced to the unit.	3) “we have a multimedia unit “7) “We have a Centre for teaching and learning, CTL”
Types of courses		
Accredited institutions - full qualifications	All educational institutions who are registered with relevant authorities to offer qualifications in line with a qualification’s framework.	5) “in addition to Higher Education we have flagship programs that are focused and in terms of price range different to Higher Education …we offer qualifications that are meant to be accessible…”
Compliance training	Compliance training is linked to compulsory regulatory knowledge in certain industries.	2) " from compliance training …the anti-money laundering, terrorist financing training …"
Industry specific training programs.	Training programmes are purposefully designed for specific roles in specific sectors or industries.	1) " occupational qualifications" 1) "difficult to actually get a one size fits all type of course "

Micro credential linked to credits	Micro credential linked to credits	2) "types of small skill sets…. that you can do…that you are proficient …" 5) We have micro credentials ... for students to upgrade their CV's, in terms of graduate attributes….to keep kind of evidence of additional skills to the academic transcript.
Short course	Standardized short courses, transferable to different settings. Can be bought off-the shelf.	1) " we purchase a lot of courses off the shelf"
Accreditation, quality, and standards		
Accreditation bodies and standards - SETA, QCTO, SAQA	Bodies and authorities concerned with standards and accreditation of courses.	2)" ... there are the various SETA's, some are doing a fantastic job and others are, it's a monstrosity... it's everybody is not doing what they are supposed to be doing.."6) "I am linked to a directorate called Mathematics Science and Technology - Curriculum, Innovation and Learning." 6) " policy formulation and ensuring the policy is being implemented" 4) "So here ...they write progress tests conducted by an external examiner"
Segment or learner personas		
Adaptive learning approach provides multiple student/ learning journeys	An adaptive learning approach enables a design for differentiated student journeys based on unique skills and performance.	5) "adaptive learning approach where you, through Canvas, can have multiple journeys " 5) "there is also differentiation within the program to accommodate that "
Generational differences	Generational differences impact the speed of adoption of technology as well as the requirements for learning materials of different groups of learners.	7)" The older people want to do things the way they've been doing that … they want to stick to that... this young generation want to change things. They want to try things …" 3) "So, you know, even the younger ones, they are very keen to go online and do everything online and just use whatever's available online" 2) "we didn't always take note of all the various generations in the group and we know that some of the generations wanted a different tangible product….such as the baby boomers want a document don't give me URL's..."
Technology usage of students and lecturers should inform design	The technology literacy and usage patterns of students and lecturers are important determinants of how technology will be integrated in the learning experience. This should be incorporate in the analysis phase of the design process.	3) "the right pedagogy for the particular group of students " 7) " So, when you get to design, we are designing with that idea of technology so that your development

3. Internal process perspective

Theme	Description	Comments - Quotes (Nr indicates nr of participant that the quote is linked to
Online design		
Online design blueprint	An online design framework with all synchronous and asynchronous learning objects and settings for different learning models and methodologies.	3) " pedagogy must come first…that must be the basis of whatever design we are going to propose and then the technology is there to assist to make it run better, smoother, to improve the teaching and learning." 5) " identify the specific learning settings that are most appropriate for a particular learning experiences..." 5) We have very deliberate blueprints that we roll out...we want the student to have a comparable experience across modules.." 5) " The assumption is that if I teach face to face, I'm fit to teach in hybrid, and that's a totally different thing..."
ADDIE design principles	ADDIE design principle of simplicity to accommodate decreasing attention span and need for excitement.	2) "And the learning objective, that's our other problem. We don't know how to write decent learning objectives." 7) "which tool is best suited to address that specific learning outcome or which tool is best suited to demonstrate that specific activity that you want to show" 7)" constructive alignment you will know that we are focusing mostly on learning outcomes, content, and the assessment."
Learning outcomes and constructive alignment	Alignment of learning objectives, instructional media, activities, and assessment.	2) "And the learning objective, that's our other problem. We don't know how to write decent learning objectives." 7) "which tool is best suited to address that specific learning outcome or which tool is best suited to demonstrate that specific activity that you want to show" 7)" constructive alignment you will know that we are focusing mostly on learning outcomes, content, and the assessment."
Online instructional strategies	There is a definite focus on the collaborative and social aspects of learning through project-based learning, on the job shadowing, or a community of inquiry/practice and peripheral participation. On the other hand, game-based learning, and digital badges are not that popular and expensive to develop. VR is used in specific settings such as the medical	1) "So, they want some to do something in that 10 minute. So, you have to chunk your stuff so that they can do it." 2)" virtual reality and the artificial AI and virtual reality, especially in the hospital sector, the nursing sector. I mean, the doctors use this all the time " 1) "gamify but you must be very careful." 2) "micro learning is the new in thing." 7) "Because I think it's expensive. It's very expensive to develop gamification.

	industry. Micro learning and micro credentials focus on specific practical skills learned in a short time frame.	
ChatGPT as student and educator resource.	ChatGPT can be used by instructional designers and educators in the design and development of learning.	3)" I've started using ChatGPT to give me ideas to get me lists of objectives, possible outcomes, possible employment with certain learning pathways. So, it's amazing. I think what is good is…if we do this with the knowledge, we have…so that way they can be critical of what comes out of ChatGPT..."
Online development		
Principles for multimedia development	Accommodate variety of formats and modalities. Technology design tools must be fit for purpose. Consider generational differences. Design according to ADDIE. Teach academics about videorecording and scaffolding.	2) "It's the whole different variety of formats. Some people want to listen. I know everybody says there isn't a thing about learning styles….and I beg to differ. You get an auditory learner who wants to listen, and you can see how intrigued this person is…then you've got your visual learner. 7) So, it depends on the tool, e.g., the tools that we integrate are mostly enhancing teaching and learning, from both student side and lecturer side.
Learning delivery	Some people still prefer face-to-face learning. Different variations of blended, online vs offline, synchronous vs asynchronous. It can also include virtual spaces and online workshops. Smartphones are often used as delivery mechanism.	2) "in the Middle East, at this stage, they still like the thing of face-to-face training." 5) "So, we're seeing growth in in how they want to engage the material on mobile " 7) "Yes, we have a blended approach, some still face to face. But I think after the pandemic, of course most of the things were blended … but remember, blended again might mean different things to different people exactly."
Training material	Training material can vary from textbooks to downloadable digital documents, videos, job aids, URLs, and websites. Training material must be fit for purpose in terms of the learner personas.	1) "some prefer textbooks to eBooks. They don't want everything online. 2 “) sometimes they just want a video …or a job aid …and it's a video… that is it's a 3-minute video…. or I want a framework…or write a script for me “2) "digital documentation… PDF" 2) " hyperlinks and URL's "
Online implementation		
Navigation and orientation	Key information to provide online is: study guide; learning objectives and module outcomes; how long each module will take (chunking); a to do list with all activities, sessions, resources and assignments; Assessments and key dates; Names and contact details of lecturers; Feedback on progress;	5) "The study guide must be uploaded" 5) "how they will be assessed all on one page and then there are specific pages for key dates." 5) "To Do List where the students know, and we color code it…these are the sessions that must be attended in the venue. These are the resources that can be completed in your own time, and these are the live online sessions" 5) " we tell them how long a specific learning object takes so they can fit it in, in between." 7) "Let's talk about going through the module and navigation,

	Announcements. Ensure transparency and consistency in learner experience.	accessibility of different things, clarity of the module clearly articulated " 7) You have to put in those small things, that's precisely what is expected of them, what they're supposed to do..."
Maintain online technology resources	Create a knowledge bank of reusable knowledge components. Provide additional resources for differentiated learning within a student persona.	6) "there's no need for somebody else to recreate, so we just create the repository" 5) " based on how students have performed, build in additional resources, but we acknowledge the fact that there is a typical student persona for a module on a program…"
Student collaboration and communication	Ensure clear communication to students and enable collaboration and group work.	5) " communicate better with our students 1) "collaborative sharing and collaborative group work"
Learning support	Provide practical support in terms of learning methods and learning material. Provide feedback and scaffold learning support.	1) "encourage them and motivate them all the time", 2) "roles and competencies of the online facilitator" 2)" the learner also has some accountability and responsibility 5) "student support course, that are also linked to, how to get psychotherapeutic support …how to get, exam tips, etc."
Online and technical support	Help and support in terms of online and technical issues.	2) " take some time to onboard students…in the online world" 5) We have a 24/7 support function which is really great because we know that at that point when
Social support	Support from peer groups and group leaders.	1) "group leaders for a number of learners or for courses, and the group leaders must interact with their learners… watch and monitor the progress of the learners on the LMS in their groups. 2) "We work in teams and then that is important, as well as just to have a social supporter …just there to sometimes just help you"
WhatsApp as support mechanism	WhatsApp group to help with encouragement, social support, learning by peripheral participation. It creates cohesion and reduces fear.	3) "We complement it with a WhatsApp group" 3) " when it comes to WhatsApp messages… little messages of encouragement to keep people going for quick responses " 6)" It's sort of continuous support for them and it works very well, because then as they keep on doing and as they learn that there is that continuous support, then it becomes easy for them to grapple with the new information, to learn a new skill without any fear at all."
Online assessment		
Guidelines for assessment	Policies, guidelines, and applications to ensure authenticity.	1) " plagiarism policies", 1) "Turnitin" 1) " declaration" 5) "they must get the assessment guideline"
New ways of assessment	Authentic online assessment needs to look at portfolios of evidence in the digital world but also	3) " authentic online assessment" 3) " I think this artificial intelligence, the way we can access it now, is possibly a little bit dangerous for people who don't

	need to include higher order skills. Clarity is required in terms of assessing work done with the help of AI.	have a strong knowledge and skills background, because it makes things too easy." 2) " show me that you've got a portfolio of evidence, I can see that these are your authentic tasks, then I know I can see that you can do it. "
Management and administration		
Stakeholder involvement in change management	Leadership and decisionmakers need to be involved when new technology is implemented, that way they can ensure support to all staff.	6) "Change management is very important...and inclusion … from the onset you must have … when we are adopting the technology before you even get to the stage where you adopt … while you're still conceptualizing, thinking about it…you must get all the stakeholders involved. 6) " …the strategy that we use is, we speak to schools, we do advocacy, and if schools are interested, like right now, we're only training two schools…the whole staff, including the management, because management must know what is happening so that they are able to support the teachers when they need to implement."
Student Management and Administration	Analytics of student data and impact assessments ensure monitoring and evaluation.	5)" what's actually happening through analytics on the LMS page" 6) "Through this monitoring and evaluation that we conduct, we are able to identify areas of need and then develop interventions like the one we are busy with at the moment."
Project management and skills integration		
Project management	Instructional design involves project management to incorporate different skills such as subject matter experts, instructional designers, edtech specialists and academic advisors.	7) "We are the Centre for Education Technology Teaching and Learning …. so, it's a collaboration, it's a collective, specific faculties have a say, Educational Technologies have a say and students have a say." 7) " it's a collaboration again, they will have academic developers, edtech, instructional designers, academic advisors in our context"
Skills integration	Instructional design skills involve technical design skills and curatorship.	1) " designer skills" 1) "qualified instructional designer", 2) " as a curator…. You know where to get all the content and you can decide which content is right for which target group. ..it must be role based."
Quality assurance and testing		
Testing and checking	Quality assurance of work done.	2)" QA checking the …quality assurance of the work."

4. Learning and growth perspective

Theme	Description	Comments Quotes (Nr indicates nr of participant that the quote is linked to
Technology infrastructure		
Technology LMS	Most Learning Management Systems come with a standardised toolbox of design tools and instruments. Some standalone tools can be integrated.	7) "Based in LMS of course it has certain tools, but there are tools that can be integrated in the LMS." 6) "So, they can use it either offline or online, it's up to them, but we always encourage them to do it online because then they can work, anywhere, anytime" 5) " we are always on the lookout for using new technology, but not enforcing it on everybody. You know it's rather from a bottom-up approach to say that let us agree on the standardized tools that we can that we can support across the board and then we will support staff with specific needs related to a specific discipline."
Technology authoring tools	Wide variety of design tools: Microsoft Suite, Google Suite, Adobe reader, Articulate, Grammarly, Quilbot, Camtasia, Captivate, Storyline 360, Kahoot and other gaming platforms, reflection tools and ChatGPT.	2) " Google suite of products" 2) "Microsoft 365" 1) "Articulate" 7) " … let's use Kahoot or should I use any other gamified platform?"
Data Management	Document management and protection on a shared drive.	1) "Dropbox" 1) "SharePoint and MS exchange" 4) "data management and data security" 2) "shared Google Drive"
Technology management and support	Management and support of all strategic and operational technology components.	2) "How do we maintain; we have to back up." 4) " technology partnerships I think will also become important" 5)" we use Teams as a standard for efficiency and economies of scale and support … 6)" guidelines with regards to the kind of equipment that is good for ICT integration in the classroom..." 6) "we have technical people, who are able to assist quickly and then we get things going."
Oline pedagogy		
Oline pedagogy	Instructional designers need to have knowledge about curriculum design and educational technology tools as well as good writing skills. Focus should be on continuous professional development in terms of an online pedagogy.	7) "I think it's very important for instructional designers and educational technologists to have a good understanding of curriculum design." 5) "when we do our staff development, we also demonstrate these tools to staff…" 2) "instructional designer or a learning designer, you must have the ability to write "

AI Literacy	Teach students the ethical use of AI technologies.	3) " we really need to start thinking about AI literacy." 7) " I think as higher education we really need to rethink how technology is being used and teach students to use technologies ethical "
AI Assessment Literacy	Rethink the assessment of digital assignments as well as assessment considering AI.	5) t's no longer even a question about similarity…. It's a question of… we have to redesign our assessments.
Technology awareness basic usage program		
Technology awareness basic usage programme	Learners and educators don't have sufficient digital literacy. Rethink what technology knowledge should be acquired to use ed tech tools efficiently. Equip learners and educators with basic technology usage knowledge and skills.	3) "We give them a computer foundation class that is compulsory for every first-year student at the university, but I don't think we're doing a good job there. We are probably teaching them things that are no longer relevant or that are not very useful, or that they can figure out for themselves on their own. While you know, forgetting about other things that are more essential." 6) "The process is very slow because you know our teachers, they are not…most of them are not that literate. Digital literacy is still very low and there is, you know, for any change or any innovation there will always be the laggards" 7) "So, providing training as well, is very important so that you train colleagues, you equip them. You are not saying they don't know how to use it … equip them, identify the skills gap that existed using that specific tool, and then you provide workshops."