

**THE RELATIONSHIP BETWEEN STUDENT SATISFACTION AND ONLINE
LEARNING INTERACTION AT A SOUTH AFRICAN INSTITUTION OF HIGHER
LEARNING (IHL)**

Submitted in fulfilment of the requirements for the degree of

**MASTER OF COMMERCE (Management)
(FACULTY OF COMMERCE)**

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By

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DECLARATION

I declare that the dissertation entitled, The Relationship between Student Satisfaction with Online Learning Interaction at a South African Institution of Higher Learning which I hereby submit for the degree Master of Commerce (Management) at Rhodes University, is my work. I also declare that I have not previously submitted this dissertation for a degree at this or any tertiary institution and that all the sources I have used or quoted have been indicated and acknowledged by complete references.


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Problem Zindove

DEDICATION

I dedicate this dissertation to my loving and supportive Life Partner, Jephita Matande, and my late father, Jairos Zindove. Their unwavering faith in the power of education and their constant encouragement have been the bedrock of my academic journey. To Jephita, whose boundless love, patience, and understanding have been a source of strength, I owe my deepest gratitude. Your belief in me, especially during the most challenging moments, has been instrumental in reaching this milestone. To my late father, Jairos Zindove, whose legacy of hard work, perseverance, and an unshakeable commitment to learning continues to inspire me, I dedicate this work in your memory. Though you are no longer with us, your spirit and the values you instilled in me guide every step I take.

This dissertation is not only a product of my efforts, but also a testament to the foundation you both helped build—one grounded in love, resilience, and the pursuit of knowledge. It is through their sacrifice, dedication and belief in my potential that I have been able to achieve this accomplishment, and I will carry their legacy forward in my future endeavours.

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ABSTRACT

Institutions of Higher Learning (IHLs) are key providers of skilled labour that drive economic growth. Therefore, it is crucial to ensure that students are satisfied with their interaction in the learning environment, including interaction with peers, instructors, and course content. This satisfaction is vital for positive learning outcomes. The COVID-19 pandemic prompted a shift from traditional face-to-face to online learning, significantly affecting student interaction.

This research aimed to explore the relationship between online learning interaction and student satisfaction at a selected South African IHL. A comprehensive review of the South African higher education landscape, online learning interaction, and student satisfaction literature was conducted. Based on this review, a hypothesised model was proposed, identifying the independent variable (and its constructs namely, learner-to-learner interaction, learner-to-instructor interaction, and learner-to-content interaction) that may influence the dependent variable- student satisfaction (encompassing both expectations and experience).

The research employed a positivistic approach using a deductive reasoning and quantitative methodology. A survey strategy, consisting of self-administered online and paper-based questionnaires, was used to gather data from a convenience sample of students registered at an IHL in South Africa. A total of 268 usable responses were analysed statistically. The validity and reliability of the measurement instrument were confirmed. Descriptive and inferential statistics, including standard deviation, Pearson's correlation coefficients, regression analysis, and Analysis of Variance (ANOVA) were applied in the data analysis. The results revealed a statistically significant relationship between online learning interaction (independent variable) and student satisfaction (dependent variable), leading to the acceptance of the hypotheses. No modifications were necessary, as the hypothesised model provided a good fit.

This research contributes to the body of knowledge on student satisfaction in online learning interaction within South African IHLs. Its use of the Community of Inquiry (CoI) framework has provided a comprehensive perspective of the online learning interaction variable. Also, this research is among the few that juxtaposed student expectations and student experience in student satisfaction discourse. Furthermore, it was found that the constructs of learner-to-learner interaction and learner-to-instructor interaction have an equally strong and statistically

significant relationship with student satisfaction, compared to the learner-to-content interaction construct. It also offers practical, methodological recommendations for IHLs to adopt and implement online learning courses effectively. Among others, the adoption of online learning at IHLs should be encouraged as it leads to student satisfaction. Tangent to this is the need for instructor training programmes on online pedagogy. Future research should also consider qualitative research design to get rich insight into *Why* and *How* the relationship between online learning interaction and student satisfaction exists.

Keywords: online learning interaction, learner-to-learner interaction, learner-to-instructor interaction, learner-to-content interaction, student satisfaction, Institutions of Higher Learning, South Africa.

TABLE OF CONTENTS

DECLARATION.....	i
DEDICATION.....	ii
ACKNOWLEDGEMENTS.....	iii
ABSTRACT	v
TABLE OF CONTENTS	vii
LIST OF ABBREVIATIONS	xiii
LIST OF TABLES.....	xiv
LIST OF FIGURES	xvi
CHAPTER ONE.....	1
INTRODUCTION AND OVERVIEW	1
1.1 INTRODUCTION AND BACKGROUND	1
1.2 PROBLEM STATEMENT.....	5
1.3 RESEARCH OBJECTIVES.....	6
1.3.1 Primary Objectives (PO)	6
1.3.2 Secondary Objectives (SO)	6
1.3.3 Methodological Objectives (MO).....	6
1.4 HYPOTHESIS AND MODEL FOR THE RESEARCH	7
1.5 RESEARCH DESIGN AND METHODOLOGY	9
1.5.1 Secondary Data.....	9
1.5.2 Primary Data Collection	10
1.6 ETHICAL CONSIDERATIONS	14
1.7 RESEARCH SCOPE	14
1.8. STRUCTURE OF THE RESEARCH	15
CHAPTER TWO.....	16
A REVIEW OF THE SOUTH AFRICAN HIGHER EDUCATION LANDSCAPE	16
2.1 INTRODUCTION	16

2.2 SOUTH AFRICAN INSTITUTIONS OF HIGHER LEARNING	16
2.3 SOUTH AFRICAN INSTITUTIONS OF HIGHER LEARNING EDUCATION LANDSCAPE BEFORE COVID-19	18
2.3.1 Inadequate Infrastructure	18
2.3.2 Student Support Services	18
2.3.3 Student Protests	19
2.3.4 Competition	19
2.4 SOUTH AFRICAN INSTITUTIONS OF HIGHER LEARNING EDUCATION LANDSCAPE DURING COVID-19	20
2.4.1 Social Injustice	20
2.4.2 Lack of Funding and Income	21
2.4.3 Lack of Government Subsidies	22
2.4.4 Credibility of Assessments	22
2.5 SOUTH AFRICAN INSTITUTIONS OF HIGHER LEARNING EDUCATION LANDSCAPE AFTER COVID-19	23
2.6 ONLINE LEARNING INTERACTION PLATFORMS: SOUTH AFRICA	25
2.7 CONCLUSION	28
CHAPTER THREE	29
ONLINE LEARNING INTERACTION AND STUDENT SATISFACTION: LITERATURE REVIEW	29
3.1 INTRODUCTION	29
3.2 THEORETICAL FOUNDATIONS UNDERPINNING THE RESEARCH	29
3.2.1 Community of Inquiry Framework (CoI)	30
3.2.2 Social Presence Theory (SPT)	35
3.2.3 Transactional Distance Theory (TDT)	35
3.3 FORMS OF ONLINE LEARNING	36
3.3.1 Asynchronous Online Learning	37
3.3.2 Synchronous Online Learning	38

3.4 ONLINE LEARNING INTERACTION	39
3.4.1 Learner-to-learner Interaction.....	40
3.4.2 Learner-to-instructor Interaction	45
3.4.3 Learner-to-content Interaction.....	50
3.5 STUDENT SATISFACTION.....	55
3.5.1 Student Expectations	56
3.5.2 Student Experience	58
3.6 HYPOTHESISED MODEL FOR THE RESEARCH.....	60
3.7 CONCLUSION	61
CHAPTER FOUR	63
RESEARCH DESIGN AND METHODOLOGY	63
4.1 INTRODUCTION	63
4.2 RESEARCH PROCESS	64
4.2.1 Research Paradigm	66
4.3 RESEARCH APPROACHES TO THEORY DEVELOPMENT	69
4.3.1 Deductive Approach.....	69
4.3.2 Inductive Approach	70
4.3.3 Abductive Approach.....	70
4.3.4 Research Approach employed in the current research	70
4.4 RESEARCH METHODS	71
4.4.1 Quantitative Research Methods.....	71
4.4.2 Qualitative Research Methods.....	71
4.4.3 Mixed Research Methods	72
4.4.4 Research Method employed in the current research.....	72
4.5 POPULATION AND SAMPLING FRAMEWORK	73
4.5.1 Population.....	73
4.5.2 Sampling.....	73

4.6 TIME HORIZON	79
4.7 DATA COLLECTION METHOD	79
4.7.1 Secondary Research.....	80
4.7.2 Primary Research.....	80
4.8 MEASURING INSTRUMENT FOR DATA COLLECTION.....	83
4.8.1 Questionnaire Development	84
4.8.2 Operationalisation of Variables	87
4.8.3 Pre-Testing and Pilot Study	93
4.8.4 Questionnaire Administration.....	94
4.9 VALIDITY AND RELIABILITY OF THE MEASURING INSTRUMENT	95
4.10 DATA ANALYSIS	96
4.10.1 Qualitative data analysis	96
4.10.2 Quantitative data analysis	96
4.11 ETHICAL CONSIDERATIONS	100
4.12 CONCLUSION	101
CHAPTER FIVE	103
EMPIRICAL RESEARCH RESULTS	103
5.1 INTRODUCTION	103
5.2. HYPOTHESES AND MODEL FOR THE RESEARCH	103
5.3 DATA COLLECTION PROCEDURE	105
5.4 DATA PRE-PROCESSING	106
5.4.1 Response Rate and Data Cleaning	106
5.5 RESPONDENTS` DEMOGRAPHIC PROFILE	107
5.6 DESCRIPTIVE STATISTICS OF THE CONSTRUCTS UNDER STUDY	112
5.6.1 Descriptive Statistics for Learner-to-Learner Interaction.....	113
5.6.2 Descriptive Statistics for Learner-Instructor Interaction	115
5.6.3 Descriptive Statistics for Learner-to-Content Interaction	117

5.6.4 Descriptive Statistics for Student Satisfaction.....	119
5.7 VALIDITY AND RELIABILITY OF THE MEASURING INSTRUMENT	121
5.7.1 Validity and Reliability of the Independent Variable.....	121
5.7.3 Validity and Reliability of Student Satisfaction	127
5.8 INFERENTIAL ANALYSIS	128
5.8.1. Pearson`s Correlation Coefficients	128
5.8.2. Regression Analysis	130
5.8.3 Analysis of Variance (ANOVA) Test	133
5.9 HYPOTHESIS TESTING	134
5.9.1 Testing the Hypothesised Model Based on Pearson`s Correlation Coefficients Results	134
5.9.2 Testing the Hypothesised Model Based on Regression Analysis Results.....	137
5.10 SUMMARY OF THE HYPOTHESIS TESTING RESULTS AND FINAL MODEL	138
5.11 DISCUSSION OF THE EMPIRICAL RESEARCH FINDINGS.....	138
5.11.1 Discussion on the Validity and Reliability of Variables	139
5.11.2 Discussion of Pearson`s Correlation Coefficients` Findings.....	140
5.11.3 Discussion of Statistically Significant Relationships of the Variables.....	141
5.12 CONCLUSION	143
CHAPTER SIX.....	145
CONCLUSIONS AND RECOMMENDATIONS	145
6.1 INTRODUCTION	145
6.2 RESEARCH SUMMARY	145
6.2.1 Summary of Chapter One	145
6.2.2 Summary of Chapter Two	147
6.2.3 Summary of Chapter Three	148
6.2.4 Summary of Chapter Four	148
6.2.5 Summary of Chapter Five.....	149

6.2.6 Summary of Chapter Six	151
6.3 ATTAINMENT OF THE RESEARCH OBJECTIVES.....	152
6.4 RECOMMENDATIONS BASED ON EMPIRICAL RESULTS.....	153
6.4.1 Recommendations Based on Statistically Significant Relationships	153
6.4.2 Recommended Framework Based on the Research Results.....	157
6.4.3 Recommendations for Future Research.....	159
6.5 SIGNIFICANCE OF THE RESEARCH.....	160
6.6 LIMITATIONS OF THE RESEARCH.....	161
6.7 FINAL CONCLUSION.....	162
REFERENCES	164
APPENDICES	189
APPENDIX A: REQUEST FOR PARTICIPATION LETTER.....	189
APPENDIX B: RESEARCH QUESTIONNAIRE.....	191
APPENDIX C: ETHICS APPROVAL LETTER.....	197
APPENDIX D: STATISTICIAN CERTIFICATE.....	198

LIST OF ABBREVIATIONS

The following abbreviations have been used in this research.

Abbreviation	Meaning
4IR	4 TH Industrial Revolution
ANOVA	Analysis of Variance
CoI	Community of Inquiry
CFA	Confirmatory Factor Analysis
COVID-19	Corona Virus Disease
DHET	Department of Higher Education
FMF	FeesMustFall
ICT	Information, Communication and Technology
IHL	Institution of Higher Learning
IHLs	Institutions of Higher Learning
LMS	Learner Management Systems
MO	Methodological Objectives
PALP	Peer Assisted Learning Programmes
PAF	Principal Axis Factoring
PPE	Personal Protective Equipment
PO	Primary Objective
SO	Secondary Objectives
SPT	Social Presence Theory
TDT	Transactional Distance Theory
UK	United Kingdom
UNISA	University of South Africa
USA	United States of America
WHO	World Health Organisation

LIST OF TABLES

Table 2. 1: SOUTH AFRICAN INSTITUTIONS OF HIGHER LEARNING	17
TABLE 2. 2: ONLINE LEARNING PLATFORMS	26
TABLE 3.2: LEARNER-TO-LEARNER INTERACTION CRITERIA	41
TABLE 3. 3:LEARNER-TO-INSTRUCTOR INTERACTION CRITERIA	46
TABLE 3.4: LEARNER-TO-CONTENT INTERACTION CRITERIA	51
TABLE 4.2: OPERATIONALISATION OF LEARNER-TO-INSTRUCTOR INTERACTION.....	90
TABLE 4.3: OPERATIONALISATION OF LEARNER-TO-CONTENT INTERACTION	91
TABLE 4.4: OPERATIONALISATION OF STUDENT SATISFACTION	93
TABLE 5. 2: RESPONDENTS` GENDER	107
TABLE 5.3: RESPONDENTS` ETHNICITY.....	108
TABLE 5. 4: RESPONDENTS` FACULTIES.....	110
TABLE 5. 5: RESPONDENTS` LEVEL OF STUDY.....	111
TABLE 5.6: LEARNER-TO-LEARNER INTERACTION DESCRIPTIVE STATISTICS	113
TABLE 5.7: LEARNER-TO-INSTRUCTOR INTERACTION DESCRIPTIVE STATISTICS.....	115
TABLE 5. 8: LEARNER-TO-CONTENT INTERACTION DESCRIPTIVE STATISTICS	117
TABLE 5. 9: DESCRIPTIVE STATISTICS FOR STUDENT SATISFACTION	119
TABLE 5. 10: FACTOR 1: LEARNER-TO-LEARNER INTERACTION	122
TABLE 5. 11: FACTOR 2: LEARNER-TO-INSTRUCTOR INTERACTION.....	124
TABLE 5. 12: FACTOR 3: LEARNER-TO-CONTENT INTERACTION.....	125
TABLE 5. 13: VALIDITY AND RELIABILITY OF STUDENT SATISFACTION FACTORS	127
TABLE 5. 14: CORRELATION COEFFICIENTS INTERPRETATION GUIDELINE	129
TABLE 5. 15: PEARSON`S CORRELATION COEFFICIENTS RESULTS	129
TABLE 5. 16: RESULTS FOR MULTICOLLINEARITY	131
TABLE 5. 17: REGRESSION ANALYSIS MODEL	132

TABLE 5. 18: ANALYSIS OF VARIANCE (ANOVA) TEST	134
TABLE 5. 19: HYPOTHESISED MODEL TESTING-PEARSON`S CORRELATION	135
TABLE 5. 20: HYPOTHESISED MODEL TESTING- REGRESSION ANALYSIS	137
TABLE 5. 21: SUMMARY OF THE HYPOTHESIS TESTING RESULTS	138

LIST OF FIGURES

FIGURE 1.1: HYPOTHESISED MODEL	8
FIGURE 3.2: REPRODUCED HYPOTHESISED MODEL	61
FIGURE 4.2: RESEARCH UNION	65
FIGURE 4.3: SAMPLING PROCESS	74
FIGURE 4.4: SAMPLING TECHNIQUES	76
FIGURE 5.1: REPRODUCED HYPOTHESISED MODEL	104
FIGURE 5. 2: RESPONDENTS` GENDER	108
FIGURE 5.3: ETHNICITY GROUPS	109
FIGURE 5. 4: RESPONDENTS` FACULTIES	110
FIGURE 5. 5: RESPONDENTS` LEVEL OF STUDY	111
FIGURE 5. 6: REPRODUCED HYPOTHESISED MODEL	136
FIGURE 6. 1: RECOMMENDED MODEL FOR ONLINE LEARNING INTERACTION AND STUDENT SATISFACTION	158

CHAPTER ONE

INTRODUCTION AND OVERVIEW

1.1 INTRODUCTION AND BACKGROUND

Through the years, there has globally been progression towards online pedagogical modes and platforms at institutions of higher learning (IHLs) (Martin and Bolliger, 2018; Greenhow, Graham and Koehler, 2020; Martin, Sun and Westine, 2020). Since the 19th century, technological advancement has transformed online learning from predominantly mail-based or repository-based asynchronous and self-engaging practice towards synchronous, multidimensional interactive mode (Kentnor, 2015, Wei and Chou, 2020). The 21st century witnessed an increase in the use of digital-based platforms such as social media, Zoom, Microsoft Teams, Google Classroom (Revere and Kovach, 2011; Bailey, 2022), video conferencing and learner management systems (LMS) such as blackboard (Singh and Awasthi, 2020) as well as customised learning resources (Kem, 2022).

These new digital platforms facilitate synchronous and asynchronous online learning interaction between learners (students), learners with instructors and learners with content. These relationships are also known as learner-to-learner, learner-to-instructor and learner-to-content interaction respectively (Saadatmand et al., 2017; Martin and Bolliger, 2018). Unlike in the first world, IHLs in developing countries made little strides to proactively adopt online learning (Riley et al., 2021). In South Africa for instance, contact-based IHLs resorted to online learning platforms in response to the Coronavirus Disease (COVID-19) induced lockdown in 2020 (Cranfield et al., 2021; Tsakeni, 2021). This disruptive transition necessitated a paradigm shift in interaction between the learners, instructors and content (Cranfield et al., 2021; Tsakeni, 2021). This has sparked scholarly debates centred on online pedagogy.

Current scholarly work on online learning and student satisfaction has provided inconclusive findings (Berbegal-Mirabent, Mas-Machuvca and Marimon, 2018; Alexander et al., 2019; Dericks et al., 2019; Ho, Cheong and Weldon, 2021; Dao Thi Thu and Duong Hong, 2021). Some schools of thought believe that students are satisfied with interaction on online learning platforms (Elshami et al., 2021) while others contest this position arguing that instructors and students in South Africa's IHLs were ill-prepared for the transition (Cranfield et al., 2021). Moreso, research placed little to moderate attention on the relationship between online learning

interaction and student satisfaction (Jiang et al., 2021). Considering the expanding student `clientship` concept at IHLs (Arias et al., 2018; Naidu, 2021), testing the relationship between these constructs is of scholarly significance.

Student satisfaction conventionally refers to the fulfilment derived from a student`s learning experience (Long 1985; Kurucay and Inan, 2017; Elshami et al., 2021). While these authors provide a reflexive and experiential definition, Martin (1988) and Yu (2022) supplement it with a comparative definition. The authors interpret it as a measure of consistency between students` expectations(s) versus students` experience. The definition by Martin (1988) and Yu, (2022) commendably adds to the discourse `student expectations`, a vital yet under-researched facet. It denotes that students are value-laden entities (hold pre-experience notions) which, once met or exceeded through experience, lead to satisfaction (Martin, 1988; Hettiarachchi et al., 2021; Yu, 2022). Bouilheres et al. (2020) and Hettiarachchi et al. (2021) argue that `learning experience` is an encompassing phrase composed of three constituencies namely, learner motivation, technology and student interaction. Learner motivation involves issues such as student preparedness and perception towards the learning challenges (Hettiarachchi et al., 2021) while technology looks at how these web-based platforms enhance student`s readiness for the 21st computer competencies, facilitate efficiency, systems reliability and convenience (Wong 2020). Lastly, student satisfaction looks at the ability of online learning interaction to build a community of socially and cognitively competent learners (Wei and Chou, 2020; Wong, 2020). For purposes of this research, student satisfaction refers to a student`s expectations – experience chasm evaluation. This definition fuses the philosophical concepts by Martin (1988), Bouilheres et al. (2020) and Hettiarachchi et al. (2021).

Multi-modal interaction is the epicentre of students` learning and subsequent satisfaction with their academic experience (Moore, 1989; Valai, Schmidt-Crawford and Moore, 2019). Moore`s (1989) seminal work propounded that student interaction in the online environment transpires in three dimensions, namely, learner-to-learner, learner-to-instructor and learner-to-content, interaction (Wong, 2020). These three are principal components of the Community of Inquiry (CoI) framework, a theoretical framework (by Garrison, Anderson and Archer, 2020) underpinning this research. In this research, these three constructs (learner-to-learner interaction, learner-to-instructor interaction and learner-to-content interaction) constitute the online learning interaction, the independent variable.

Learner-to-learner interaction refers to peer-to-peer collaboration and support meant at developing a student's social intellect (Purwandari, Junus and Santoso, 2022). As IHLs are preparatory grounds for industry, this augments group dynamics capabilities, sharpens team management skills, communication and other soft skills- building a social academic (Phillips et al., 1988 in Moore, 1989). In addition, Miao, Chang and Ma, (2022) point out that learner-to-learner interaction stimulate critical thinking through group tasks and discussions. This interaction may transpire synchronously during lectures, group work or beyond (e.g., moral support). Johnson and Johnson (2002); Battalio, (2007); Burdett and Hastie (2009) and Kurucay and Inan, (2017) observed high learner-to-learner interaction with online learning platforms while Gary and DiLoreto (2016) concluded that learner-to-learner interaction does not have a significant impact on student satisfaction at undergraduate level but rather at postgraduate level. Kurucay and Inan, (2017) and Flock (2020) add that the interaction frequency, productivity and quality of engagements inspire student satisfaction.

Learner-to-instructor interaction refers to the instructor's pedagogical capability, content creation and delivery that provokes creative thinking, interaction, maintaining learners' interest, creating a sense of direction and ultimately satisfaction (Moore, 1989; Bell, 2022). The instructor can facilitate group presentations, provide assignments, ask questions, mediate discussions, issue task guidelines and feedback (Saadatmand et al., 2017). Chen, Liu and Zheng (2022) emphasise that pedagogical approach has a major effect on student satisfaction. Beyond this, instructors may provide counselling, career advice, psychological and moral support to the learners (Moore, 1989; Bell, 2021). Sadaatmand et al. (2017); Wei and Chou, (2020) and Hoi, et al. (2021) posit that learner satisfaction is heightened if this transpires throughout the duration of the research.

Learner-to-content interaction refers to a student's engagement with the subject content to build cognitive capacity - insight, thinking, memory and decision-making (Moore, 1989; Hettiarachchi et al., 2021). In line with the CoI framework, content should help develop a student as a member of the community of academics (Purwandari et al., 2022). Student satisfaction is, thus, a product of the resultant intellectual growth and alignment to course requirements as evidenced by the student's problem-solving capacity, ability to apply content, and performance in assessments (Appavoo et al., 2019). Unlike before, content is available in diverse forms - written, audio, visual available at the learner's convenience-asynchronously and synchronously (Hettiarachchi et al., 2021).

IHLs perform student satisfaction surveys usually at the end of the academic projects, as *mere formalities* rather than improving education (Leach, 2019; Winstone et al., 2022). These student satisfaction surveys barely prompt content nor instructor's pedagogical transformation (Li and Asante, 2021). Although the past decade has witnessed a noticeable increase in online enrolments and student retention at IHLs (Seaman, Allen and Seaman, 2018; Arias et al., 2018; Hettiarachchi et al., 2021; Zeng and Wang, 2021), the issue of student satisfaction has not been sufficiently addressed. Students are still traditionally perceived as passive (and insignificant) role-players with teaching methods focussing on instructors with little learner input (Moore, 1989; Murillo-Zamorano, Sánchez and Godoy-Caballero, 2019; Li and Asante, 2021). This is against Consortium (2002) in Kurucay and Inan (2017) and Naidu, (2021) who emphasises that IHLs should award student satisfaction equal (if not greater) attention than other IHLs performance measures such as research output, world rankings, funding, etc. (de Wit and Altbasch, 2021) as it lies at the heart of institutional mission. In addition, DiPietro et al. (2022) emphasise the importance of involving students as stakeholders in curriculum development. Leach, (2019) points out that, when designing content, most IHLs are preoccupied with meeting their standards, benchmarks and (the industry) but barely the students' expectations. Resultantly, in the case of South African IHLs, this affects current and future enrolment figures since there will be little word-of-mouth advertising (Naidu, 2021). This 'silent' yet crucial feedback loop voice is of interest to this research given the crucial role of students in decision making in South African IHLs (Naidu, 2021).

The research was guided by the CoI framework developed by Garrison, Anderson and Archer, (2000). The framework assumes that education experience takes place within a community of individuals that have a similar purpose of academic excellence. In addition, the framework evaluates learning experiences, content design and interaction in distance and online learning (Garrison et al., 2000). According to Garrison et al. (2000), the framework assumes that the three core elements present for an effective learning experience are social presence, teaching presence and cognitive presence. Social presence aligns with learner-to-learner interaction. Garrison et al. (2000) define social presence as the ability of the participants to project their personalities and present themselves as actual people within a community. Teaching presence aligns with learner-to-instructor interaction. Garrison et al. (2000) define teaching presence as the support role to cognitive and social presence that is primarily played by instructors. Cognitive presence aligns

with learner-to-content interaction. Garrison et al. (2000) identify cognitive presence as the level through which participants can generate meaning through constant communication.

1.2 PROBLEM STATEMENT

The problem in research is that, despite adoption of online learning as the sole mode at IHLs in South Africa during the COVID-19 era, there is limited understanding of its relationship with student satisfaction. This is compounded by the fact that, a substantial body of literature examining student satisfaction (Hettiarachchi et al., 2021; Yu, 2022) has concentrated primarily on student experience (Elshami et al., 2021) underplaying student expectations. A significant gap exists regarding incorporation of student expectations, an area that remains underexplored despite its potential academic significance (Pinto and Anderson, 2013; Li and Asante, 2021). Incorporating the concept of student expectations into student satisfaction discourse may yield valuable insights and new findings that enhance both theoretical and practical understanding of the relationship between online learning interaction and student satisfaction.

While notable research has adopted the CoI framework, a paltry study comprehensively examined them. Thus, existing research has provided a discrete perspective on the impact of the three online learning interaction constructs (learner-to-learner interaction, learner-to-instructor interaction and learner-to-content interaction) on student satisfaction (expectations and experience) (Ng, 2017; Nyathi and Sibanda, 2022). This status quo challenges the CoI framework, which posits that these three constructs are interconnected and collectively contribute to student satisfaction (Kurucay and Inan, 2017; Sadaatmand et al., 2017; Tsakeni, 2021). Therefore, this research examined these interaction constructs to determine their respective roles in shaping student satisfaction.

The existing body of research has produced inconclusive and often mixed findings regarding the relationship between online learning interaction (the independent variable) and student satisfaction (the dependent variable) (Berbegal-Mirabent, Mas-Machuvca, and Marimon, 2018; Alexander et al., 2019; Dericks et al., 2019; Ho, Cheong, and Weldon, 2021; Dao Thi Thu and Duong Hong, 2021). This research attempted to clarify these discrepancies by investigating how online learning interaction relates to student satisfaction (expectations and experience). By addressing this issue, the research confirmed and/ or refuted prior findings regarding the

significance of the online learning interaction-student satisfaction relationship, thereby contributing to a more nuanced understanding of online educational practices.

1.3 RESEARCH OBJECTIVES

The objectives of this research comprised of primary, secondary and methodological objectives. The following objectives have been formulated accordingly:

1.3.1 Primary Objectives (PO)

The primary objective of this research was to establish the relationship between online learning interaction and student satisfaction at IHLs in South Africa.

1.3.2 Secondary Objectives (SO)

Based on the primary objective, the following secondary objectives (SO) have been formulated:

SO¹: To examine the relationship between online learner-to-learner interaction with student satisfaction considering both expectations and experience.

SO²: To examine the relationship between learner-to-instructor interaction and student satisfaction considering both expectations and experience.

SO³: To examine the relationship between learner-to-content interaction and student satisfaction considering both expectations and experience.

1.3.3 Methodological Objectives (MO)

The following methodological objectives have been formulated for this research:

MO¹: To provide an overview of the relationship between online learning interaction and student satisfaction.

MO²: To conduct a detailed literature review on the South African higher education landscape.

MO³: To conduct a comprehensive literature review on the relationship between online learning interaction and student satisfaction.

MO⁴: To develop a hypothesised model depicting the relationship between online learning interaction and student satisfaction.

MO⁵: To identify and implement the research design and methodology most suitable to address the problem statement and the research objectives.

MO⁶: To conduct an empirical investigation and testing of the hypothesised model in MO⁴

MO⁷: To provide recommendations to researchers and academic institutions on online learning interaction and student satisfaction.

1.4 HYPOTHESIS AND MODEL FOR THE RESEARCH

This research identified key independent and dependent variables to construct the hypothesised model. The independent variable is online learning interaction (which incorporates three constructs, namely, learner-to-learner interaction, learner-to-content interaction, and learner-to-instructor interaction), while the dependent variable is student satisfaction (which encompasses student expectations and experiences). A comprehensive discussion of these variables is presented in Chapter Three, detailing their significance and interrelationships within the context of online learning environments.

Following the introduction, background, and problem statement, the following research questions (RQs) have been formulated to guide the inquiry and deepen the understanding of the dynamics between these variables:

RQ¹: What is the relationship between online learning interaction and student satisfaction?

RQ^{1a}: What is the relationship between online learner-to-learner interaction and student satisfaction?

RQ^{1b}: What is the relationship between learner-to-instructor interaction and student satisfaction?

RQ^{1c}: What is the relationship between learner-to-content interaction and student satisfaction?

To address the research objectives and to answer the research questions, a hypothesised model was developed as illustrated in Figure 1.1.

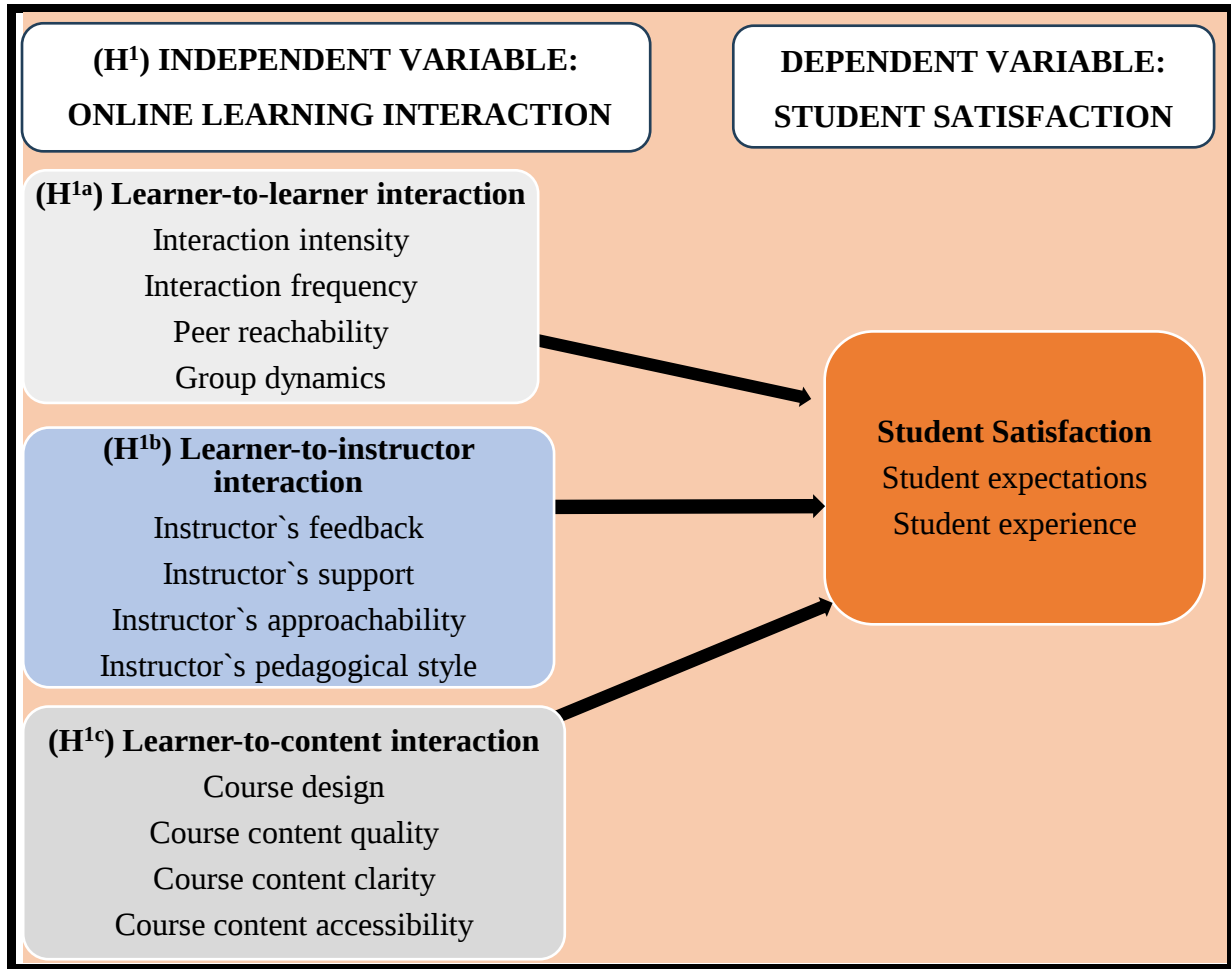


FIGURE 1.1: HYPOTHESISED MODEL

Source: Researcher's construction

Figure 1.1 illustrates the hypothesised model for this research. The proposed model selected the independent variable, online learning interaction (which includes three constructs learner-to-learner interaction, learner-to-instructor interaction and learner-to-content interaction) that possibly affects the independent variable, student satisfaction (which includes expectations and experience). The following hypothesis was formulated for empirical testing:

- H¹:** There is a statistically significant relationship between online learning interaction (learner-to-learner interaction, learner-to-instructor interaction and learner-to-content interaction) and student satisfaction (expectations and experience).
- H^{1a}:** There is a statistically significant relationship between online learner-to-learner interaction and student satisfaction.

H^{1b}: There is a statistically significant relationship between learner-to-instructor interaction and student satisfaction.

H^{1c}: There is a statistically significant relationship between learner-to-content interaction and student satisfaction.

1.5 RESEARCH DESIGN AND METHODOLOGY

This research aimed to investigate the relationship between online learning interaction (which encompasses three constructs learner-to-learner, learner-to-instructor and learner-to-content interaction) and student satisfaction—encompassing both expectations and experience. A well-structured research design is crucial as it provides a systematic approach for conducting the research and achieving the outlined research objectives (Pandey and Pandey, 2021).

This research adopted a quantitative research approach grounded in a post-positivist paradigm, utilising a single cross-sectional design (Bell, Bryman and Harley, 2022). This approach was chosen to facilitate the collection of data from a single sample group that comprehends the dynamics of online learning interaction and its influence on student satisfaction. Quantitative methods were particularly suitable for this type of research, as they allowed for statistical analysis of relationships between variables, thereby providing objective insights (Kurucay and Inan, 2017; Lemay, Bazelais, and Doleck, 2021).

1.5.1 Secondary Data

This research employed secondary data to contextualise the findings within the broader landscape of existing knowledge (Creswell and Creswell, 2018). Secondary data refers to information that has been collected for purposes other than the current research project (Taherdoost, 2021). In this study, various sources were explored to assess the relationship between online learning interaction and student satisfaction. The literature review encompassed academic textbooks and peer-reviewed journal articles, accessed through databases such as EBSCOhost and Google Scholar, made available via the researchers' affiliated institution, Rhodes University.

The use of secondary data was particularly valuable in this context, as it allowed for the integration of established research findings and theoretical frameworks, thereby enriching the analysis of current trends in the South African higher education landscape. By examining diverse

studies and publications, the research aimed to identify common gaps and emerging issues in online learning interaction and student satisfaction, thus, contributing to a comprehensive understanding of these variables in the online learning environments. Moreover, the utilisation of secondary data not only enhanced the reliability of the research findings but also provided a foundation for further investigation, potentially informing future studies and educational practices in the realm of online learning interaction.

1.5.2 Primary Data Collection

In addition to the secondary data, this research also incorporated primary data collected directly from respondents, which was essential for addressing the specific objectives of the research. Primary data refers to information gathered specifically for the current research project, allowing for more tailored insights into the topic at hand (Saunders et al., 2019). To collect primary data, a variety of methodologies can be employed, including interviews, observations, experiments, and surveys (Taherdoost, 2021). For this study, a survey was chosen as the primary instrument for data collection from a selected sample. Self-administered online and paper-based questionnaires were utilised to reach a diverse respondent pool, ensuring inclusivity and accessibility.

The research followed a quantitative data collection approach, enabling the use of statistical methods to test hypotheses and derive empirical results (Hair et al., 2019). This approach facilitates the analysis of numerical data, providing a robust framework for interpreting the findings (Babbie, 2020). To ensure a rigorous sampling process, the following steps, as recommended by Brown, Suter, and Churchill (2018), were implemented.

1.5.2.1 Target Population

The target population refers to the specific group of individuals or items from which primary data is collected for research (Brown et al., 2018; Babbie, 2020). For this research, the target population consisted of students enrolled at an IHL, who experienced online learning during the academic years 2020 to 2022. This period was particularly significant as students were compelled to transition to online learning due to the restrictions imposed by the COVID-19 lockdown.

Understanding the satisfaction levels of these students with their online learning experiences is crucial for IHLs, as it provides insights into the effectiveness of their remote education

interaction strategies and highlights areas for improvement. Given that this cohort faced unprecedented challenges, including technological barriers, changes in teaching methodologies and the social isolation associated with remote learning, their feedback can help institutions enhance the quality of future online education.

To ensure a comprehensive and unbiased representation of student experiences, the research considered participants from all faculties within the IHL. By including a diverse array of disciplines—such as Humanities, Sciences, Commerce, Pharmacy, etc., the research aimed to capture a wide spectrum of perspectives and satisfaction levels. This inclusive approach minimised potential bias and allowed for a more nuanced understanding of the varied impacts of online learning interaction across different fields of study.

1.5.2.2 Sampling

After identifying the target population, a sampling frame was established, as outlined by Brown et al. (2018). Saunders et al. (2019) describe a sampling frame as a comprehensive list of eligible individuals from which sampling elements are selected. In this research, the sampling frame consisted of all registered students at the chosen IHL during the research period in 2023. However, there was no distinct list identifying students who had participated in online learning. Consequently, a non-probability convenience sampling technique was employed to select respondents. This method, as noted by Zikmund, Quinlan and Griffin (2019), depends on the availability and willingness of individuals within the researcher's reach to participate. Students from the selected IHL were invited to complete both online and paper-based questionnaires, facilitating data collection from a diverse group of participants.

Drawing from established methodologies in prior research by Kline (2017), Memon et al. (2020), and Hair et al. (2021), a sample size of 250 was determined to be sufficient for this research. The sample size is defined as the number of elements included in research (Cresswell and Cresswell, 2018), ensuring that the findings are statistically relevant (Tanderhost, 2021). Data collection occurred through a cross-sectional time horizon, specifically during September for the online questionnaires and October for the paper-based surveys. This approach allowed for the collection of primary data at a single point in time (Babbie, 2020), thereby enhancing the efficiency of the research process. The data collection instrument was a structured closed questionnaire, designed to elicit specific information from respondents. It consisted of three sections: Section A focused

on demographic information, while Sections B and C explored the key variables pertinent to the research objectives. The detailed structure of the questionnaire is elaborated upon in Chapter Four of this research, ensuring clarity and transparency in the research methodology.

1.5.2.3 Validity and Reliability

Ensuring the validity and reliability of the measuring instrument is crucial in any research (Hair et al., 2021). Validity, as defined by Pandey and Pandey (2021), refers to the extent to which a research instrument accurately measures what it is intended to measure. To uphold the face validity of this research, several due processes were meticulously followed. Initially, the questionnaire was reviewed by the research supervisor, a professor with expertise in marketing and management, as well as an experienced marketing lecturer and qualified statistician. Their feedback led to several modifications to enhance the instrument's clarity and relevance.

In addition to expert review, a pilot study was conducted with a select group of respondents who matched the characteristics of the target research sample. This preliminary stage was instrumental in identifying any ambiguities in the questionnaire and allowed for further refinements based on participant feedback. The pilot study not only contributed to the content validity of the instrument but also provided insights into potential challenges respondents might face during the actual data collection process. Further, Confirmatory Factor Analysis (CFA) was employed to ensure construct validity. This guarantees that the selected factors effectively operationalise the constructs (Singh, 2019)

Reliability, on the other hand, refers to the consistency of the measuring instrument, as noted by Singh (2017) and Hair et al. (2021). A reliable instrument should yield similar responses from participants even when the questions are repeated. To assess the reliability of the questionnaire, Cronbach's alpha coefficients were utilised. Following Hair et al. (2019), the minimum acceptable threshold for the Cronbach's alpha coefficients were set at 0.70, indicating a reasonable level of internal consistency. To further substantiate the reliability of the instrument, measures from previous studies that reported alpha coefficients above 0.70 were incorporated. This approach ensured that only items with an alpha coefficient ranging from 0.70 to 1.00 were accepted for inclusion in the final instrument.

By rigorously addressing both validity and reliability, this research aimed to ensure that the data collected would accurately reflect the constructs being measured.

1.5.2.4 Data Analysis

Once the data collection process was completed, the dataset was transferred to Microsoft Excel for initial organisation and cleaning. Subsequently, the data was sent to a statistician at a reputable analytics firm for comprehensive analysis. Given that this research adopts a quantitative approach, a variety of quantitative data analysis methods were employed to derive meaningful insights from the data.

Descriptive and inferential statistics were the primary analytical techniques utilised. The combination of descriptive and inferential statistical analyses enriched the understanding of the research findings and contributed to the validity of the conclusions drawn. Descriptive statistics, as outlined by Zikmund et al. (2019) and Hair et al. (2021), provide a summary of the characteristics that statistically describe the sample. This form of analysis is crucial for identifying patterns and trends within the dataset (Brown et al., 2018; Pandey and Pandey, 2021). For this study, several descriptive statistics were employed, including measures of central tendency (mean, median, mode), measures of frequency (counts and percentages), and measures of variability (range, variance, and standard deviation). These metrics allowed for a comprehensive understanding of the participants' demographics and responses, helping to establish foundational patterns in the data.

In addition to descriptive statistics, inferential statistics were employed to draw conclusions that extend beyond the sample to the larger population (Creswell and Creswell, 2018; Morgan et al., 2019). Specifically, Pearson's correlation coefficient and regression analysis were utilised to uncover relationships between key variables (online learning interaction and student satisfaction) and provide a deeper understanding of the data. Further, an Analysis of Variance (ANOVA) was used to test the statistical significance of the overall regression model. Pearson's correlation coefficient was calculated to assess the strength and direction of the relationships between online learning interaction and student satisfaction. This statistical method offered valuable insights into how these variables interact, providing a clearer picture of the patterns and trends within the dataset (Hair et al., 2021). By quantifying the degree of association between these variables, Pearson's correlation enhanced the interpretation of how online learning interaction might

influence student satisfaction. Additionally, regression analysis was conducted to further explore these relationships. Before performing regression analysis, several assumptions were met. For example, a multicollinearity assessment was carried out to ensure that the continuous variables intended for inclusion were not highly correlated with one another, which could undermine the reliability of the regression results (Shrestha, 2020). Regression analysis examines the relationship between one dependent variable and two or more independent variables (Christopher, 2021). This technique helped to predict the value of the dependent variable based on changes in the independent variable, providing a more nuanced understanding of how different online learning interaction factors may influence student satisfaction within online learning environments. Furthermore, regression analysis can reveal both direct and indirect effects, offering a more comprehensive view of the dynamics at play (Tsagris and Pandis, 2021). ANOVA assesses the significance of survey results, aiding in decision-making regarding the acceptance or rejection of the hypothesis (Armstrong, 2019).

1.6 ETHICAL CONSIDERATIONS

Ethics pertains to the principles and values that govern acceptable human behaviour (Babbie, 2020). This research received initial approval from the Research Ethics Committee of the selected IHL on 7 June 2023, for a one-year period. The approval was subsequently renewed for an additional year on 7 July 2024 (approval number: 2023-7329-7783). Additionally, permission from gatekeepers at the university was secured before engaging with students. To ensure the ethical integrity of the study, voluntary consent was also sought from participants before they could proceed with the research. This research prioritised ethical considerations at every stage of the research process. Detailed information regarding the ethical practices followed is found in Chapter Four.

1.7 RESEARCH SCOPE

This research aimed to investigate and develop a model that elucidates the relationship between online learning interaction and student satisfaction. The research focused on the independent variable, online learning interaction, and its influence on the dependent variable, student satisfaction. By examining how the various online learning interaction constructs (learner-to-learner interaction, learner-to-instructor interaction and learner-to-content interaction), affect overall satisfaction (expectations and experience). The research sought to provide insights that could enhance the online learning interaction.

The goal of this research was to propose a comprehensive model that clearly outlines the dynamics between online learning interaction and student satisfaction. This model is intended to serve as a valuable tool for educators and administrators in optimising online learning environments and fostering greater student satisfaction. This research provided a targeted examination of the interplay between online learning interaction and student satisfaction, laying the groundwork for future studies that may expand upon these findings by incorporating additional variables.

1.8. STRUCTURE OF THE RESEARCH

This research is organised as follows:

Chapter One: This chapter presents the research background, an overview of the study, and the problem being investigated. It outlines the research objectives and introduces the hypothesised model, as well as detailing the research methodology employed.

Chapter Two: In this chapter, the context of the research is established through an exploration of the South African higher education landscape.

Chapter Three: This chapter reviews existing literature to enhance understanding of online learning interaction and student satisfaction. It culminates in the development of a conceptual model and the research hypotheses.

Chapter Four: This chapter details the research design and methodology, addressing issues of validity and reliability. It also outlines the methods used for data evaluation.

Chapter Five: Empirical results from the data analysis are presented in this chapter, along with the results of the tests for the hypothesised model.

Chapter Six: This chapter summarises the primary findings and draws conclusions based on them. It also discusses limitations of the research and offers recommendations for future research.

CHAPTER TWO

A REVIEW OF THE SOUTH AFRICAN HIGHER EDUCATION LANDSCAPE

2.1 INTRODUCTION

The previous chapter introduced the research by introducing the research topic and providing an overview of the research problem. It further introduced the variables under study, the objectives of the study, the proposed methodology and the ethics considerations. To gain a clear understanding of the relationship between online learning interaction and student satisfaction, this chapter reviews literature on the South African higher education landscape, with a focus on IHLs. The education sector in developing countries was significantly impacted by the COVID-19 pandemic, particularly in South Africa, where the abrupt closure of academic institutions occurred during a scheduled academic break. This left little to no time for adequate preparations for the transition to online learning. This chapter explores the South African higher education system before, during, and after COVID-19 to provide an understanding of the pandemic's effects on the sector.

2.2 SOUTH AFRICAN INSTITUTIONS OF HIGHER LEARNING

After the end of apartheid in 1994, President Mandela's government was committed to ensuring that all South Africans had access to tertiary education, regardless of race or socio-economic status (Jappie, 2020; Chomunorwa, Mashonganyika, and Marevesa, 2023). To address historical inequalities, the government prioritised resources for the establishment of IHLs throughout South Africa (Scott and Ivala, 2019; Tewari and Ilesanmi, 2020). These IHLs operate under the Department of Higher Education and Training (DHET), overseen by the Minister of Education. Currently, South Africa has a total of 26 IHLs, categorised as shown in Table 2.1.

Table 2. 1: SOUTH AFRICAN INSTITUTIONS OF HIGHER LEARNING

Category	Name of University	Primary Objective
Traditional universities	• North-West University (2004) • Rhodes University (1904) • University of Cape Town (1989) • University of Fort Hare (1916) • University of the Free State (1904) • University of KwaZulu-Natal (2004) • University of Limpopo (2005) • University of Pretoria (1908) • University of Stellenbosch (1866) • University of Western Cape (1959) • University of Witwatersrand (1896)	• To provide theoretical learning programmes
Universities of technology	• Cape Peninsula University of Technology (2005) • Central University of Technology (1981) • Durban University of Technology (2002) • Mangosuthu University of Technology (2007) • Tshwane University of Technology (2003) • Vaal University of Technology (2003)	• To provide career-focused technical programmes
Comprehensive universities	• Nelson Mandela University • Sefako Makgatho Health Science University • Sol Plaatje University (2013) • University of Johannesburg • University of Mpumalanga • University of South Africa (UNISA) (1973) • University of Venda (1982) • University of Zululand (1960) • Walter Sisulu University (1977)	• To provide a combination of both theoretical and practical programmes

Source: Adapted from Essop (2020:11)

Table 2.1 categorises the 26 IHLs in South Africa into three distinct types: traditional universities, universities of technology, and comprehensive universities. These institutions are central to this research's primary objective: to establish the relationship between online learning interaction and student satisfaction at an IHL in South Africa.

As discussed in the following section, IHLs were encountering challenges even before the onset of the COVID-19 pandemic.

2.3 SOUTH AFRICAN INSTITUTIONS OF HIGHER LEARNING EDUCATION LANDSCAPE BEFORE COVID-19

Before COVID-19, there were plans for South African IHLs to incorporate Information, Communication and Technology (ICT) infrastructure in their teaching and learning, to enhance competitiveness on a global scale (Molokomme, 2024). As part of the 4th Industrial Revolution (4IR) plan, IHLs adopted learner management systems (LMS) and incorporated blended learning. However, IHLs have been reluctant to incorporate the use of technology in their teaching and learning activities (Matarirano et al., 2021). Also, the South African higher education space has been facing many challenges before the COVID-19 pandemic (Chomunorwa et al., 2023). These include inadequate infrastructure, poor student support services, student protests, lack of funding, and competition among IHLs (Hlatshwayo and Fomunyan, 2019; Chomunorwa et al., 2023; de Villiers, 2023). These challenges are discussed in the following subsections.

2.3.1 Inadequate Infrastructure

There has been a significant rise in the demand for higher education qualifications in South Africa. For example, enrolments in master's and doctoral programmes increased by 150% between 1996 and 2016 (Gumede, 2020). This has been expedited by the government's incentives to cater to the post-apartheid skills shortage the country faced (Chomunorwa et al., 2023). For example, the number of students funded by the government through the National Student Financial Aid Scheme (NSFAS) increased from 7.6% in the year 1995 to 46% by the year 2020 (de Villiers, 2023). This demand has not been met with infrastructure expansion at most IHLs in South Africa (Chomunorwa et al., 2023). This included additional lecture rooms to decongest the current ones, additional teaching staff to reduce the lecturer-student ratio, and technological infrastructure to enhance the students' technological skills so that they can be equipped for the 4IR skills (de Villiers, 2023). In addition, most IHLs lack sufficient accommodation, leading to students sourcing their accommodation with extremely high charges and unsafe conditions (Sotomayor et al., 2022).

2.3.2 Student Support Services

According to Scott and Ivala (2019), IHLs often overlook the importance of providing tailored student support services. IHLs are characterised by a diverse student body in terms of age, experience, culture, basic needs, and financial situations (Elaish, Shuib and Ghani, 2019).

Therefore, a one-size-fits-all approach to student support is insufficient. Instead, IHLs should offer personalised support systems to meet the unique needs of individual learners. Scott and Ivala (2019) argue that student support services such as language assistance, academic and learning skills support, and counselling are fundamental to student satisfaction. They further emphasise that when students feel cared for and supported by their institutions, they are more likely to remain engaged with their studies. Conversely, a lack of perceived support can lead to disengagement, with some students even opting to deregister (Steyn et al., 2024).

2.3.3 Student Protests

The history of protests at South African IHLs is rooted in colonialism and apartheid. Since 1994, little has been done to ease these protests after the change of political power from the apartheid regime to the African National Congress (ANC) (Morwe, Garcia-Espana and Luescher, 2018). Protests have been identified as a way of expressing dissatisfaction (Morwe et al., 2018). Apart from isolated cases, some student protests, such as the FeesMustFall (FMF), became nationwide (Du Plessis et al., 2022). The general motives behind these protests are to address students' financial, economic and social challenges (Hlatshwayo and Fomunyan, 2019). Many violent student protests led to the destruction of the available infrastructure through torching of buildings and vandalism (Hlatshwayo and Fomunyan, 2019). During the 2015 FMF protest, about 12 buildings at different IHLs nationwide were torched by students (Hlatshwayo and Fomunyan, 2019). Financially, IHLs have suffered a serious setback, worsened by increasingly declining financial support from the national government (Temoso and Myeki, 2022).

2.3.4 Competition

South African IHLs have struggled with competition for resources, student enrolment, and academic prestige, largely due to historical disparities from the apartheid era (Mtshweni, 2022). Performance-based government grants often favoured historically white institutions that met the required research output and graduation rates, over disadvantaged historically black institutions that could not achieve these standards. This created an uneven playing field that hindered the growth and development of the latter (Temoso and Myeki, 2022). Additionally, the push to align with global educational standards has added further pressure (Mtshweni, 2022). As a result, universities have had to innovate in research output and student services to enhance their appeal and remain relevant in a rapidly evolving educational landscape, posing significant challenges for disadvantaged students (Wangenge-Ouma and Kupe, 2020).

Before the IHLs and the government could effectively address the challenges previously mentioned, South Africa, like the rest of the world, was impacted by the COVID-19 pandemic. This event not only exacerbated existing challenges but also introduced new ones, which are discussed in the following section.

2.4 SOUTH AFRICAN INSTITUTIONS OF HIGHER LEARNING EDUCATION LANDSCAPE DURING COVID-19

The national lockdown, announced by the World Health Organisation (WHO) on March 11, 2020, was part of efforts to combat the COVID-19 pandemic. Following President Cyril Ramaphosa's declaration of the lockdown on March 18, 2020, South African IHLs, which had primarily relied on in-person instruction (Du Plessis et al., 2022), were forced to rapidly transition to online learning platforms and learning management systems (LMS) (Mbhiza, 2021). Before the lockdown, students, lecturers, and support staff were largely unfamiliar with navigating these online platforms (Mbhiza, 2021). This lack of preparedness made the abrupt shift to remote learning particularly challenging for most institutions, except for UNISA, which had a long-standing history in distance education (Tarman, 2020; Mbhiza, 2021). Concerns have been raised about student satisfaction with online learning, as well as compromises in the quality and effectiveness of educational offerings during this transition (Maringe et al., 2020; Mbhiza, 2021).

During the COVID-19 pandemic, IHLs faced numerous challenges, many of which had persisted since before the onset of the pandemic. Key issues included social injustice, inadequate funding and income, insufficient government subsidies, and concerns regarding the credibility of assessments. These challenges are explored in greater detail in the following subsections.

2.4.1 Social Injustice

South Africa continues to grapple with lingering issues of social injustice, with many disadvantaged communities, particularly in rural areas, still struggling to recover from their challenging circumstances (Maringe et al., 2020; Mhlanga and Moloi, 2020; Chomunorwa et al., 2023). These communities often lacked the financial resources to purchase modern devices necessary for online learning. Even when such devices were acquired, many parts of South Africa suffered from inconsistent electricity supply, making it difficult to keep them charged (Mukuna

and Aloka, 2020). In areas with electricity, frequent load shedding presented a significant obstacle, with power outages sometimes lasting up to six hours a day (Molokomme, 2024).

Additionally, poor network connectivity in some regions prevented students from participating in live lectures (Mbhiza, 2021; Kgarose, Makhubele, and Setaise, 2024). During load shedding, the lack of backup power for network boosters further exacerbated connectivity issues (Molokomme, 2024). Dube (2020) notes that these challenges have widened the academic gap between the wealthy and the poor, creating what is referred to as the digital divide. Many students, particularly in rural areas, struggled to afford backup systems to maintain connectivity during load shedding, which has negatively impacted their learning experience and overall satisfaction with online education (Mbhiza, 2021; Chomunorwa et al., 2023; Kgarose et al., 2024).

2.4.2 Lack of Funding and Income

Many students enrolled at IHLs in South Africa relied on funding from the government and other sources. This funding normally covers food, accommodation, tuition, and travel allowances in some instances (Du Plessis et al., 2022). The total closure of face-to-face learning led to the removal of some of these allowances. Thus, a lot of students on these bursaries were left with no proper food and resources required for them to fully function (Zulu, 2020; Masutha and Naidoo, 2021).

Moreover, the pandemic led to widespread retrenchments and salary cuts, significantly impacting household income levels (Du Plessis, 2020). This economic strain further exacerbated the exclusion of poorer students from online learning. Those who could afford laptops and data continued their education, while those who could not were left behind, resulting in dissatisfaction with their studies (Mbhiza, 2021; Molokomme, 2024). Only students from affluent families were able to purchase laptops, data, and online textbooks, while the majority relied on support from the government and private organisations (Gumede and Badriparsad, 2022; Molokomme, 2024). Meanwhile, IHLs were also unable to provide adequate assistance to their students due to financial constraints, as they had other pressing obligations to maintain their operations (Du Plessis et al., 2022).

2.4.3 Lack of Government Subsidies

Most IHLs rely on government subsidies for their operations. However, during the pandemic, the government reduced funding to IHLs and focused on securing vaccines and Personal Protective Equipment (PPEs) for the pandemic (Du Plessis, 2020). Institutions were expected to quickly provide infrastructure that would allow instructors and students to interact (Du Plessis et al., 2022). The COVID-19 pandemic exposed significant inequalities in South Africa's higher education landscape, especially regarding technology and online learning. As highlighted by Du Plessis (2020), Mbhiza (2021), and Mestry (2023), IHLs with greater resources were able to invest in electronic devices, student laptop loans, data, and staff training for online education. These investments allowed wealthier universities to continue their curricula uninterrupted, maintaining high educational standards. This technological divide exacerbated pre-existing inequalities within the higher education sector, highlighting the critical need for better support and funding for less affluent institutions to ensure equitable access to education (Dube, 2020; Gumede and Badriparsad, 2022).

2.4.4 Credibility of Assessments

The shift to online learning has raised significant concerns regarding the credibility of student assessments (Adedoyin and Soykan, 2023). A major issue has been the inability of institutions to afford adequate proctoring tools, such as software that monitors students via camera during examinations. This lack of oversight has led to an increase in academic misconduct, with students resorting to plagiarism or even hiring imposters to complete assessments on their behalf. These practices have sparked widespread concerns about academic ethics and the overall quality of online assessments (Molokomme, 2024).

Moreover, the ease of communication via instant messaging applications like WhatsApp has made it easier for students to collaborate and share answers during examinations, further undermining the integrity of assessments (Mbhiza, 2021). Although instructors have attempted to limit access to online notes and recordings during examinations, these measures have proven ineffective, as students could easily retrieve previously downloaded materials (Ndaba et al., 2023). The limited control that educators and examination boards had over online assessment platforms left them struggling to maintain academic standards. In many cases, lecturers and academic institutions found themselves powerless to enforce traditional examination protocols,

leading to a growing debate over the reliability of online education and its assessments (Du Plessis, 2020; Adedoyin and Soykan, 2023).

This situation has prompted calls for the development of more robust online proctoring technologies and stricter academic policies to ensure that the credibility of assessments is upheld in the online learning environment. Without these improvements, the integrity of online education may continue to be questioned (Molokomme, 2024).

As the IHLs were beginning to adapt to operating under COVID-19 regulations, the pandemic came to an end. This shift necessitated further changes in institutional operations to ensure competitiveness in the post-pandemic environment. The following section explores the educational landscape following the pandemic.

2.5 SOUTH AFRICAN INSTITUTIONS OF HIGHER LEARNING EDUCATION LANDSCAPE AFTER COVID-19

Aside from the initial challenges of adapting to online learning, both students and instructors gradually became accustomed to this new mode of education. Many believed that the shift to online learning was a permanent change (Mpungose, 2023). However, this perception was short-lived as COVID-19 cases significantly declined. As the economy reopened, including IHLs, students had grown used to the advantages of online learning, such as the ability to learn at their own pace, take ownership of their schoolwork, and enjoy the flexibility it offered (Steyn et al., 2024).

For the South African IHLs, the COVID-19 pandemic has been seen as a wake-up call to incorporate aspects of the 4IR and make use of artificial intelligence in the education system (Enaifoghe, 2024). In support of this view, Du Plessis et al. (2022) concluded that South Africa has not been ready for the 4IR because it lacked the required infrastructure to roll it out. Thus, the pandemic was a much-needed push and most IHLs ended up incorporating the use of technology in teaching and learning post-COVID-19 (Enaifoghe, 2024). Naidu (2024) also argues that if it were not for the pressure from the COVID-19 restrictions, many South African IHLs would not have shifted from their traditional methods of offering teaching and learning to online learning.

At the onset of online learning, both students and instructors exhibited considerable resistance. However, this gradually shifted as they realised that there were few viable alternatives (Du Plessis et al., 2022). The training sessions provided to help them navigate online platforms effectively played a crucial role in this change, leading both groups to respond more favourably. Many became so accustomed to online learning that they expressed a willingness to continue with it even after the COVID-19 pandemic. Additionally, with a significant number of students opting to stick with online learning, many institutions have been compelled to adopt hybrid education models (Steyn et al., 2023; Mpungose, 2023). Failing to accommodate students' preferences for online learning could render these institutions obsolete in the emerging educational landscape.

Research conducted by Anakpo, Nkungwana, and Mishi (2024) analysed student lecture attendance in South African universities before and after COVID-19, revealing a significant 48.2% decline in attendance post-pandemic. This decline has been attributed to several factors, primarily the loss of income to support educational expenses, depression stemming from the loss of loved ones, and dissatisfaction with the online learning format.

IHLs serve as the crucible for economic growth, as their graduate students are expected to be equipped to drive economic development (Scott and Ivala, 2019). However, students who received online education during the pandemic faced significant challenges when transitioning to the workforce, particularly in practical subjects. While they gained theoretical knowledge, they lacked the opportunity to apply it in real-world settings, which hindered their ability to effectively cope in professional environments (Ndaba et al., 2023).

Another important lesson learned during the COVID-19 pandemic, and one that continues to shape the post-pandemic academic landscape, is the value of collaboration. IHLs have shifted from competing with one another to working together for the collective benefit (Du Plessis et al., 2022). This shift has also facilitated global partnerships between institutions in both developed and developing countries. Knowledge sharing, particularly in areas such as teaching and learning, has become a common practice among IHLs, fostering greater cooperation and innovation (Buitendijk et al., 2020).

The previous sections examined the higher education landscape before, during and after the COVID-19 pandemic. The following section focuses on the online learning platforms utilised during the pandemic and their impact on student satisfaction.

2.6 ONLINE LEARNING INTERACTION PLATFORMS: SOUTH AFRICA

To continue the academic curriculum, South African IHLs relied on online learning platforms. The subsequent subsections provide a discussion of these platforms and their effects on student satisfaction. The COVID-19 pandemic allowed IHLs to unearth new ways of teaching and learning that would not have been acceptable before the pandemic (Mbhiza, 2021). Some researchers speculate that some of the ways introduced during the pandemic will become the new norm of teaching and learning in the future (Mhlanga and Moloi, 2020). Furthermore, these researchers conclude that the much-needed push towards the 4IR in South Africa was driven by the pandemic. Many teaching and learning platforms were put into practice and learning was digitised (Mbhiza, 2021). Table 2.2 outlines the most popular digital platforms that were used during the pandemic.

TABLE 2. 2: ONLINE LEARNING PLATFORMS

PLATFORM	PLATFORM DESCRIPTIONS
Microsoft Teams	• Used by lecturers and students to hold online lessons and discussions. Promoted instructor-to-learner and learner-to-learner interaction. • Uses chat, audio calls, video calls and collaboration features. • Short-term (a week) recordings of class sessions that allowed for asynchronous learner-to-content interaction.
Google meet	• Used by lecturers and students to hold online discussions. Promoted instructor-to-learner and learner-to-learner interaction. • Uses chat, audio calls, video calls and collaboration features.
Blackboard Collaborate	• Used by lecturers and students to hold online discussions. Promoted instructor-to-learner, learner-to-content and learner-to-learner interaction. • Uses chat, audio calls, video calls and collaboration features. • Live interaction, teaching with screen sharing or using a whiteboard, and having breakout rooms.
Zoom	• Used by lecturers and students to hold online discussions. Promoted instructor-to-learner and learner-to-learner interaction. • Video and audio conferencing, collaboration, chat, webinars, breakout rooms. • Recorded synchronous sessions promoted asynchronous learner-to-content interaction.
Skype	• Used by lecturers and students to hold online discussions. • Video and audio calls, talk, chat and collaboration features. • Allow calls to be recorded and listened to later, hence promoting learner-content interaction.
WhatsApp	• Used by lecturers and students to hold online discussions and used by learners to engage in collaborative learning. Promoted instructor-to-learner and learner-to-learner interaction. • Audio calls (during COVID-19), as well as talk, chat and collaboration features. Limited group calls (up to 3) during COVID-19. • Calls could not be recorded for asynchronous learner-to-content interaction.

Adapted from Mbhiza (2021:284)

Table 2.2 presents various online learning platforms utilised by many IHLs as substitutes for traditional contact lectures (Mbhiza, 2021). These platforms offer diverse capabilities that facilitate a range of online learning interaction. For instance, Microsoft Teams provided notable advantages, such as the ability to record and transcribe conversations for future reference. It is also multifunctional, allowing access to chats, documents and other resources (Ndovela, Risinamhodzi and Matobobo, 2022). Nonetheless, live lectures on this platform were also

susceptible to interruptions caused by power outages and poor internet connections (Mbiza, 2021).

Google Meet became popular due to its chat, audio, and video call features, as well as its collaborative tools, making it ideal for online teaching and learning. Its paid version offers unlimited call duration, beneficial for online teaching and learning (Mafugu, 2020). However, the free version limits simultaneous participants to 100, which poses challenges for larger groups (Boklan et al., 2023). Despite internet connectivity issues in some areas, Google Meet was a preferred option for many IHLs in South Africa during the COVID-19 pandemic.

Blackboard Collaborate provides synchronous video conferencing, voice calls, and options for asynchronous learning through recorded sessions, effectively mimicking face-to-face interaction (Mbiza, 2021). These features contributed to student satisfaction by enabling interaction with both instructors and course content (Moloi, 2021). However, live lectures were frequently interrupted by electricity outages and inadequate internet connectivity (Aina and Ogegbo, 2021).

Zoom became popular in South African IHLs for its user-friendly interface and features like whiteboards and breakout rooms, enhancing interactive learning (Mpungose, 2020). However, a significant drawback was its lack of emotional connectedness between learners and instructors, which impacted engagement and participation, especially in the context of connectivity and engagement challenges in South Africa (Mpungose, 2023).

Skype was used by South African IHLs to facilitate online discussions and allow for lecture recordings, particularly in the early stages of remote learning. It provided a basic platform for communication and offered the ability to record lectures for later access by students (Nguyen, Liwan, and Mai, 2020). However, Skype's video functionality posed a significant challenge, as the video would automatically terminate after the scheduled time, leaving only audio available for continued discussion (Nguyen et al., 2020). This limitation made it less suitable for live sessions, especially in South African IHLs where effective real-time interaction is crucial for maintaining student engagement (Mpungose, 2023).

WhatsApp emerged as a rapid, cost-effective, and user-friendly communication tool for both instructors and learners (Moyo et al., 2022). However, WhatsApp offered limited options for

learner-to-learner interaction, particularly in group settings, as video calls were restricted to three participants during the COVID-19 pandemic (Mbhiza, 2021). Additionally, non-academic discussions on the platform could serve as distractions (Van den Berg and Mudau, 2022).

Despite the challenges faced, the online learning platforms discussed above played a crucial role in maintaining the academic curriculum. This resulted in student satisfaction with online learning during the COVID-19 pandemic (Yousaf et al., 2023).

2.7 CONCLUSION

This chapter examined the South African education landscape, focusing on various aspects of higher education. Initially, the chapter identified the IHLs in South Africa and categorised them accordingly. It also reviewed the state of higher education in the country before the COVID-19 pandemic, highlighting several long-standing challenges. These included social injustices rooted in the apartheid era, inadequate infrastructure, insufficient student support services, and frequent student protests.

The chapter then shifted to the impact of the COVID-19 pandemic on South African higher education. While the pandemic introduced certain benefits, such as increased flexibility and accessibility to learning materials, it also exacerbated existing challenges. Issues such as insufficient funding, lack of infrastructure, and connectivity problems were prominent during this period. This chapter also examined how South African IHLs are navigating the post-pandemic landscape. It discussed various online learning platforms used for teaching and learning during the COVID-19 pandemic, including Microsoft Teams, Google Meet, and Blackboard Collaborate. The benefits and limitations of these platforms were highlighted. Additionally, the challenges encountered in online learning and the use of these platforms have notably affected student satisfaction with online learning, a topic that is explored in more detail in the following chapter.

CHAPTER THREE

ONLINE LEARNING INTERACTION AND STUDENT SATISFACTION: LITERATURE REVIEW

3.1 INTRODUCTION

The previous chapter provided a discussion of the South African higher education landscape, establishing the context within which this research is situated. Building upon that foundation, the current chapter shifts focus to examine the literature surrounding online learning interaction and student satisfaction, critical components for understanding and improving educational experiences in digital environments.

This chapter begins by introducing the theoretical frameworks that underpin the research. First, the theoretical framework developed by Garrison et al. (2000), was explored as it serves as the cornerstone for the research. This framework offered valuable insights into the structure and dynamics of online learning environments and was explored in detail to establish a solid theoretical grounding. Following this, the chapter examined Moore's (1989) three online learning interaction constructs, which provided a nuanced understanding of the interaction between students, instructors, and content within online learning settings. This examination highlighted how these online learning interaction constructs relate with student satisfaction.

Additionally, the chapter expanded the concept of student satisfaction by drawing on broader principles of customer satisfaction. Specifically, it explored the dynamic between student expectations and their actual experiences, providing a comprehensive overview of how these factors contribute to perceived satisfaction in online learning environments. Through a review of these theoretical perspectives and concepts, this chapter aimed to offer a framework for analysing online learning experiences and identifying key factors that influence student satisfaction. The following section details the theoretical frameworks underpinning this research.

3.2 THEORETICAL FOUNDATIONS UNDERPINNING THE RESEARCH

A theoretical framework forms a foundation for strong research (Ngulube, 2019). Three theories namely, CoI, Social Presence Theory (SPT) and Transactional Distance Theory (TDT) have been identified as relevant conceptual frameworks to understand the online learning-student

satisfaction interface. This research adopted the CoI framework as its anchor theory to explain the phenomena. Though SPT and TDT theories are useful, the CoI framework gives a more comprehensive explanation. For instance, the CoI framework (through its social presence dimension) provides extensive coverage of the SPT. This section further elaborates on these theories and their relationship with student satisfaction within the online environment.

3.2.1 Community of Inquiry Framework (CoI)

The CoI framework evaluates learning experiences, content design and interaction in distance and online learning (Fatani, 2020). According to Garrison et al. (2000), the framework cites the three core elements for effective learning experience, namely, social presence, teaching presence and cognitive presence. Considering the circumstances under which online learning was applied during the COVID-19 pandemic, where students were in isolation, resulting in increased levels of anxiety among learners (Mukuna and Aloka, 2020), maintaining an academic community became very important (Wang et al., 2021). These three elements blend with Moore's three online learning interaction constructs (learner-to-learner interaction, learner-to-instructor interaction and learner-to-content interaction). The relationship between the three elements of the CoI framework and the online learning interaction constructs is illustrated in Figure 3.1.

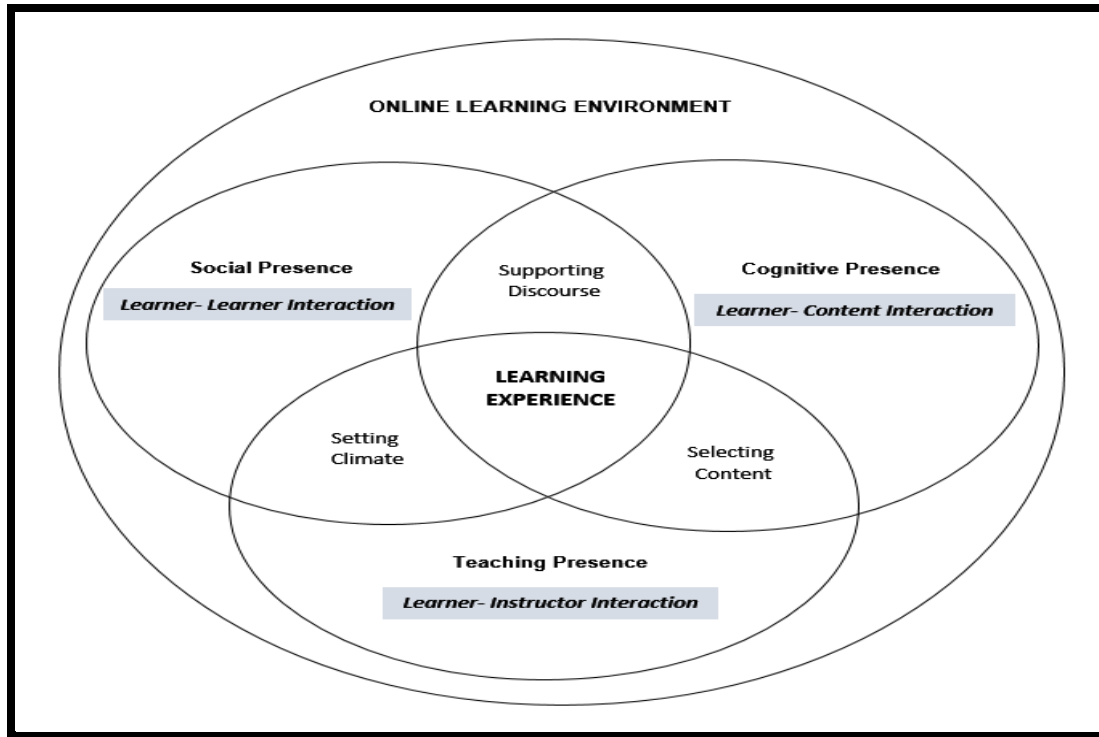


FIGURE 3. 1: COMMUNITY OF INQUIRY FRAMEWORK

Source: Adapted from Saadatmand et al. (2017:65)

Figure 3.1 displays the CoI framework which results in learning experience in the online learning environment. The elements and components of each aspect of the CoI framework are depicted in Table 3.1.

TABLE 3.1: ELEMENTS, CATEGORIES AND INDICATORS OF THE COMMUNITY OF INQUIRY FRAMEWORK

ELEMENTS	CATEGORIES	INDICATORS (examples)
Social Presence	• Open communication • Group cohesion • Affective expression	• Risk-free expression • Encourage collaboration • Express emotions
Teaching Presence	• Design and Organisation • Facilitating discourse • Direct instruction	• Setting curriculum • Setting learning methods • Sharing personal meaning • Focusing discussion
Cognitive Presence	• Triggering event • Exploration • Integration • Resolution	• Sense of puzzlement • Information exchange • Connecting ideas • Apply new ideas

Source: Garrison and Arbaugh (2007:159)

The elements of the CoI framework are explained in the subsections to follow.

3.2.1.1 Social Presence

Social presence is synonymous to learner-to-learner interaction by Moore (1989) which is discussed in Section 3.4. Garrison et al. (2000) define social presence as the ability of the participants to project their personalities and present themselves as actual people within a community. Law, Geng and Li (2019) point out that this is where learners have freedom of expression, and they develop bonds and relationships within their learning community. This involves interaction with peers and instructors (Garrison, Anderson and Archer, 2010; Bickle, Rucker and Burnsed, 2019). Even though social presence resonates with peer-to-peer interaction it slightly differs from Moore (1989)'s theory in that the former considered interaction between learners and instructors, whereas the latter only considered the interaction among learners. With the changing academic, social and technological environment, the meaning and constituency of social presence includes interaction through computer aided as well as social media platforms (Richardson et al., 2016).

Social presence is an important aspect of the CoI framework as its presence also has a positive contribution towards cognitive presence (Garrison et al., 2010). In addition, Lim and Richardson (2021) noted that social presence plays a mediating role in cognitive and teaching presence. In research by Bickle et al. (2019) on 228 learners from Southeastern university in the United States of America (USA) that examined the factors that contribute to student satisfaction with online learning, the researchers observed that students are satisfied with a sense of belonging to a community and the ability to interact with their peers. In addition, once students feel that they are part of a community, their willingness to contribute and participate in class discussions is increased (Katsarou and Chatzipanagiotou, 2021). Alenezi (2022) clarifies that social presence is wide, ranging from primary contact between individuals through simple ways like text messages, emails, and phone calls to complex ones like group work, etc.

3.2.1.2 Teaching Presence

Teaching presence aligns with Moore's (1989) learner-to-instructor interaction and instructional design discussed in Section 3.4. Garrison et al. (2000) define teaching presence as the supporting role to cognitive and social presence that is primarily played by course instructors. Hence, it is considered a very important element in the CoI framework (Garrison et al., 2010; Moore and

Miller, 2022). Instructors play three vital roles namely the designing and organising of course content, instruction and presentation of course content as well as facilitating learning within the online learning community (Law et al., 2019; Wang et al., 2021; Moore and Miller, 2022). Course design and delivery focuses on designing the curriculum, learning environment, selection and utilisation of online learning mediums as well as choosing suitable instructional tools (Kilis and Yildirim, 2019). Instructors “...*facilitate discourse by encouraging, acknowledging, or reinforcing students` contributions; setting a positive climate for learning; drawing in participants; prompting discussions; and assessing the efficacy of the process*” (Kilis and Yildirim, 2019:180) including assessments and feedback. This indicates that instructors have a responsibility before, during and after online lectures. Lim and Richardson (2021) observed that there is a high correlation between student satisfaction and teaching presence.

3.2.1.3 Cognitive Presence

The cognitive presence resonates with the learner-to-content interaction by Moore (1989) which are discussed in Section 3.4. Garrison et al. (2000) identify cognitive presence as the process through which meaning is constructed by exploring, integrating, applying and sustaining reflection in discourse within a community. It is central to students` social constructivism, thus, an “... *important indicator of quality of an online learning experience since it consists of authentic approaches based on collaboratively constructing knowledge in an online environment*” (Sadaf, Wu and Martin, 2021:2). It serves as a means through which online learning becomes reflective and content becomes intensely meaningful to a student`s higher order thinking, experiences and application (Sadaf et al., 2021). Wang `et al. (2021) reinforce that, students` interest in learning is triggered by a learning activity followed by a desire to explore, design and apply solutions to real life situations. To achieve this, the content and the instructional design should be innovative enough to inspire students` learning curiosity, challenge their thinking and compel interactive learning activities (Hu et al., 2016). Within the CoI framework, cognitive presence represents the highest level that learners strive to reach to enhance their satisfaction (Li and Yu, 2022). Additionally, Lim and Richardson (2021) conducted research examining students` perceptions of social, cognitive, and teaching presence across 25 courses at two universities in USA. Their findings concluded that cognitive presence emerged as the most significant predictor of student satisfaction among the three presences. Thus, once cognitive presence is achieved, learners become more satisfied with their learning.

3.2.1.4 Relationship between Interaction Presences

Some researchers argue that the three types of presences are interdependent as evidenced by the intersections in the CoI framework in Figure 3.1 (Saadatmand et al., 2017; Moore and Miller, 2022). This implies that the three presences complement each other for the ultimate student satisfaction goal. The interplay between cognitive presence and social presence yields a supporting discourse (Zhang and Lin, 2021). Setting content is the interface between cognitive presence and teaching presence. At the point where social presence and teaching presence overlap is the area of setting the climate. This is the point where the instructors set the learning atmosphere for students (Moore and Miller, 2022; Guo, 2024). Lastly, student learning experience, refers to the point where the three presences (social, teaching and cognitive) intersect and that is where the learning experience takes place (Biccard, 2022).

In this context, social presence serves as a mediator between cognitive and teaching presence (Lim and Richardson, 2021). In addition, Moore and Miller (2022) also found that teaching presence directly influences both social and cognitive presence by enabling the instructor to create content that encourages the learner to engage with peers (social presence) and develop their thinking skills (cognitive presence). In this framework, there is a relationship between teaching and cognitive presence. Setting the climate implies that the instructor creates a supportive and conducive online learning environment that allows for engagements in the online learning space (Biccard, 2022; Guo, 2024). In addition to delivering lessons, instructors also serve as a crucial support system for their learners (Baber, 2020; Su and Guo, 2021). This sets a climate for interaction through cultivating communication opportunities with students (Bernard et al., 2009; Guo, 2024). Supporting discourse relates to students assisting each other to understand the course content (Moore and Miller, 2022) through class discussions, presentations and peer-to-peer learning support. Teaching presence has a predictive effect on cognitive presence. This means that cognitive presence can be fostered by effective teaching presence (Lim and Richardson, 2021). Garrison et al. (2000) emphasised the importance of the coexistence among these CoI framework elements since learning cannot be just social among peers and instructors, rather it should help the student to develop higher-order thinking when they interact with content (Hoey, 2017).

Despite the above explanations, online learning interaction is believed to be more comprehensive than the explanations offered by the CoI framework (Biccard, 2022). For instance, the framework

assumes a comprehensive and organised relationship amongst the elements yet practical relationships are more subtle, chaotic and complex (Biccard, 2022). Also, the framework posits that the three components (social, teaching and cognitive presence) are distinct, yet they are also interrelated and sometimes inseparable in practice, for instance the relationship between social presence and teaching presence (Biccard, 2022). This research added to the current debates by providing further examination of nuances in the interaction among the three constructs of the independent variable (learner-to-learner interaction, learner-to-instructor interaction and learner-to-content interaction).

3.2.2 Social Presence Theory (SPT)

This theory was developed by Short, Williams, and Christie (1976) and it has become a pivotal framework in the research of online learning environments. The theory initially described social presence as the degree to which individuals perceive others within online platforms (Short et al., 1976). Social presence is synonymous to learner-to-learner interaction by Moore (1989). Garrison et al. (2010) defines social presence as the ability of the participants to project their personalities and present themselves as actual people within a community. Law et al. (2019) point out that this is where learners have freedom of expression, and they develop bonds and relationships within their learning community. This concept emphasises the projection of personality through two key elements of intimacy and immediacy. Intimacy in communication is characterised by both verbal and non-verbal cues, such as body movements, smiling, and eye contact (Zhang et al., 2023). Immediacy refers to the psychological proximity between the communicator and the communication object, exemplified by response time (Law et al., 2019). The effectiveness of online learning interaction is significantly influenced by the capacity of the chosen medium (Yeboah et al., 2023). SPT is particularly important in examining the contexts of online learning interaction and student satisfaction. This is because it underlines the role of interpersonal connections and communication dynamics in shaping educational experiences and student satisfaction with online learning (Zhang et al., 2023).

3.2.3 Transactional Distance Theory (TDT)

This is a critical framework for understanding the interaction dynamics between instructors and learners who are separated by space and potentially by time (Moore, 2018). TDT is essential to defining and comprehending distance education, with widespread application in online research by numerous IHLs (Cebi, 2023). Moore (1993) describes this theory as the educational

relationship between geographically separated instructors and learners. Moore's research underscores that pedagogy plays a more crucial role than the physical distance between learners and instructors (Gavrilis, Mavroidis and Giossos, 2020). It describes the relationship that exists between learners and instructors despite the distance between both parties (Ukwoma and Ngulube, 2021). The theory emphasises the transactional nature of distance learning, highlighting that such learning can occur synchronously or asynchronously. Advances in technology have significantly enhanced the effectiveness of these interaction. Transactional distance is conceptualised as a psychological and communication space that must be bridged to avoid misunderstandings between instructors and learners (Ukwoma and Ngulube, 2021). The higher the interaction quality the less the transactional distance (Cebi, 2023). This transactional distance is influenced by the interaction of three key components, namely, structure, dialogue, and learner autonomy (Moore, 2018; Gavrilis et al., 2020).

Structure refers to the flexibility of educational objectives, teaching methodologies, and evaluation processes. It is not universally standardised and can be influenced by the instructor's personality, learner characteristics, and communication methods (Moore, 2018). The design of a course significantly impacts the levels of dialogue and learner autonomy (Kim et al., 2021). Dialogue pertains to the interaction between instructors and learners, which facilitate the learners' understanding of the subject matter. Enhanced dialogue reduces transactional distance and fosters a sense of community among students (Gavrilis et al., 2020). Learner autonomy is defined as the extent to which students control their learning objectives, experiences, and evaluation processes (Gavrilis et al., 2020). Understanding TDT is crucial in studies of student satisfaction with online learning, as the theory postulates that effective interaction between instructors and learners predicts perceived student satisfaction (Gavrilis et al., 2020; Kara, 2021).

The interaction occurs within an online learning environment. Therefore, the next section critically explores the online learning environment as an online learning interaction platform. This includes examining the online learning dimensions such as asynchronous and synchronous forms and how they influence student satisfaction.

3.3 FORMS OF ONLINE LEARNING

Online learning has experienced significant growth in developed countries, particularly in USA, over the past fifty years (Martin et al., 2020). This rise has coincided with increasing academic

interest in the field (Allen and Seaman, 2017). Initially, online education relied on mail-based methods and simple digital resources, primarily asynchronous in nature (Bernard et al., 2009; Bickle et al., 2019). However, technological advancements have transformed learner-instructor interaction in IHLs, shifting towards more dynamic online platforms.

As discussed in Chapter Two, the 21st century has seen a proliferation of digital communication tools such as Microsoft Teams, Zoom, and Google Meet, playing a crucial role in enhancing interaction among learners, instructors, and course content (Pano and Gjika, 2020; Quarta, 2020). These tools have enabled more engaging learning experiences through synchronous and asynchronous interaction, particularly during the COVID-19 pandemic, when they became essential for remote teaching (Ha et al., 2023). Despite the benefits, the impact of these platforms on student satisfaction remains a critical concern.

The following subsections explore the two forms of online learning—synchronous and asynchronous—and their influence on student satisfaction, emphasising the need for IHLs to maintain high standards to meet current and prospective students' expectations and experience.

3.3.1 Asynchronous Online Learning

Asynchronous learning refers to learning that does not require real time participation of the instructor and the learner (Doug, 2020; Aque et al., 2021). Students would not meet with fellow students or with the instructor. Instead, the instructor posts content on the learning platforms and the students interact with it at their own time and work on the assessments within a given timeframe (Doug, 2020). There is no stipulated time of meeting as a class, in other words there are no lecture timetables (Doug, 2020).

Traditionally, asynchronous learning premises on cognitive presence relying on text (hard and soft copies), videos and audios (Bernard et al., 2009; Malka et al., 2022). The instructor would send study packs and discs with recordings to students via mail who in turn would post back any assessments (Moore, 1989). However, there has been a shift in preference towards videos, podcasts, web-based resources, blogs etc. (Doug, 2020; Malka et al., 2022). In their research on students' online learning readiness at a university in Malaysia, Chung, Subramaniam and Dass (2020) found that students were more satisfied with PowerPoint presentations that had voice overs as it drew their attention, and they could repeatedly play the recordings for enhanced

cognisance. Asynchronous learning is beneficial to students as it allows them to distribute their workload as well as working on it at their own pace (Castro and Tumibay, 2021). Students can repeatedly go through the content for further understanding (Zeng and Wang, 2021). This type of online learning is flexible and effective to time constrained students (Doug, 2020; Castro and Tumibay, 2021). Aque `et al. (2021) added that, asynchronous learning becomes more interesting if there is collaboration with other learners, for example through group work. This is helpful in student satisfaction because other students can help to explain and clarify some aspects not understood by other students (Chung, Noor and Mathew, 2020).

3.3.2 Synchronous Online Learning

Synchronous learning is whereby the instructors and the students would simultaneously log in to the learning platforms and communicate with each other virtually (Doug, 2020; Sari et al., 2022). Instructions and interaction with the course instructor and other students are real-time through texts, audio, video and/or chats etc. (Doug, 2020). Through synchronous learning, instructors can promote both peer-to-peer interaction and cognitive interaction by facilitating discussions and activities (Moore and Miller, 2022). Furthermore, the real time nature allows for questioning, reflections, and discussions to happen (Zeng and Wang, 2021). In their research on factors affecting student satisfaction in online learning in Egypt, Basuony et al. (2020) concluded that students prefer synchronous modes of learning through virtual sessions and conference calls. This gave the students a traditional sense of interaction with their peers.

Researchers Wart `et al. (2020), in their research on student satisfaction with online learning from two IHLs in the USA, found that synchronous learning had a positive effect on student satisfaction due to its allowance for real-time engagements as well as question and answer sessions. Synchronous online platforms not only provide potential for the convergence of all three online learning interaction constructs (learner-to-learner, learner-to-instructor and learner-to-content) but improves the chances of asynchronous online learning, especially if sessions are recorded. Furthermore, synchronous sessions imitate the traditional face-to-face learning (Wart et al., 2020), thus the effects of transitioning are reduced. In addition, Moore and Miller (2022) point to the importance of this mode of online learning, as it allows for both instructors and students to read the gestures and facial expressions that aid in communication and enhance understanding. Ensuring that students experience the same interaction and support as they used to get in the traditional face-to-face mode of learning gives them satisfaction (Zeng and Wang,

2021). In addition, Chung et al. (2020) concluded that while offering synchronous learning, instructors must ensure enriched interaction such as good sound quality, stable internet connectivity, proper pedagogical approaches, supportive software, and recording of sessions among others.

However, synchronous modes of learning have their own set of challenges that can result in student demotivation. Poor internet connection, lack of flexibility in the use of technology (Bickle et al., 2019), and a reluctance to switch on cameras during live sessions (Oliveira et al., 2020), were some of the challenges faced by students during their synchronous lectures. According to Cranfield et al. (2021) students prefer not to switch on their cameras during synchronous lectures. In support of this finding, Castro and Tumibay (2021), also point out that shy and reserved students prefer to participate without exposing their faces to fellow students or instructors.

Given the drawbacks of both asynchronous and synchronous modes of online learning, researchers concluded that blending asynchronous and synchronous learning yielded higher satisfaction as opposed to separately using synchronous and asynchronous learning (Sari et al., 2022). This section investigated the relationship between online learning interaction (and its constructs) and student satisfaction. The following section explores the online learning interaction variable (and its three constructs).

3.4 ONLINE LEARNING INTERACTION

Regardless of the type of offering, interaction has been an important aspect for effective learning (Bernard et al., 2009; Baber, 2020). Researchers confirm that if interaction is missing in the online learning environment, learners feel isolated and resultantly dissatisfied (Bickle et al., 2019; Wang et al., 2019; Ariffin, Darus and Abdul Halim, 2022). However, if correctly administered, online learning interaction in turn creates a sense of belonging in learners which resultantly provokes thinking and eagerness to acquire knowledge which results in overall satisfaction (Garrison et al., 2000; Ariffin et al., 2022). Wong and Chapman (2022) found in their research on student satisfaction at IHLs in Singapore, that satisfaction extends beyond mere interpersonal interaction. Instead, it encompasses various factors such as the quality, depth, and medium of interaction, indicating a more nuanced understanding of the dynamics involved. Furthermore, they concluded that interaction is both formal (with content and instructors) and

informal (with fellow students). Singh, Steele and Singh (2021) argue that learner-to-learner interaction can take place formally through group discussions, role plays, problem-based exercises, pair shares etc., as guided by the instructor.

Section 3.2 introduced the three online learning interaction constructs, namely, learner-to-learner interaction, learner-to-instructor interaction and learner-to-content interaction. However, there has been debate in research, with some researchers arguing that there is interdependence of these three online learning interaction constructs (Lim and Richardson, 2022; Moore and Miller, 2022) while some argue that they are independent from each other (Gray and DiLoreto, 2016). With most researchers not looking at the different constructs of online learning interaction independently towards student satisfaction (Wong and Chapman, 2022), this research established the relationship between the three types of online learning interaction constructs and gained an understanding of each construct towards student satisfaction. This research traversed on this tangent as it subscribed to the CoI framework.

3.4.1 Learner-to-learner Interaction

Thach et al. (2021) define learner-to-learner interaction as the online engagements that a learner has with one or more students. Goh et al. (2017) put it as the support that learners get from their peers during their learning process. Both definitions emphasise the point that in their learning, students need each other for support. With the many challenges that are involved in online learning, social presence has been proved to bring satisfaction to learners (Bickle et al., 2019; Ritonga et al., 2022). This type of interaction enhances student satisfaction through collaborations and learning moderation (Thach et al., 2021). Aligning with Moore (1989)'s findings, Kyei-Blankson, Ntuli and Donnelly (2019), found that learner-to-learner interaction can take on various forms, these include greetings, gatherings, activities, discussions, etc. These various interaction forms help in learners' knowledge and skills development as well as knowledge application ability (Katsarou and Chatzipanagiotou, 2021).

However, some researchers argue that when learning takes place asynchronously, students are subjected to loneliness due to lack of interaction (Martin, 2020; Yu et al, 2022). Also, students do not get a chance to bond since they are hesitant to switch on their cameras during lecture sessions, thus adding to their loneliness (Oliveira et al., 2021). Chung et al. (2020) observed in their research on Malaysian university students that they lacked the confidence to effectively

communicate in group settings. Furthermore, Baber (2020) and Wong and Chapman (2022) concluded that interaction among learners significantly contribute to student satisfaction, as informal exchanges support academic engagement and enrich overall university experiences. In research at a South African university, Van den Berg (2020) found that students are driven to attend lectures due to their informal interaction with their peers. Additionally, the inclusion of online learning interaction fosters mutual trust among peers, particularly benefiting those who may feel isolated (Doo and Bonk, 2020).

Research on student satisfaction with learner-to-learner interaction has not been conclusive. Cranfield et al. (2021) argue that learner-to-learner interaction has a positive contribution towards student satisfaction. Wong and Chapman (2022) also argue that learner-to-learner interaction is the most critical of all the three constructs of online learning interaction. In addition, Sharma et al. (2020) concluded that learner-to-learner interaction leads to positive student satisfaction results, those students who were interacting rated high in satisfaction. Research on the effectiveness of learner-to-learner interaction is still low in South Africa; therefore, this research aimed to examine the effectiveness of learner-to-learner interaction within the South African context. Various studies have developed criteria to assess the satisfaction of learner-to-learner interaction as detailed in Table 3.2.

TABLE 3.2: LEARNER-TO-LEARNER INTERACTION CRITERIA

LEARNER-TO-LEARNER INTERACTION CRITERIA	AUTHOR(S)
Group discussions and collaborations	Elshami et al. (2022), Mohammed et al. (2022)
Interaction intensity level	Prohorets and Plekhanoya, (2015)
Interaction substance	Alqurashi, (2019)
Interaction depth	Katsarou and Chatzipanagiotou, (2021)
Number of interaction times	Kurucay and Inan, (2017)
Peer engagements	Chen et al. (2020)
Interaction opportunities	Bernard et al. (2009)
Peer connections	Alenenzi, (2022)

Source: Researcher's construction.

Table 3.2 outlines criteria for learner-to-learner interaction by various authors. The criteria in Table 3.2 operationalise the learner-to-learner interaction construct. For the purpose of the research, the criteria have been scaled down to four, namely, interaction intensity (interaction intensity level, interaction substance, interaction depth), interaction frequency (number of

interaction times), peer reachability (interaction opportunities and peer connections), and group dynamics (peer engagements and group discussions and collaborations). An explanation of each of the criteria is provided in the sections to follow.

3.4.1.1 Interaction Intensity

Interaction intensity refers to the level of engagement and communication among students during learning activities (Belt and Lowenthal, 2023). Interaction intensity is the highest determinant of learner-to-learner interaction satisfaction (Kurucay and Inan, 2017). High interaction intensity involves immediate communication through video and conference calls, instant messaging, group discussions and presentations (Belt and Lowenthal, 2023). According to Kyei-Blankson et al. (2019), high interaction intensity helps in personality development, promotes student engagement and student knowledge through group discussions, group presentations, project collaborations, threads, blogs, etc. In support of this view, Roovai (2002); Liu et al. (2007) and Bailey (2022) concluded that high interaction intensity leads to trust and constructive relations among the learners. This coincides with the findings of Goh et al. (2017), which found that when students share knowledge active learning is fostered along the way and leads to satisfaction.

Prohorets and Plekhanova (2015) identified three levels of interaction intensity, ranging from Level 1 to Level 3. At Level 1, students predominantly engage in non-human interaction, such as individually working on assignment sections without collaboration or utilising reference materials independently. Level 2 entails active expression of ideas and communication among group members, facilitated through avenues like forums and online discussions. Finally, Level 3 denotes the highest degree of interaction, characterised by frequent communication among group members via instant messaging, video conferences, collaborative project forums, and similar platforms. This heightened interaction level is particularly desirable as it fosters robust student engagement and, consequently, satisfaction. This aligns with the conclusions drawn by Alqurashi (2019), who proposed that interaction devoid of substance loses its significance. Effective interaction involves active participation, soliciting feedback from peers, exchanging thoughts and ideas, and collaborating on group tasks. Furthermore, Katsarou and Chatzipanagiotou (2021) emphasise that profound learner-to-learner interaction, characterised by cooperation, constructive challenges, and adaptability, play a pivotal role in facilitating meaningful learning experiences for students.

Moreover, Bernard et al. (2009) and Chen and Teh (2022) observed that meaningful interaction requires everyone's input for it to be effective. However, Bailey (2022) found that some students do not effectively use the interaction opportunities created for them, they do not participate in group activities. The researcher further proposed a solution to this challenge indicating that there should be individual accountability of tasks within a group, and there should be interdependence on others. This way, effective interaction is encouraged.

3.4.1.2 Interaction Frequency

Kurucay and Inan (2017) refer to interaction frequency as the actual number of times that students interact with their peers. It has been proved that learners need to interact frequently to build connections with one another as well as to freely share information and support (Bailey, 2022). In addition, students who frequently interact with their peers are more satisfied with their learning (Song, Rice and Oh, 2019). In a case study on student satisfaction levels with online learning interaction in the USA, Rovai, (2002) observed that students formed a communication forum to enhance their interaction frequency. Furthermore, when learners frequently interact, interpersonal bonds are built (Liu et al., 2007; Yarmand et al., 2021). These bonds extend beyond the academic boundaries and are established into social bonds that help facilitate learning through peer encouragement (Goh et al., 2017; Yarmand et al., 2021). Wang et al. (2019) observed a similar view and concluded that the interaction that students have during lecture discussions creates peer dependency on each other. They frequently desire to be in close communication, leading to greater satisfaction. An additional avenue for students to engage in regular interaction is through peer-facilitated discussions. The frequency of these interaction among students fosters social acceptance, as peers come to recognise the valuable contributions made by their fellow learners (Wang et al., 2019). Through peer encouragement, specific students are tasked to facilitate and engage with other students, they would serve as discussion moderators while the rest of the group play the role of researchers (Chen et al., 2020; Moore and Miller, 2022). Furthermore, engaging with peers inspires the cognitive, academic and emotional development of students (Yuksel and Basaran, 2020).

3.4.1.3 Peer Reachability

According to Alenezi (2022), peer reachability refers to the ease and extent to which students can access and interact with their peers for collaborative learning, support and meaningful engagements. Understanding the critical aspect of learner-to-learner interaction assists IHLs to

develop platforms that allow for students to engage (Wong and Chapman, 2022). Ultimately, this shapes the way students perceive their learning and satisfaction with online learning (Alenezi, 2022). These platforms could include Peer Assisted Learning Programmes (PALP) (Wong and Chapman, 2022), group submissions, forum discussions etc. Furthermore, Lim and Richardson (2021) concluded that peer reviews and introductory biographies serve as additional means to enhance connection with peers. Moreover, Bickle et al. (2021) highlight that the accessibility of peers has been facilitated by online learning platforms, enabling students to connect both during and after traditional university hours. Additionally, as noted by Bernard et al. (2009), the capacity for learner-to-learner interaction, whether individually or in small groups, is crucial as it fosters cognitive engagement and motivational reinforcement. They also observed that, even though the opportunities to interact are available, sometimes students do not utilise them, thus reaching out becomes difficult in the online learning environment. Furthermore, being able to reach out to peers and having quality interaction is beneficial to students as it helps to develop the social networks that encourage knowledge construction (Katsarou and Chatzipanagiotou, 2021; Mohammed et al., 2022).

3.4.1.4 Group Dynamics

Group dynamics refers to the processes, actions, changes and influences that occur within and amongst groups (Forsyth, 2014). Group dynamics is a very important aspect in learner-to-learner interaction (Kyei-Blankson et al., 2019). It refers to the ability of students to emotionally express themselves and the ability to work with others in a group (Moore and Miller, 2022). Group dynamics encompasses the types of interaction that the group members engage in, the way they communicate, decision making roles and the overall group operation and efficiency (Garrison et al., 2000; Moore and Miller, 2022). Bickle et al. (2019) further assert that student satisfaction is heightened when learners collaborate as a group, such as when completing assignments or engaging in group activities and presentations. This experience holds emotional significance for students, as it often leads to the cultivation of diverse and robust learning outcomes (Katsarou and Chatzipanagiotou, 2021).

The learner's ability to find common interests and backgrounds helps in creating a sense of belonging to a community (Alenezi, 2022). Students can start by introducing themselves in a group and once they are familiar with each other they can build a community which can lead to satisfaction for the members (Liu et al., 2007; Yarmand et al., 2021). Having a blend of both

knowledgeable and less knowledgeable students within groups facilitates the dissemination of knowledge, thereby yielding favourable outcomes for the group (Yarmand et al., 2021). This is confirmed by Katsarou and Chatzipanagiotou (2021) who found that the student collaborations in groups encouraged the underperforming students to research and study more so that they could match the performance of their fellow students.

Students' ability to work with each other in groups increases their presentation skills, builds their confidence, improves their knowledge sharing ability and the ability to resolve conflicts among themselves (Moore and Miller, 2022). However, Kurucay and Inan, (2017) point out that, if the other students do not complete their responsibilities, it can become a disappointment to other members. Therefore, instructors should ensure that group members participate equally in the given tasks (Kurucay and Inan, 2017). Conversely, Ariffin, Noor, and Alias (2022) found in their research on student expectations and experiences that when students engage in interaction with others, they exhibit a more subdued demeanour and demonstrate an increased ability to collaborate effectively for the collective benefit of the group. Overall, collaborative group work fosters a positive attitude towards learning and enhances student satisfaction (Katsarou and Chatzipanagiotou, 2021).

3.4.2 Learner-to-instructor Interaction

Zaheer (2015:11) describes an instructor as "a teacher who provides guidance and mentoring to students." Katsorau and Chatzipanagiotou (2021) define learner-to-instructor interaction as the communications that originate from either the instructor or the student before, during, and after instruction on the content. According to Moore (1989), the objective of these interaction is to clarify any content-related misunderstandings and to encourage and motivate learners. As discussed in Section 3.3, the emergency shift to online learning presented instructors with the challenge of engaging learners with their course content and fellow students (Hodges et al., 2020). Despite this significant task, instructors faced additional challenges, including limited preparation time for creating content suitable for online platforms, isolation from their students, and a lack of effective pedagogical approaches to the new "norm" (Hodges et al., 2020; Sharma et al., 2020; Kumar, Saxena and Baber., 2021; Oliveira et al., 2021).

Learner-to-instructor interaction is considered the most crucial construct of online learning interaction, as it directs learners on how to engage with other students and the learning content

(Katsorau and Chatzipanagiotou, 2021 and Thach et al., 2021). In their quantitative research on factors influencing student satisfaction, Thach et al. (2021) highlight that, the most important aspects of learner-to-instructor interaction are the quantity and quality of feedback and guidance provided by the instructor. Almusharraf and Khahro (2020) agree that instructor feedback significantly enhances learner satisfaction and is a highly valued component of online learning platforms. In general, instructors play a pivotal role in ensuring smooth interaction within the online learning environment (Bickle et al., 2019; Van den Berg, 2020).

Instructors also play a motivational role for students, beyond merely delivering lectures (Zaheer, 2015; Martin and Moore, 2022). They create a supportive and encouraging learning environment that inspires students to engage deeply with the subject matter and their overall learning journey. Students view their instructors as role models and respected experts in their fields, which motivates them to pursue their academic dreams and professional goals with enthusiasm. This dynamic is particularly pronounced in developing countries, where instructors are held in high esteem, compared to developed countries where they may not be as highly regarded (Loi, 2016; Thach et al., 2021).

Bell (2022) developed criteria that can be used to assess student satisfaction with learner-to-instructor interaction which is detailed in Table 3.3.

TABLE 3. 3:LEARNER-TO-INSTRUCTOR INTERACTION CRITERIA

LEARNER-TO-INSTRUCTOR CRITERIA
Teacher knowledge
Lecture presentation style – enthusiasm, expressiveness and charisma
Approachability and empathy
Teacher feedback and explanation
Sensitivity
Appropriate teaching
Availability of staff for academic enquiries and support techniques

Source: Bell (2022:495)

Table 3.3 outlines the learner-to-instructor criteria that contribute to online learning interaction and student. This research has adopted these criteria to operationalise student satisfaction in an

online learning environment and divided it into the following criteria: instructors' feedback (teacher feedback and explanation), support (approachability, empathy, sensitivity, and positive interaction), approachability (availability of staff for academic inquiries), and pedagogical style (teacher knowledge, lecture presentation style, and appropriate teaching methods).

3.4.2.1 Instructors' Feedback

Instructors' feedback refers to the information and responses provided by instructors to students regarding their performance, understanding, or behaviour in the learning process (Lipnevich and Panadero, 2021). The instructors' ability to communicate with students and give valuable feedback on their performance has been a very important aspect towards student satisfaction with online learning (Bickle et al., 2019). Research by Giray (2021) to assess student satisfaction with e-learning engineering students in Turkey concluded that it is essential for students to receive quick responses from their instructors, this adds to their satisfaction with online learning. Feedback should be provided regularly, this allows for students to be able to revise their work and reinforce the concepts and ultimately have the sense of achievement which results in improved satisfaction with online learning (Zaheer, 2015; Lipnevich and Panadero, 2021).

Furthermore, Lim and Richardson (2021) outlined that instructors should provide personalised feedback, they can also carry out one-on-one feedback sessions. Also, the duo noted that instructors can provide videos explaining how the students could have answered questions (Lim and Richardson, 2021). This is corroborated by Bell (2022), who emphasised that instructor feedback should be thorough, aiming to deepen students' understanding of how to approach future questions. Additionally, instructors should employ suitable feedback techniques that convey fairness and sincerity to students (Thurmond et al., 2002), aligning with research indicating that instructor feedback serves as a motivating factor for students (Goh et al., 2017; Alenezi, 2022). Furthermore, Zaheer (2015) and Alqurashi (2019) advocate for timely feedback on both formative and summative assessments, as it fosters students' willingness to rectify mistakes and enhances satisfaction. However, Sutherland Warwick and Anderson (2019) offer a contrasting perspective on summative assessments feedback, arguing that it is typically provided at the conclusion of an academic project. As a result, students find it less valuable for future projects, which limits its impact on their satisfaction with the learning experience.

3.4.2.2 *Instructors` Support*

Instructors` support refers to the various ways educators provide guidance, encouragement, and resources to help students succeed academically and personally (Kim and Frick, 2022). This support could be through emotional and mental support for students` academic journeys (Katsarou and Chatzipanagiotou, 2021). For example, instructors can support students by advising on how to answer questions through memos, recordings, or live discussions of sample questions (Ariffin et al., 2022). This support can encourage students to interact with content and with other students (Lim and Richardson, 2021; Alenezi, 2022). Sharma et al. (2021) observed high satisfaction among nursing students in Nepal who received instructor support. Similarly, Van den Berg (2020) concluded that social interaction between students and instructors significantly enhances student satisfaction with online learning in their research at a South African university.

However, research by Sohail and Hasan (2021) on 279 students from various universities in Saudi Arabia found that instructor support did not significantly contribute to student satisfaction. Contrarily, Alsheyadi and Albalushi (2020) found that instructor support positively impacted student satisfaction among 352 students from 18 IHLs in Oman. They concluded that when instructors treat students fairly, understand their needs, and show genuine care, it positively affects satisfaction. According to Bell (2022), students are more satisfied when instructors demonstrate care through active engagement, such as reaching out when students miss lectures, avoiding favouritism, listening attentively, showing patience, and providing additional support.

3.4.2.3 *Instructors` Pedagogical Style*

Instructors` pedagogical style refers to the distinctive methods, strategies, and approaches they use to facilitate learning (Martin and Bolliger, 2022). This includes how they structure and present content, engage with students, and promote participation (Martin and Bolliger, 2022). In the context of online learning, where isolation can lead to feelings of loneliness, instructors` ability to adopt diverse pedagogical styles becomes crucial in fostering a sense of community among learners (Bickle et al., 2019; Lewis, 2021). Instructors` pedagogical styles vary from traditional teacher-centred methods, such as lectures and direct instruction, to more learner-centred approaches, like collaborative learning, inquiry-based teaching, or experiential learning (Martin and Bolliger, 2022). According to Ghazal, Al-Samarraie and Aldowah (2018) the teaching style of instructors significantly influences student satisfaction. Instructors who adopt

a learner-centred pedagogical style positively impact students' interest in participation and cognitive engagement. Truhlar, Williams, and Walter (2018) observed that instructors who create group discussion forums enhance learner-to-learner interaction. Ariffin et al. (2022) added that active participation is essential for students to reinforce what they have learned. This can be achieved through methods such as role plays, group discussions, interactive presentations, and redirecting questions to the class (Ariffin et al., 2022). However, redirecting questions must be done in moderation to avoid making students feel singled out when they are unprepared to answer (Bell, 2022). Therefore, instructors should maintain a balanced, student-centred approach during online lecture sessions (Ghazal et al., 2018).

Furthermore, instructors can utilise various multimedia tools such as videos, graphics, and text to deliver course content effectively (Sadatmaand et al., 2017; Lewis, 2021). According to Ariffin et al. (2022), using different methods to deliver lectures, such as posting lecture recordings and providing links to relevant YouTube content, has proven to be effective. Supporting this view, Bell (2022) found that students are more satisfied when instructors incorporate varied learning activities into lecture sessions. This is particularly important for long lecture sessions, such as those under Bell (2022)'s research at a UK university that ran for three hours. In asynchronous learning environments, instructors need to create videos that are brief enough to maintain students' attention while still providing clear explanations of the subject matter (Cranfield et al., 2021).

Effective communication by instructors is another key element of successful online learning (Ariffin et al., 2022). Instructors should design interactive activities, such as end-of-topic activity sessions, to gauge students' understanding and promote satisfaction with online learning (Zaheer, 2015; Alenezi, 2022). Additionally, instructors need to adjust their examination styles to suit the online learning environment while maintaining the integrity of the assessments (Martin, 2020).

3.4.2.4 Instructors' Approachability

Instructor approachability refers to the perceived openness and willingness of educators to engage with students, making it easy for them to seek help, ask questions, and discuss academic or personal concerns (Baker and Lattuca, 2022). In the realm of online learning, students predominantly look to their instructors for support and motivation (Zaheer, 2015). However, comparative research aimed at understanding students' perspectives on online learning within

IHLs, it was noted that South African students exhibited reluctance to engage with their instructors, often avoiding interaction during online sessions (Cranfield et al., 2021). Thach et al. (2021) further observed that in developing countries, instructors are culturally perceived as figures of authority, making students hesitant to approach them unless necessary.

This underscores the need for instructors to foster an environment conducive to interaction and approachability. They should be readily available to respond to inquiries via various channels such as email, calls, or messages, and do so in a courteous and helpful manner (Goh et al., 2017). Bell (2022) emphasises that students derive satisfaction from instructors who are responsive to their queries, with the timeliness of responses significantly impacting their overall satisfaction with the online learning experience. Failure to address students' questions promptly can lead to a negative perception of the course (Ghazal et al., 2018).

In essence, instructors should serve as facilitators of communication and interaction with students (Yan et al., 2021; Thach et al., 2021), particularly to alleviate the frustrations often associated with navigating unfamiliar online systems through trial and error (Bell, 2022). Both Bell (2022) and Sharma et al. (2020) highlight the importance of instructors being approachable and responsive to inquiries to enhance student satisfaction with the learning process.

3.4.3 Learner-to-content Interaction

This construct of online learning interaction has a greater impact on student satisfaction than learner-to-learner interaction or learner-instructor interaction constructs (Martin et al., 2020; Lim and Richardson, 2022). Zaheer (2015) highlights that course content encompasses the quality of materials and resources provided to students by instructors. During the rapid transition from face-to-face to online learning necessitated by the COVID-19 pandemic, many instructors relied heavily on content originally designed for in-person teaching (Puriwat and Tripopsakul, 2021). Arrifin et al. (2022) observed that students often become passive and less engaged in online learning environments compared to face-to-face settings. However, other researchers have found no significant difference in student satisfaction between the two formats (Yen et al., 2018; Van der Westhuizen and Hlatshwayo, 2023). Singh et al. (2021) suggest that student satisfaction with online learning depends largely on the instructor's ability to develop learners' cognitive skills.

Bell (2022) devised various criteria to gauge the interaction between course content and students in the United Kingdom, aiming to elucidate the correlation between learner-to content online learning interaction construct and student satisfaction. The various criteria are shown in Table 3.4.

TABLE 3.4: LEARNER-TO-CONTENT INTERACTION CRITERIA

COURSE CONTENT INTERACTION CRITERIA
Clarity of objectives
Course stimulating and challenging
Organisation of overall course and timetabling
Enabling thinking
Direct contact time with teaching staff in lectures and seminars
Course materials – clear and interesting
Feedback and assessment

Source: Adapted from Bell (2022:496)

Table 3.4 presents the criteria for assessing the quality of online learning interaction developed by Bell (2022). This research has adopted the above learner-to-content interaction criteria to operationalise student satisfaction. However, this research categorised these criteria into four distinct criteria, namely, course design (comprising overall course organisation and scheduling), course content quality (including stimulation, challenge, and facilitation of critical thinking), course content clarity (covering objective clarity and comprehensibility of course materials), and course content accessibility (encompassing direct engagement with instructors and feedback mechanisms). A detailed examination of these criteria follows in the next subsections.

3.4.3.1 Course Design

Su and Guo (2021) define course design as the process through which instructors plan and design the course content as well as evaluation and development of the effective course delivery strategies. The sudden shift from face-to-face learning to online learning should ideally have been met with some changes in content that is compatible with the demands of the online platforms (Baber, 2020). To match the two formats (face-to-face and online), online course content should be designed in a way that enforces interaction, independent learning skills, engaging and challenging teaching materials and support that is tangible (Basu, Hackman and Maher, 2021). The way a course is designed determines the overall student satisfaction (Goh et

al., 2017; Kumar et al., 2019). Considering that IHLs train future professionals, the way the course is designed should support knowledge acquisition and skills development (Nortvig, Petersen and Balle, 2018). In advanced online learning platforms such as LMS, there are various ways through which content can be structured (Thach et al., 2021). The structure should always support the learning objectives. Lewis (2021:4) argues that there are three groups of objectives namely, programme and course learning outcomes (being able to identify the basic concepts of the course); course to module learning objectives (there should be an alignment between the course and the learning outcomes); and course assessment objectives (graded assignments such as quiz, tests and presentations).

Zaheer (2015) noted that consistent course design enhances learner satisfaction by providing clarity and predictability in interaction with course content. In the South African context, challenges such as poor internet connectivity and high data costs have made it difficult for many students to keep up with accumulating work during offline periods (Dube, 2020; Van der Westhuizen, 2023). Additionally, several studies have reported that students find the workload in online learning to be more burdensome compared to face-to-face teaching (Wang et al., 2019; Yan et al., 2021). To address this, researchers have emphasised the importance of manageable workloads, which include a balanced and well-organised approach to course demands (Sutherland et al., 2019; Martin, 2020; Bell, 2022). Lewis (2021) further emphasised that aligning learning outcomes, assessments, and course materials is critical for student satisfaction. Research by Sutherland et al. (2019) at a United Kingdom (UK) business school also revealed that students prioritise the medium of content delivery over the content itself.

Given that certain learning materials are accessed asynchronously, it is crucial to maintain engagement and prevent boredom among students when they are navigating the content independently, without the presence of peers or instructors for clarification. Strategies to achieve this include incorporating visuals such as images and integrating recordings of synchronous meetings (Zeng and Wang, 2021). This is in support of the findings by Sutherland et al. (2019) which suggest that the course material plays an important role in influencing student satisfaction, these could be in the form of audio-visual materials, lecture notes, e-books, etc. In addition, course content could be designed to be engaging and promoting active learning (Katsarou and Chatzipanagiotou, 2021; Ariffin et al., 2022). This could be achieved through role plays, presentations etc. (Ariffin et al., 2022).

3.4.3.2 Course Content Quality

Al Mulhem (2020) defines course content quality as the quality of information generated by the online instructors to the students. Pham et al. (2019), Al Mulhem (2020) and Basuoney et al. (2020) concluded that course content quality has a positive relationship with student satisfaction. Information quality was defined by Ghazal et al. (2018) as the quality of the course content that is brought to the students through the online information systems. Unfortunately, apart from the standards set by governing bodies in different countries (DHET in South Africa), there are no international standard guidelines that have been established to measure course content quality (Lewis, 2021). However, for information to be considered as quality, it must be accurate, relevant, complete, available, usable, understandable, consistent, accessible and meaningful to the users (Ghazal et al., 2018; Ohliati and Abbas, 2019). The model of learning should allow for interactive brainstorming, multimedia course presentations, and management of the learning process, etc. (Ghazal et al., 2018; Piccolo, Livers and Tipton, 2021). Moreover, Bernard et al. (2009) found that course quality is improved by incorporating strategies that are effective for problem-based tasks and guided findings. Zaheer (2015) concluded that the quality of the content of the video lectures stimulates interest in learning in students and their satisfaction is enhanced.

3.4.3.3. Course Content Clarity

Su and Gao (2021) define course content clarity as the degree to which the course materials are effectively presented and comprehended. They further emphasise that content organised in a clear and logical format enhances learners' interest and engagement in the learning process. Furthermore, Pham et al. (2019) found that the course material must be well organised and logical for learners to be able to establish its coherence. Ghazal et al. (2018) specified that the online course content for both synchronous and asynchronous platforms should be clearly arranged and should incorporate figures and examples that help the students to understand the course. Researchers Zaheer (2015), Basu et al. (2021) and Bell (2022) concluded that clearly set course content goals enhances student satisfaction with online learning. This agrees with the research by Murray et al. (2012) on students at a regional university in the USA, that found that students are interested in course material that is clearly linked to the course objectives. In addition, feedback and instructions on assessments should be given in a clear and understandable manner to reduce student frustrations and enhance student satisfaction (Bell, 2022). Furthermore, the effectiveness of learner interaction with content is significantly influenced by the clarity of

question structuring. For instance, a systematic review by Moore and Miller (2022) reveals that case-based questions are particularly effective in fostering engagement with the material. In support of Bell, Moore and Millers` views, Lewis (2021) suggests that providing clarity on the assessment requirements helps in students` ability to answer the questions correctly. Additionally, the provision of rubrics can clarify the expectations associated with the questions.

3.4.3.4 Course Content Accessibility

Ghazal et al. (2018) define course content accessibility as the ease with which students can access and engage with the course materials. The use of online learning has opened an opportunity for students to easily access their course content (Ghazal et al., 2018; Castro and Tumibay, 2021; Katsarou and Chatzipanagiotou, 2021). Goh `et al. (2017) and Ariffin `et al. (2022) add that student satisfaction is enhanced by the learner`s ability to easily access the learning material as well as the media used to deliver the course material. Lewis (2021) also adds that there are many regulations that an online course should meet for it to be considered of quality. One of the regulations is accessibility, a course must provide video transcripts, correct formatting, testing to see if the learners are able to access it from their end and testing the vendor products and websites to ensure that they are accessible (Zeng and Wang, 2021 and Ariffin et al., 2022). In an online learning environment, student satisfaction with content is also enhanced when the students can access the course content in time, this gives them ample time to go through the course material before they attend their online lectures (Zeng and Wang, 2021). Research by Le Roux and Nagel (2018) at a South African IHL, found that students understood the lessons better after going through the course material before the lecture, ultimately leading to improved performance and satisfaction.

Moreover, the availability of recorded and pre-recorded lectures offers students the valuable opportunity to review content, aiding their preparation for assessments (Chung et al., 2020; Giray, 2021). Engaging regularly with course materials not only deepens their grasp of key concepts but also contributes to their overall satisfaction with the course (Wang et al., 2021). Zaheer (2015) advocates for the timely release of course content at the beginning of students` academic projects, a practice proven to reduce anxiety by clarifying expectations and enabling proactive planning (Zaheer, 2015). Additionally, ensuring prompt access to course assessments facilitates thorough research and timely submission, with platforms enabling accessibility from any location further enhancing convenience (Ghazal et al., 2018). For instance, at the Virtual

University of Pakistan, students benefit from flexible exam scheduling and individually generated exam papers, bolstering satisfaction and ensuring assessment quality (Zaheer, 2015).

In summary, research shows that online learning is favoured by students for its flexibility, cost-effectiveness, and time-saving advantages, as well as the enhanced opportunities for interaction with peers and instructors during live sessions (Basouny et al., 2020; Sarma et al., 2020). However, some researchers argue that students may feel dissatisfied with online learning due to feelings of isolation and reduced peer interaction (Basouny et al., 2020). The following section explores the student satisfaction variable.

3.5 STUDENT SATISFACTION

Student satisfaction cascades from the broad concept of customer satisfaction which has been defined by early researchers as an after-use evaluation of a product or a service that occurs at the end of a psychological process (Guolla, 1999). This definition just looks at post-use of product or service, thus it lacks the aspect of customers' input that plays an important role in forming satisfaction. Yi (1990)'s expectancy-disconfirmation paradigm postulates that customers have preconceived expectations about a product or service. Satisfaction is therefore a result of met expectations on the performance experienced after the use of a product or service (Kotler and Keller, 2016; Kotler and Armstrong 2018). Within the context of online learning environments, student satisfaction is construed as the degree of contentment students feel regarding their interaction with other learners, instructors and course content (Ghazal et al., 2018; Martin and Bolliger, 2022).

In today's academic landscape marked by heightened competition, universities increasingly regard students as customers, striving to ensure their satisfaction (Pham et al., 2019; Sohail and Hassan, 2021). Consequently, the significance of student satisfaction within online learning environments has been underscored (Ho et al., 2021; Martin and Bolliger, 2022). Bell (2022) emphasises the importance of gauging student satisfaction as a metric for evaluating how effectively IHLs are meeting the needs and aspirations of their clientele. Furthermore, Tsiligiris and Hill (2021) assert that student satisfaction has emerged as a benchmark of excellence in IHLs, offering a competitive advantage. The foundation of student satisfaction lies in the expectations-perception model; when students perceive that their expectations have been met, they tend to be satisfied (Tsiligiris and Hill, 2021). Chen et al. (2020) have also found that

satisfaction is contingent upon users' expectations and experiences. Moreover, Pham et al. (2019) posit that a wider disparity between student expectations and experiences correlates with higher levels of dissatisfaction. The following subsections detail one aspect of student satisfaction-student expectations.

3.5.1 Student Expectations

Students are value-laden beings who bring a set of expectations and values to their learning experiences (Appleton-Kapp and Kentler, 2016; Kotler and Armstrong, 2018). Research at a South African IHL by Du Toit and Pool (2020) found that student expectations regarding online learning are categorised into preconceived and informed expectations. Preconceived expectations stem from prior knowledge and experiences, which can be shaped by personal experiences, peer feedback, rumours, and the institution's reputation. As students engage with online learning and acquire new information, these preconceived expectations evolve into informed expectations. This aligns with Qazi et al. (2017), who found that customer satisfaction expectations are often shaped by past experiences and feedback from others. The evolving expectations play a crucial role in building students' confidence in interacting with content, instructors, and peers. When these expectations are met, it leads to greater satisfaction with the online learning experience (Alqurashi, 2019).

Panoy et al. (2022) argue that establishing student expectations is crucial, especially since forced online learning is a relatively new phenomenon in academia. Students anticipate technological flexibility, interaction, and support from both peers and instructors (Du Toit and Pool, 2020). When these expectations are not met, it can lead to poor class attendance, negative word of mouth, poor performance, demotivation, and overall dissatisfaction with online learning (Ozor, 2021; Bell, 2022). Institutions and instructors often meticulously plan their teaching methodologies well in advance of enrolment, sometimes neglecting the valuable insights that students can offer, which are essential to the learning process (Panoy et al., 2022). However, IHLs must give due consideration to students' expectations, recognising them as the primary consumers in the educational journey (Ozer, 2021), despite variations in the levels of these expectations among students (Appleton-Kapp and Kentler, 2016).

Most student expectations surveys are typically conducted at the conclusion of the academic period. However, in accordance with the recommendations of Appleton-Kapp and Kentler

(2016), conducting student expectations surveys at the outset of the academic project could potentially yield less biased results. Obtaining a clear understanding of students' expectations for an online course prior to its commencement can also aid instructors in aligning their teaching methodologies with those expectations, ultimately enhancing student satisfaction with online learning (Appleton-Kapp and Kentler, 2016; Ozer, 2021). Nevertheless, it is essential to handle students' expectations with care, as unmet expectations can lead to dissatisfaction among students (Ozer, 2021).

Furthermore, Appleton-Kapp and Kentler (2016) observed that instructors can influence students' expectations by providing detailed explanations of course expectations, which subsequently become integrated into students' own expectations. Additionally, learners can be introduced to the work of previous successful students, encouraging them to either match or exceed these established benchmarks (Alqurashi, 2019). This is particularly beneficial for newcomers to the field who may lack prior knowledge of the course material. Moreover, students often have expectations regarding their interaction with course content, fellow learners, and instructors (Alqurashi, 2019).

Researchers have found that students have high expectations for their interaction with course content (Zaheer, 2015; Bell, 2022), which is considered their primary reason for attending IHLs. Students expect the course content, including notes and assessments, to align with the course objectives (Goh et al., 2017; Lewis, 2021). They also anticipate that the course material will be easily accessible and well-organised for straightforward understanding and access (Chen et al., 2020; Ariffin et al., 2022). Well-organised content is expected to facilitate students' comprehension of the material (Alqurashi, 2019). Additionally, learners expect the course content to be delivered through various online formats, such as interactive texts, videos, PowerPoint presentations, and online study guides (Alqurashi, 2019; Lewis, 2021). Furthermore, students have high expectations regarding the quality of the course content, as this enables them to digest the material, process the information, and think critically without needing extra assistance (Ghazal et al., 2018; Alqurashi, 2019; Al-Mulhem, 2020).

Students also have high expectations for interaction with their peers in online programmes. As previously mentioned, online learning platforms can be isolating, leading to student dissatisfaction with their courses (Doo and Bonk, 2020; Oliveira et al., 2021; Yu et al., 2022).

Students anticipate engaging in meaningful interaction with their peers, seeking quality exchanges that provide tangible benefits rather than superficial interaction (Goh et al., 2017; Alqurashi, 2019). They value having their peers review their work and provide meaningful feedback, and they expect to contribute similarly to their peers' work (Oliveira et al., 2021). Additionally, students expect to collaborate with other learners in group activities, necessitating frequent interaction to achieve the desired outcomes (Alqurashi, 2019).

Research indicates that students have high expectations for interaction with their course instructors (Alqurashi, 2019; Thach et al., 2021). They expect instructors to be approachable, willing to answer questions, and facilitate online discussions, thereby enhancing learner-to-learner and learner-to-content interaction (Zaheer, 2015; Alqurashi, 2019; Bell, 2022). Students also anticipate receiving valuable and timely feedback from their instructors, which helps them correct mistakes and improve future activities and assessments (Alqurashi, 2019; Bickle et al., 2019). Furthermore, as students navigate the unfamiliar territory of online learning, they expect support and guidance from their instructors, fostering a sense of belonging within the online community (Alqurashi, 2019; Martin and Moore, 2022).

3.5.2 Student Experience

Yap et al. (2022) defines student experience as the satisfaction derived from the services provided by educational institutions. According to researchers such as Alqurashi (2019) and Kumar and Ghosh (2021), a crucial aspect of evaluating the effectiveness of online learning is the student's ability to reflect on their educational journey. Baber (2020) suggests that student satisfaction is an immediate outcome of online learning, with positive experiences leading to increased satisfaction levels. Additionally, Su and Guo (2021) emphasise that students serve as the judges of course effectiveness, basing their judgments on their overall interaction experiences. Satisfaction arises when they perceive the course as beneficial.

When students' expectations for interaction with course material, course quality, and course clarity are met or exceeded, their satisfaction is enhanced. Research on English students in Turkey by Ozer (2021) revealed that students derived satisfaction from engaging with course materials. The interaction with course content materials exceeded students' expectations by contributing to their personal and professional development. Additionally, aligning expected course quality with experienced course quality brings satisfaction to students' online learning

experiences (Ghazal et al., 2018; Katsarou and Chatzipanagiotou, 2021). Satisfaction with course quality results from the course's ability to promote problem-solving and critical thinking skills (Zaheer, 2015), as well as from the design of the course materials and assessments (Ozer, 2021). Beyond the quality of the course materials, course content quality also extends to the system through which the content is delivered. Students are satisfied when the online learning system is easy to navigate and runs efficiently (Ghazal et al., 2018). Furthermore, student satisfaction increases when the clarity of the course content matches or exceeds their expectations. Course content clarity includes clearly defined course objectives, expectations, guidelines, and assessments (Su and Guo, 2021). If the course quality, course clarity and interaction with the course content's expectations are met, they play a significant role in influencing student satisfaction with online learning.

Students appreciate the presence of others with whom they can engage, as this interaction significantly enhances their learning satisfaction (Goh et al., 2017). They also value the quality of peer interaction, which fosters deeper thinking and intellectual engagement (Katsarou and Chatzipanagiotou, 2021). Similarly, research by Song et al. (2019) on the effectiveness of learner interaction in online learning in the USA found that frequent peer interaction contributes to higher levels of student satisfaction. Such interaction enables students to establish connections and build a sense of reliance on their peers (Liu et al., 2007; Yarmand et al., 2022). These connections often extend beyond academic relationships to form social bonds, which fulfil students' social needs and ultimately enhance their overall academic satisfaction (Chen et al., 2020).

Student satisfaction with online learning interaction is significantly enhanced by the students' ability to connect with peers (Alenezi, 2022; Bickle et al., 2021) through PALP (Wong and Chapman, 2022). Moreover, group interaction with peers has a positive impact on student satisfaction with online learning (Kyei-Blankson et al., 2019). Working with others to complete group tasks motivates the weaker students to work hard and encourages the stronger students to assist the weaker ones (Bickle et al., 2019; Katsarou and Chatzipanagiotou, 2021). Additionally, completing tasks without the guidance of instructors gives room for students to take charge of their work and be able to make decisions and solve problems on their own (Moore and Miller, 2022). Therefore, peers play an important role in influencing student satisfaction with online learning.

Overall, knowledgeable, empathetic and supportive instructors who provide timely feedback improves student experience and satisfaction with online learning (Ozer, 2021). Employment of responsive and dynamic pedagogical models and techniques captivates student concentration and develop their sense of community (Bickle et al., 2019; Almusharraf and Khahro, 2020). Research by Ice et al. (2007) at West Virginia university in USA on postgraduate students found that students are more satisfied with audio than text feedback. Similar studies reveal that timely feedback improves student performance in successive assessments (Ghazal et al., 2018; Wang et al., 2021). Furthermore, the learners were satisfied with the care that they received from their instructors which made them feel that they belonged (Ice et al., 2007, Almusharraf and Khahro, 2020). Gray and DeLoreto (2016) and Bickle et al. (2019) noted that students whose instructors communicate effectively and show commitment display higher satisfaction than their counterparts (Mohammed et al., 2022). This reinforces findings by Wang et al (2021) that student support induces students desire to learn. The above shows the critical role of instructors in influencing student satisfaction with online learning.

In aggregate, the above arguments reinforce the hypothesis presented in Chapter One which are summarily presented as follows:

- **H¹**: There is a statistically significant relationship between online learning interaction (learner-to-learner interaction, learner-to-instructor interaction and learner-to-content interaction) and student satisfaction (expectations and experience).
- **H^{1a}**: There is a statistically significant relationship between learner-to-learner interaction and student satisfaction.
- **H^{1b}**: There is a statistically significant relationship between learner-to-content and student satisfaction.
- **H^{1c}**: There is a statistically significant relationship between learner-to-instructor and student satisfaction.

The next section presents a hypothesised model of the hypothesis.

3.6 HYPOTHESISED MODEL FOR THE RESEARCH

The hypothesised model presented in Chapter One, examines the relationship between online learning interaction and student satisfaction. After reviewing literature on the independent and dependent variables, the hypothesised model in Figure 1.1 has been reproduced in Figure 3.2.

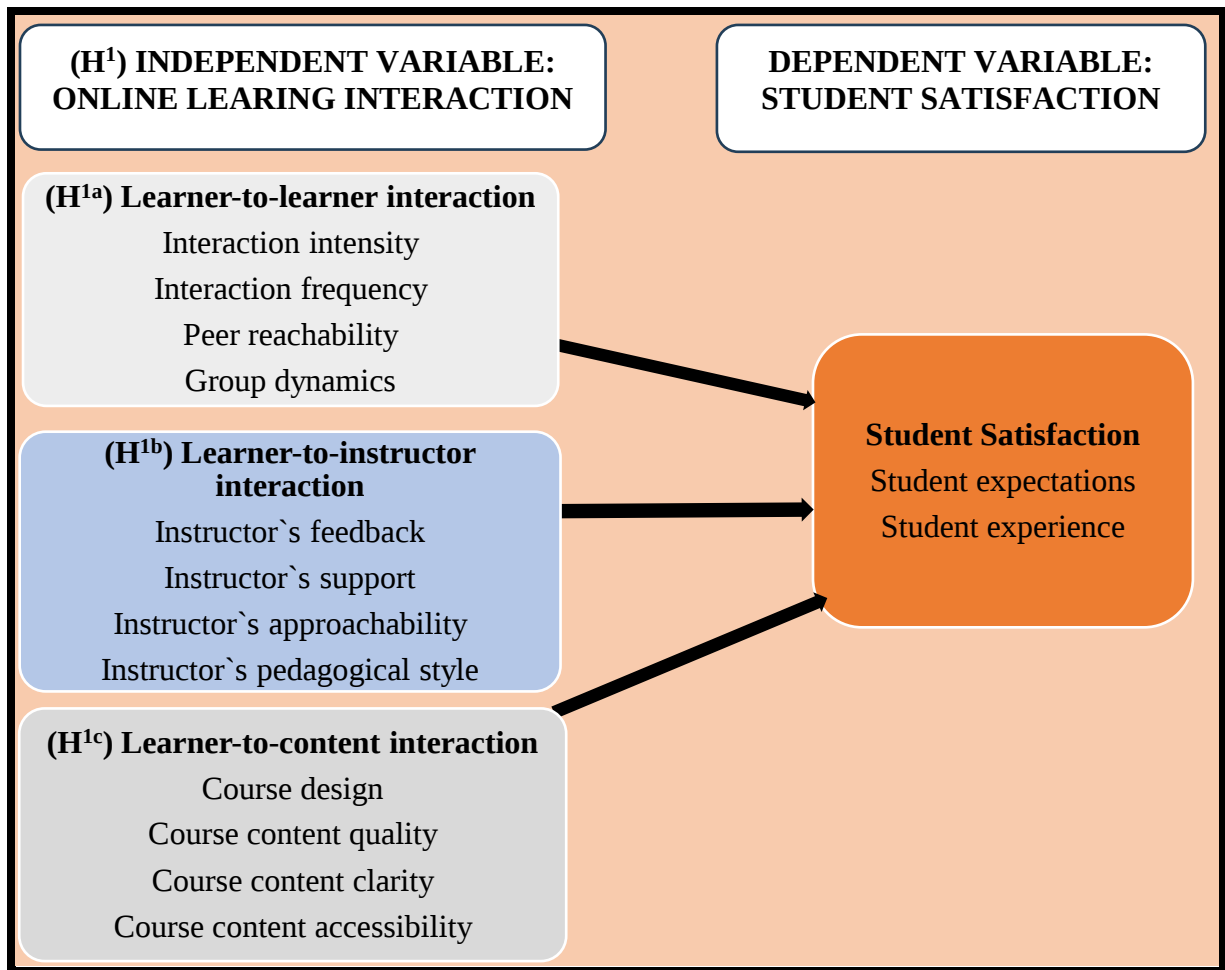


FIGURE 3.2: REPRODUCED HYPOTHESISED MODEL

Source: Researcher's construction

The reproduced Figure 3.2 proposes the independent variable – online learning interaction (which constitutes, learner-to-learner interaction, learner-to-content interaction, and learner-to-instructor interaction constructs) that possibly influence the dependent variable - student satisfaction (expectations and experience) in the online learning environment. The following section concludes this chapter.

3.7 CONCLUSION

This chapter began by presenting the theoretical foundations underpinning this research, namely, CoI, SPT and TDT. This was followed by an overview of online learning. The two primary modes of online learning, asynchronous and synchronous, were explained. Additionally, the chapter explored the theories of social presence, cognitive presence, and teaching presence, detailing each within the framework of the CoI framework. These three presences were then

connected to the online learning interaction constructs, with each construct elucidated through previous scholarly literature. Finally, the chapter examined student satisfaction, exploring the two key factors— student expectations and student experience —that contribute to student satisfaction with online learning. Emphasis was placed on student expectations.

The subsequent chapter presents the research methodology followed in the research, reproduces the formulated hypotheses and operationalise the concepts based on the literature reviewed.

CHAPTER FOUR

RESEARCH DESIGN AND METHODOLOGY

4.1 INTRODUCTION

The previous chapter provided a review of the literature on online learning interaction and student satisfaction, forming the foundation for the hypotheses formulated in this research. The independent variable, online learning interaction (and its constructs learner-to-content interaction, learner-to-learner interaction and learner to instructor interaction) were explored as key elements that related to the dependent variable, student satisfaction (expectations and experience). This review offered a framework that directed the current research.

This chapter outlines the research methodology employed in this research, providing a comprehensive overview of the entire research process. It begins by presenting the overall research framework, setting the stage for a detailed exploration of the methodology guided by Saunders et al. (2019) `s research onion model. The outer layer of the research onion focuses on the research design, where the various research paradigms and approaches are discussed. This section clarifies the research approach adopted by this research, as well as the philosophical underpinnings that informed the research.

Following the discussion of research design, the chapter addresses the population and sample for the research. This includes a description of the target population, the sampling frame utilised to identify participants, and the rationale behind the chosen sample size. The research employed a convenience sampling technique. Next, the data collection process was examined, highlighting the types of data collected - qualitative, and quantitative. This section details the survey data collection method used- questionnaires. Additionally, it outlines the data analysis techniques and software employed to present and interpret the collected data.

The chapter also addresses the methods used to test the validity and reliability of the data collected, ensuring research findings credibility and inference to the population. Finally, reference is made to the ethical considerations that guided the research, emphasising the importance of safeguarding respondents` rights and confidentiality during the data collection process. This chapter details the steps taken to ensure informed consent, anonymity, and the ethical treatment of all respondents involved in the research.

The following section provides an outline of the research process, illustrating how these methodological components interconnect to support the research's objectives.

4.2 RESEARCH PROCESS

The research process refers to a systematic method of investigating a specific problem or question, aimed at gathering data, analysing information, and drawing conclusions (Creswell and Creswell, 2018). Figure 4.1 illustrates the research process followed in this research, encompassing each stage from the initial literature review to the presentation, interpretation, and reporting of results. This comprehensive approach ensured a structured pathway for addressing the research objectives, allowing for a clear progression through each phase of the investigation.

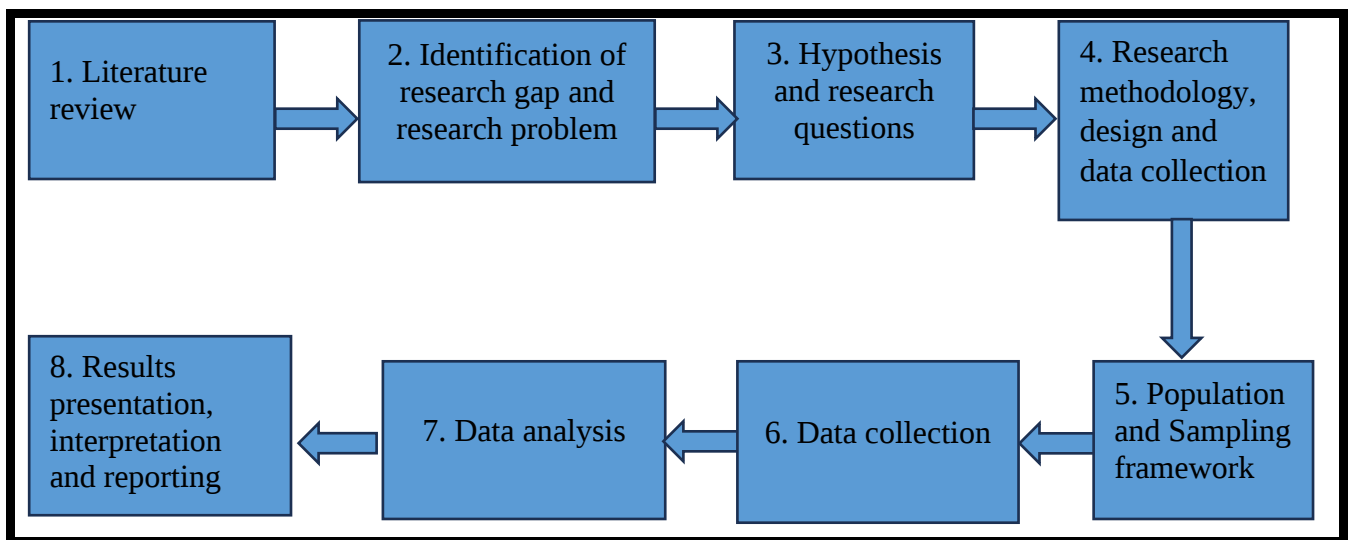


FIGURE 4.1: RESEARCH PROCESS

Source: Researcher's construction

Figure 4.1 outlines the research process followed in this study. This research started deductively with an investigation of recent literature on online learning interaction and student satisfaction in South Africa and globally. This culminated in the identification of the research gap and problem. After positioning the research, a hypothesised model was developed linking the independent variable, online learning interaction (and its constructs, namely learner-to-learner interaction, learner-to-instructor interaction and learner-to-content interaction constructs) to the dependent variable, student satisfaction (expectations and experience). This was followed by the adoption of a deductive research design following a positivist research philosophy. Using a quantitative research methodology, a self-administered questionnaire was developed for data

collection. Thereafter, data analysis, presentation and interpretation of research findings and discussions of the results was conducted before conclusions and recommendations are drawn. The research culminates with a proposed model.

Furthermore, Figure 4.2 highlights the research onion developed by Saunders et al. (2019), that guided the research methodology process for this research.

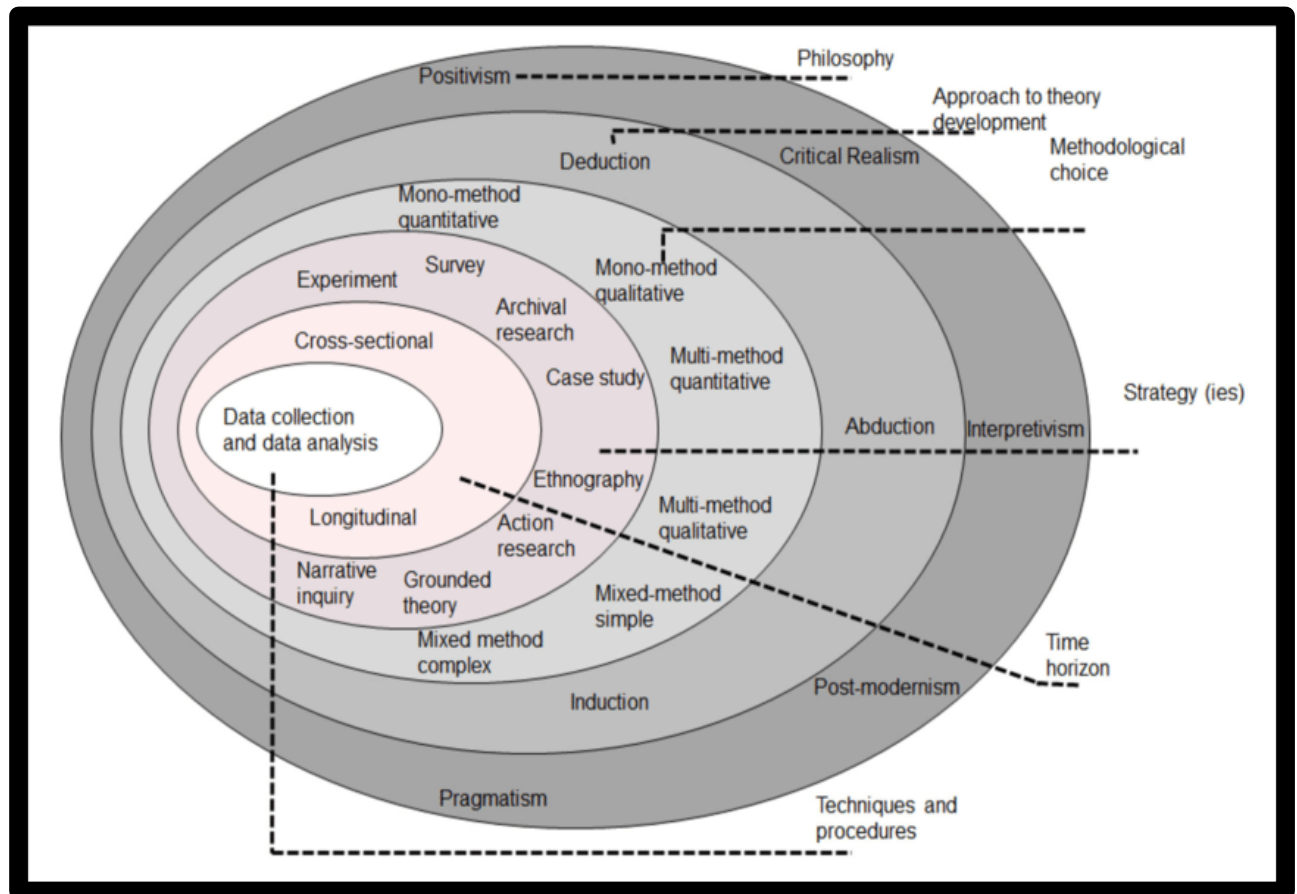


FIGURE 4.2: RESEARCH ONION

Source: Adapted from Saunders, Lewis and Thornhill (2019:130)

Figure 4.2 illustrates the "research onion," which outlines the sequence of procedures to be followed in the research process. The research process is like peeling an onion, each layer represents a distinct phase. This begins with establishing the research philosophy and progresses through to data collection and analysis (Saunders et al., 2019). The following section explains the research paradigm.

4.2.1 Research Paradigm

The first step in the research methodology is to identify the research paradigm research should follow (Saunders et al., 2019). Melnikovas (2018) emphasises that a standard research process is rooted in philosophical theories, which aid in developing research strategies and techniques. Creswell and Creswell (2018) define research philosophy as the collective creation of values, beliefs, concepts, and practices within a specific discipline. This definition aligns with that of Saunders et al. (2019), who describe research philosophy as the structured beliefs and assumptions that underpin knowledge creation. The application of these philosophies enables researchers to clarify the theoretical frameworks through which reality is interpreted and understood (Zikmund et al., 2019). Rahi (2017) asserts that adhering to a research philosophy is crucial for producing valid research. Historically, two major research philosophies have been recognised, namely, positivism and interpretivism (Hair et al., 2021). Additionally, several emerging philosophies have gained prominence, such as postmodernism, pragmatism, and critical realism (Saunders et al., 2019). These research philosophies are briefly explored in the following subsections.

4.2.1.1 Positivistic Research Paradigm

The positivist approach aligns with the perspective of natural scientists (Rahi, 2017; Saunders et al., 2019). It posits that social reality is governed not by human perception but by absolute laws that can be observed, studied, and modelled (Melnikovas, 2018; Alrashidi, 2021). Positivists maintain that relationships between phenomena are causal and predictable; once these relationships are understood, future events can be predicted with certainty (Rehman and Alharthi, 2016; Melnikovas, 2018; Saunders et al., 2019). From a positivist viewpoint, researchers can draw similar conclusions about a phenomenon regardless of the context, as reality is considered independent of its context. Positivists assert that the world is static, and by applying scientific methods that govern social laws, factual statements can be formulated. Additionally, positivists hold an objectivist epistemological stance (Rahi, 2017; Alharahsheh and Pius, 2020).

A positivist research procedure primarily involves testing hypotheses about the causal relationships between phenomena (Zikmund et al., 2019; Hennink, Hutter and Bailey, 2020). A survey questionnaire is the primary data collection instrument. Following a deductive approach, extensive quantitative data is collected and analysed to establish these causal relationships. The

analysis results are then used as evidence to confirm or refute the hypotheses and can be inferred to the population (Zikmund et al., 2019; Ugwu, Ekere and Onoh, 2021).

4.2.1.2 Interpretivist Research Paradigm

The interpretivist research paradigm posits that there are no universally accepted standard truths; instead, there are multiple socially constructed realities (Rehman and Alharthi, 2016; Saunders et al., 2019; Alharahsheh and Pius, 2020). Interpretivists argue that reality and truths are mutually mediated by the researcher and the participants' senses and are thus created rather than discovered. The epistemology of interpretivism is subjective, as individuals within a society assign names and meanings to social phenomena through interaction (Rahi, 2017; Melnikovas, 2018; Saunders et al., 2019). Reality is seen as dependent on individuals' backgrounds, realities, concepts, and lived experiences, thus, making researchers part of the subject under research (Blaikie and Priest, 2019; Alharahsheh and Pius, 2020).

The interpretivist belief is that realities can be viewed from different perspectives. To understand social phenomena, the methodology requires viewing them from the participants' side rather than the researchers' (Junjie and Yingxin, 2022). This approach primarily involves the collection of qualitative data and the use of an inductive approach to analysis (Alharahsheh and Pius, 2020). Researchers seek to understand social phenomena by grouping collected data into codes, categories and broad themes to observe emerging patterns (Rehman and Alharthi, 2016; Saunders et al., 2019). It is believed that social subjects continually reproduce common interpretations in their daily life activities (Blaikie and Priest, 2019; Alharahsheh and Pius, 2020).

4.2.1.3 New Emerging Paradigms

In addition to the traditional research paradigms of positivism and interpretivism discussed in the previous sections, several new and emerging paradigms have gained attention in recent years, reflecting the evolving landscape of research across disciplines. These emerging paradigms challenge established ways of thinking and provide alternative frameworks for understanding complex phenomena (Saunders et al., 2019). Some of the key emerging paradigms are explained in the following subsections:

(i) Critical Realism

Critical realism assumes that the world consists of entities, and the perception focuses on the reality of these entities rather than the entities themselves (Saunders, 2019). Knowledge is acquired by examining the effects of real mechanisms to understand the nature of social phenomena (Haydam and Steenkamp, 2020). Critical realism posits that the social world is in a state of continuous reproduction and transformation, prompting researchers to formulate hypotheses about mechanisms capable of generating patterns of events (Bell et al., 2022). The paradigm challenges the norm that reality is observable from face value. Rather, what is observable is a result of the underlying factors. This paradigm also employs scientific reasoning to observe reality. The science is either qualitative, mixed or quantitative depending on the maturity of the phenomena under investigation (Muhaise et al., 2020). Thus, a researcher can choose to either be immersed in the research or observe it objectively.

(ii) Postmodernism

Postmodernism's emphasis is on giving a voice to society rather than adhering to predetermined rules for action (Haydam and Steenkamp, 2020). Social complexities and realities are obtainable from firsthand experiences as opposed to third acting as agencies of silent/ silenced voices. This paradigm acknowledges social inequalities and gives voice to suppressed voices. This includes for instance gender, race, disability, the poor, minority groups, underprivileged social classes, and other issues (Bell et al., 2022).

Using the narrative research design, this paradigm utilises qualitative research to derive subjective meanings that interpret behavioural patterns through the narratives of respondents (Bell et al., 2022). It focuses on understanding the diversity of perspectives and experiences within society, allowing for a more distinct interpretation of social phenomena (Haydam and Steenkamp, 2020).

(iii) Pragmatism

The pragmatism philosophy suggests that in supporting an action, it is crucial to have practical concepts (Saunders et al., 2019). Pragmatism emphasises the importance of applying theories and ideas in practical contexts to solve problems and achieve desired outcomes. This approach values the usefulness and applicability of knowledge, often blending quantitative and qualitative methods to address research questions effectively (Ugwu et al., 2021).

4.2.1.4 Research Paradigm employed in current research

Although a researcher can follow multiple paradigms within one research (Bryman, 2016), this research adopts the positivist research philosophy. This choice is justified by the objective nature of the analysis, which relies on data and facts, ensuring it is free from bias and that the data is credible (Saunders et al., 2019). The selection of quantitative research over qualitative approaches further strengthens this rationale, as quantitative methods facilitate the measurement and statistical analysis of variables, allowing for generalisable results (Creswell and Creswell, 2018). Additionally, previous research on online learning interaction and student satisfaction applied the positivist philosophy (Almussharaf and Khahro, 2020; Pham et al., 2021). This philosophy enables the relationship between the phenomena to be objectively researched and inferred to the population.

Building on the discussion of the research paradigm, the following section explores the various research approaches to theory development. This discussion highlights how different methodologies contribute to the formulation and refinement of theories in research.

4.3 RESEARCH APPROACHES TO THEORY DEVELOPMENT

Theory development is a critical component of research across various disciplines, encompassing the processes of creating, refining, and testing theoretical frameworks to enhance the understanding of complex phenomena. According to McGregor, Restoule and Johnston (2018), theory development can occur through theory testing, theory building, or a combination of both. This section outlines the three primary approaches to theory development, namely, deductive, inductive, and abductive.

4.3.1 Deductive Approach

The deductive approach begins with a general theory or hypothesis, which researchers aim to test through specific observations or experiments (Saunders et al., 2019; Hennink et al., 2020). This structured approach derives predictions from established theories, followed by empirical investigations to validate these predictions (McGregor et al., 2018). Predominantly used in fields like physics and psychology, the deductive approach asserts that if the premises are true, the conclusions must also be true (Saunders et al., 2019). For instance, psychological theories about behaviour can be tested by observing specific actions in controlled environments, providing insights that either support or modify existing theoretical frameworks (McGregor et al., 2018).

Data collection tools such as self-administered questionnaires are used to obtain quantitative data from a representative sample (Hennink et al., 2020).

4.3.2 Inductive Approach

In contrast, the inductive approach begins with specific observations or data, from which general theories or hypotheses are developed (Saunders et al., 2019; Kennedy, 2018). This method emphasises pattern recognition and the generation of new theoretical insights grounded in empirical evidence (Kennedy, 2018; Hennink et al., 2020). It is particularly valuable in qualitative research, such as ethnography and case studies where the goal is to explore and understand less clearly defined phenomena (Hennink et al., 2020). Techniques such as interviews, focus groups, and observations are utilised to gather in-depth data from a limited number of participants (Hennink et al., 2020). For instance, researchers might conduct interviews to identify themes that enhance the understanding of social behaviour. The inductive approach relies on established premises to derive unproven conclusions, facilitating the exploration of new ideas and insights (Saunders et al., 2019).

4.3.3 Abductive Approach

The abductive approach merges elements of both deduction and induction, allowing researchers to make educated guesses or hypotheses based on incomplete data. This method is particularly beneficial in complex scenarios where not all variables are controllable or known. By moving between identifying patterns (inductive reasoning) and utilising existing theories to propose hypotheses (deductive reasoning), the abductive approach facilitates the development of plausible explanations for observed phenomena (Saunders et al., 2019). This approach is often employed in social sciences, where intricate interaction between variables challenges the formulation of clear theoretical frameworks (Hennink et al., 2020).

4.3.4 Research Approach employed in the current research

This decision to adopt a deductive approach, which is well-suited for testing specific hypotheses derived from existing theories (Hennick et al., 2020). By utilising established theories related to online learning interaction and student satisfaction, this approach allowed for the formulation of clear hypotheses that could be empirically tested. The decision to adopt the deductive method is justified by the need to validate or challenge existing theoretical frameworks, as discussed in Chapter Three. By starting with a theoretical foundation, the research aimed to confirm or decline

the hypothesised relationship between online learning interaction and student satisfaction. This structured methodology not only facilitates the systematic investigation of relationships between variables but also contributes to the broader discourse on online learning interaction by either supporting or refining existing theories (Saunders et al., 2019). Thus, the deductive approach aligns well with the objectives of this research, enhancing the rigour and relevance of the findings. The following section outlines the research methods derived from the afore-mentioned approaches to theory development.

4.4 RESEARCH METHODS

The research methods employed in research are typically categorised into three main types: quantitative, qualitative, and mixed methods (Saunders et al., 2019). Each of these approaches offers distinct advantages and is suited to different research objectives. The following subsections explore these methods.

4.4.1 Quantitative Research Methods

Quantitative methods are primarily descriptive and aim to answer questions about relationships, focusing on who, what, when, why, where, and how (Melnikovas, 2018; Saunders et al., 2019). This approach is deductive, often starting with a hypothesis and testing it through the measurement of key concepts, relevant variables and /or constructs (Melnikovas, 2018). Data is typically gathered on a larger scale using structured questions with predefined responses. Techniques such as surveys and experiments are commonly employed to collect data that can be mathematically and statistically analysed (Basias and Pollalis, 2018; Taherdoost, 2021). The statistical methods used in the empirical analysis of this data enable objective predictions and explanations of phenomena (Cresswell and Cresswell, 2018). This method is particularly effective for verifying hypotheses and testing theories using extensive datasets (Basias and Pollalis, 2018).

4.4.2 Qualitative Research Methods

In contrast to quantitative methods, qualitative research focuses on exploring and understanding complex phenomena through in-depth insights and subjective interpretations (Hennink et al., 2020). These methods emphasise the context and meaning behind participants' experiences, allowing for a nuanced understanding of social dynamics, behaviours, and motivations (Saunders et al., 2019). Qualitative approaches are inherently inductive; researchers delve deeper into

responses to obtain rich data and insights that emerge from the conversations (Braun and Clarke, 2021). This approach typically employs unstructured questioning (Bernard, 2018), with interviews and focus groups being the most used techniques (Hennink et al., 2020). These methods generate descriptive data that provide depth and context to research findings (Bernard, 2018). However, the sample sizes in qualitative research tend to be relatively small, which means the results may not be easily generalised to the broader population (Flick, 2022).

4.4.3 Mixed Research Methods

To address the limitations of individual research methods, some researchers adopt a mixed methods approach that combines both qualitative and quantitative techniques (Saunders et al., 2019; Flick, 2022). This integration allows the methods to complement each other, mitigating the challenges encountered when each is used in isolation and resulting in richer, less biased data (Saunders et al., 2019). By leveraging the strengths of both approaches, researchers can gain a more comprehensive understanding of a research problem. For example, quantitative data can provide a broad overview and statistical validity, while qualitative data can offer deeper insights into the context and motivations behind those numbers (Creswell and Plano Clark, 2018).

The two methods can be implemented sequentially, where one phase informs the next, or concurrently, allowing for simultaneous data collection (Melnikovas, 2018). For instance, a researcher might begin with qualitative interviews to identify key themes and then design a quantitative survey based on those themes to test their prevalence across a larger population. This iterative process not only enriches the research outcomes but also allows for the exploration of emerging questions that may arise during the research (Saunders et al., 2019). Overall, mixed-methods research allows researchers to explore complex phenomena from multiple angles, enhancing the overall robustness of their findings and increasing the credibility of the results (Cresswell and Plano Clark, 2023; Saunders et al., 2019).

4.4.4 Research Method employed in the current research

For this research, a quantitative research method was chosen for its capability to draw from a large sample size, enabling generalisation of the findings to the broader population (Saunders et al., 2019). The primary objective was to establish the relationship between online learning interaction and student satisfaction, a task for which quantitative methods are particularly effective. This approach allowed the researcher to confirm or refute existing research findings

and theories on the relationship between these two variables. Additionally, the quantitative method facilitated the establishment of the validity and reliability of the measurement tools, further minimising bias (Almusharraf and Khahro, 2020). The results produced were quantitative in nature and remained unaffected by the researcher's personal feelings or opinions (Basias and Pollalis, 2018). Previous studies have successfully employed this method to investigate the relationship between online learning interaction and student satisfaction (Zaheer, 2015; Muzammil et al., 2020; Almusharraf and Khahro, 2020; Pham et al., 2021). The following section outlines the population and sampling framework for this study, guided by the chosen research methods. This framework is crucial for ensuring that the sample is representative of the target population and enhances the validity of the findings.

4.5 POPULATION AND SAMPLING FRAMEWORK

Population and sampling are fundamental concepts in research that significantly influence the validity and reliability of findings. Understanding these elements is crucial for effectively designing research and ensuring that the results are representative of the broader context. The following subsections provide a detailed examination of the population under research and the sampling methods employed, highlighting their importance in shaping the research outcomes.

4.5.1 Population

According to Etikan and Babatope (2019) population refers to a combination of entities that have characteristics or attributes in common. Usually, the population is so large to the extent that it is impossible to carry out a census where every item is included in the research (Etikan and Babatope, 2019; Stratton, 2021). The population for this research are all the students that participated in online learning at a selected South African IHL.

4.5.2 Sampling

Sampling is a fundamental process in research that involves selecting a subset of individuals or items from a larger population (Gill, 2020). This approach allows researchers to gather insights and make inferences about the entire population without the need to research every member, which can be time-consuming and costly (Malhotra, Nunan and Birks, 2017). By employing various sampling methods, researchers can ensure that their findings are both reliable and representative (Zikmund et al., 2019). The following subsection details the sampling procedure as illustrated in Figure 4.3, starting with defining the target population until data collection from

the sample elements. Understanding the sampling procedure is essential for conducting effective and credible research.

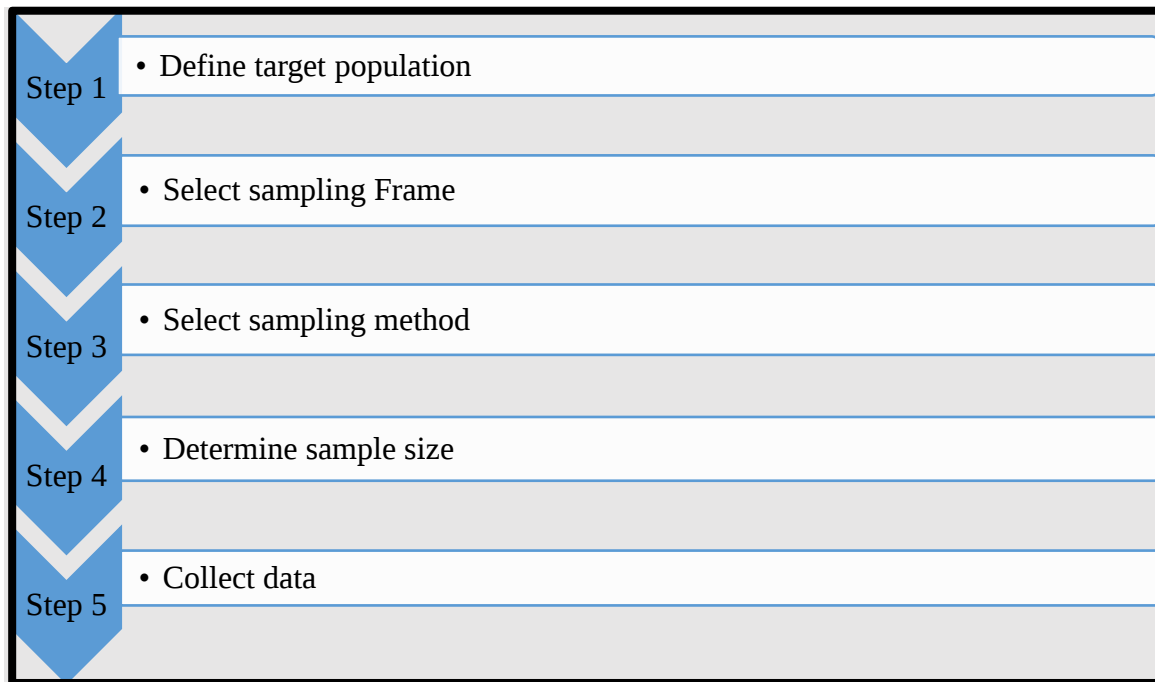


FIGURE 4.3: SAMPLING PROCESS

Source: Adapted from Zikmund et al. (2019)

4.5.2.1 Target Population

The target population refers to the specific group of individuals or items that a researcher aims to study, defined by criteria relevant to the research question (Babbie, 2020). Identifying the target population is crucial, as it establishes the group from which data is collected to answer the research questions (Zikmund et al., 2019). The target population for this research was all students at a selected IHL in South Africa who were enrolled between 2020 and 2022 (during the lockdown). This is the cohort that participated in online learning during the COVID-19 induced lockdown. The target population is composed of students from different faculties (Commerce, Pharmacy, Science, Humanities, Law and Education) and at different levels of education (Undergraduate, Honours/Postgraduate, Master`s and PhD). The scope of the research drew respondents from all the faculties at an IHL.

4.5.2.2 Sampling Frame

A sampling frame refers to the list of elements from which a sample is drawn (Etikan and Babatope, 2019). The need for a sampling frame arises from practical considerations such as costs, time constraints, limited human resources, and the potential difficulty in reaching all subjects (Zikmund et al., 2019). These factors often make it impractical or impossible to gather data from the entire population. Consequently, a representative number of subjects is selected from the population, forming the sample (Etikan and Babatope, 2019). A well-chosen sample enhances the reliability of the research findings and minimises the risk of bias (Saunders et al., 2019).

In this research, the sampling frame consisted of all registered students at a selected IHL in South Africa. Despite the lack of a specific list of students who had specifically participated in online learning, this frame was considered applicable and representative of the population. The selected sample was sufficient to represent the population, suggesting that conducting a census would not yield significantly different results. Therefore, findings derived from the sample of registered students can be reliably inferred to the population.

4.5.2.3 Sampling Techniques

Sampling techniques refer to the methods used to select a sample from the population (Etikan and Babatope, 2019). Choosing an appropriate sampling technique is crucial to ensure the selection of a representative sample. There are two main sampling techniques commonly employed in quantitative research, namely, probability sampling and non-probability sampling (Stratton, 2021). These are illustrated in Figure 4.4.

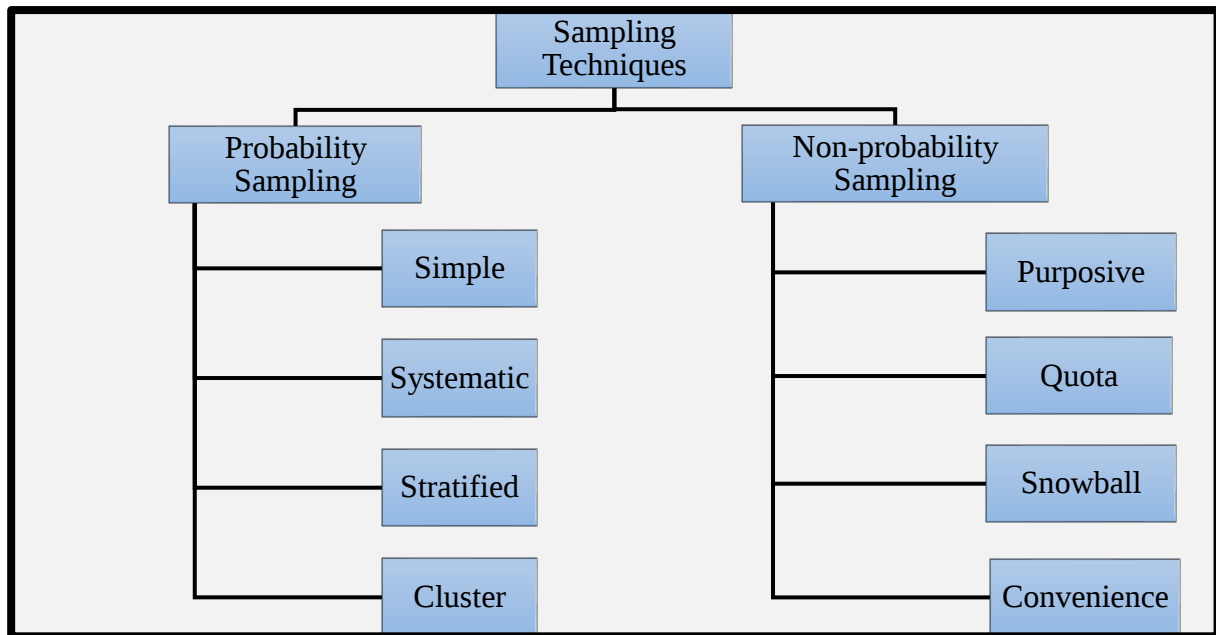


FIGURE 4.4: SAMPLING TECHNIQUES

Source: Adapted from Cresswell and Cresswell (2018:212)

(i) Probability Sampling Techniques

With the probability sampling technique, every member of the population has an equal chance of being selected for the sample (Stratton, 2021). The selection of elements is done randomly and objectively (Etikan and Babatope, 2019). This method reduces bias and allows for the determination of sample size, sampling error, and result precision (Stratton, 2021). The most common probability sampling techniques include simple random sampling, systematic sampling, stratified sampling and cluster sampling.

In simple random sampling, every member of the population has an equal chance of being included in the sample (Pandey and Pandey, 2021). Systematic sampling involves selecting a random starting point and subsequently choosing respondents at regular intervals, such as every third individual (Blair and Blair, 2020). This method requires the population to be arranged systematically. In stratified sampling, the population is divided into homogeneous strata, and respondents are randomly selected from each stratum. Cluster sampling involves subdividing the population into clusters, from which a random selection of clusters is made, and all members of the chosen clusters are included in the sample (Pandey and Pandey, 2021; Nardi, 2018).

(ii) Non-probability Sampling Techniques

Non-probability sampling is a technique whereby not every member of the population has an equal chance of being selected to participate in the research (Stratton, 2021). The selection of the sample is based on the researcher's predetermined judgement regarding which subjects to include. Some common types of non-probability sampling include purposive, quota, convenience and snowball sampling (Etikan and Babatope, 2019).

Purposive sampling, also known as judgmental sampling, is a qualitative research technique where the researcher selects participants based on specific criteria relevant to the study. This method allows researchers to focus on individuals who possess particular characteristics essential for addressing the research questions (Gill, 2020). It is particularly effective in studies where specific expertise or experience is necessary (Berndt, 2020). Quota sampling involves dividing the population into distinct subgroups, or quotas, based on certain characteristics such as age, gender, or socioeconomic status. Researchers then select samples from these subgroups using either judgmental or convenience sampling methods. This approach ensures that each subgroup is adequately represented in the sample, which can enhance the validity of the findings (Gill, 2020). Snowball sampling is a unique method often employed in research involving hard-to-reach populations. This technique begins with an initial respondent who meets the study's criteria. Once engaged, this respondent refers additional participants, effectively "snowballing" the sample size until the desired number of participants is achieved (Saunders et al., 2019). This method is particularly beneficial in studies where participants may be difficult to identify or access due to stigmatisation or isolation (Gill, 2020). Lastly, convenience sampling which is discussed in the following section.

(iii) Sampling Technique employed in the current research

Convenience sampling is a non-probability technique that involves selecting respondents who are readily available, willing to participate, and easily accessible to the researcher (Creswell and Creswell, 2018; Gill, 2020). In this study, convenience sampling was employed to gather data from respondents at an IHL in South Africa that was within the researcher's reach. This choice was influenced by factors such as the researcher's proximity to the sample population, as well as considerations of time and cost associated with sampling from other institutions across the country. As the researcher is a student at the same institution, the approval protocols and access to participants were more manageable. To address the inherent sampling bias associated with

convenience sampling, the researcher established clear inclusion criteria to minimise selection bias. Specifically, participants were required to have engaged in online learning between the years 2020 and 2023. This ensured that the sample included individuals with relevant experience.

Respondents were recruited from multiple faculties to ensure a broad spectrum of perspectives on online learning. Recruitment methods included email invitations, flyers, and in-person outreach. The questionnaire was distributed anonymously via email, reducing the likelihood of biased responses. Additionally, notices containing a link to the questionnaire were shared in various student social media groups, with the researcher's identity intentionally not disclosed. To further minimise selection bias, an experienced third party was enlisted to distribute the questionnaires across all faculties. This third party received training on the research's objectives and was closely monitored by the researcher to ensure compliance with research guidelines. This strategy was designed to enhance the reliability and validity of the findings while mitigating the risk of researcher influence in the sampling process (Gill, 2020).

4.5.2.4 Sample Size

According to Brown et al. (2018), the sample size refers to the number of elements included in the sample. Selecting an adequate and appropriate sample size helps reduce sampling error, improve research reliability and minimises research bias. When determining the sample size, various factors such as research objectives, population diversity, statistical techniques employed, and time and financial constraints should be considered (Etikan and Babatope, 2019). Memon et al. (2020) reinforce that there is no universal standard for sample size in research instead, multiple factors must be taken into account including the nature of the study, input from the research supervisor, sample sizes from previous similar studies, and the anticipated completion rate.

The type of analysis to be conducted also influences sample size requirements (Cresswell and Cresswell, 2018). For example, regression analysis typically requires a minimum of 100 participants, while Pearson's correlation analysis necessitates at least 200 (Memon et al., 2020). Other authors, such as Kline (2016), suggest that a sample size of less than 100 is considered low, while a sample size of 250 is considered large. Additionally, it is argued that a sample size of 120 can be representative for behavioural sciences. Hair et al. (2021) proposed that the ratio of sample size to indicator variables should range from 5:1 to 10:1.

Based on these arguments, from the 6 662 registered students at the IHL under study, a minimum of 250 responses was chosen to constitute a representative sample for this research. To ensure representation, these respondents were from different faculties. This number allows for generalisation of the results. Furthermore, based on Hair et al.'s (2021) recommendation, this research, with 46 indicator variables, should have a sample size between 230 and 460. The selected sample size of 250 falls within this range, thus, allowing for statistical inference. Also, it met the researcher's time and financial constraints. Ultimately, the research exceeded the target of 250, by 18 responses.

4.5.2.5 Data Collection

After determining the sample size, the final step in the sampling procedure is to collect data from the selected participants. This process is detailed in Section 4.7. The following section outlines the time horizon during which data collection occurred.

4.6 TIME HORIZON

The time horizon refers to the duration over which research is conducted, determining whether data is collected at a single point in time or over an extended period (Saunders et al., 2019). There are two main types of time horizons - cross-sectional and longitudinal. Cross-sectional studies collect data at one specific moment, while longitudinal studies gather data over a longer timeframe (Alrashidi, 2021). This research employed a cross-sectional approach. Previous research on online learning interaction and student satisfaction have also utilised cross-sectional designs (Sharma et al., 2020; Almusharraf and Khahro, 2020; Mohammed et al., 2022).

To provide respondents with ample opportunity to complete the questionnaire thoughtfully, it was made available for one month. This time frame allowed for sufficient engagement and reflection on the part of the respondents. Following the data collection period, a data analysis was conducted to draw insights and conclusions regarding online learning interaction and student satisfaction. The following section outlines the data collection process carried out at this specific point in time, utilising a cross-sectional design.

4.7 DATA COLLECTION METHOD

To effectively address the research questions and objectives, it is essential to apply an appropriate data collection method (Saunders et al., 2019). There are two types of data collection methods

that can be employed, namely, secondary and primary data collection (Taherdoost, 2021). Both data collection methods were strategically combined in this research to enhance the overall quality and depth of the research findings. The following sections presents each method in more detail.

4.7.1 Secondary Research

Secondary data collection utilises existing data that has already been gathered and analysed by others, providing a broader context or background for the research (Cresswell and Cresswell, 2018; Taherdoost, 2021). This type of data is valuable for developing hypotheses and research objectives, as it helps identify gaps in existing research (Saunders et al., 2019). Secondary data can also provide a baseline for comparison and/or triangulation with primary results (Taherdoost, 2021). Despite its cost-effectiveness and accessibility, secondary data has limitations. Since it was collected for other purposes, it may be subject to manipulation and may not be fully reliable (Babbie, 2020; Taherdoost, 2021). Additionally, variations in time and environment can affect the credibility of secondary data. Sources of secondary data include books, magazines, journals, diaries, letters, and more (Saunders et al., 2019; Taherdoost, 2021).

Although secondary research relies on data collected for purposes other than the current research, it provides valuable insights into the phenomena being investigated. Additionally, it enables researchers to compare findings with those from the present research (Saunders et al., 2019). In this research, secondary data was employed to gain understanding of the relationship between online learning interaction and student satisfaction. A thorough search of peer-reviewed international and local journals was conducted using platforms such as Google Scholar and EBSCOhost. Textbooks were also consulted to enrich the study`s context. The following section outlines the primary data collection method employed in this research.

4.7.2 Primary Research

Primary data refers to first-hand information collected directly from original respondents specifically for research (Saunders et al., 2019). This data is gathered exclusively for the research at hand and remains unavailable to others until published by the researcher (Taherdoost, 2021). Key sources of primary data include surveys, interviews, experiments, focus groups, observations, and case studies (Creswell and Creswell, 2018; Taherdoost, 2021). According to

Babbie (2020), primary data is essential for validating theories and confirming models, while Taherdoost (2021) highlights its value when exploring new phenomena.

In this research, primary data was collected to address the research questions and test the hypotheses. This approach allowed the researcher to gather information specifically aligned with the research's objectives, enhancing both its validity and reliability, as the data was directly managed by the researcher. By focusing on targeted data collection, the results obtained were particularly relevant and specific to the research context. Despite challenges such as defining the scope of data collection, timing, methodology, and associated costs, the advantages of primary data collection include its ability to yield high-quality and current information (Kabir, 2018; Taherdoost, 2021). The primary data collection methods are detailed in the following section.

4.7.2.1 Primary Data Collection Methods

Primary data can be collected using a variety of methods, which can be categorised into qualitative and quantitative approaches. These methods encompass surveys, experiments, interviews, observations, and more. Each of these approaches offers distinct advantages and is suited to different research objectives. The following subsections provide an explanation of the primary data collection methods employed in this study.

(i) Qualitative Primary Data Collection Methods

Qualitative research seeks to deeply explore and understand issues by analysing experiences, behaviours, and relationships (Basias and Pollalis, 2018). It involves examining the current situation from a selected group of participants. The results cannot be generalised to the broader population (Flick, 2022). In qualitative research, the researcher and the participants collectively define, interpret, and translate concepts and phenomena (Basias and Pollalis, 2018; Cresswell and Cresswell, 2018). This method provides an in-depth understanding, making it suitable when there is uncertainty about concepts and phenomena. It addresses questions such as what, how, when, and where (Basias and Pollalis, 2018). However, qualitative research can be open to bias as interpretations may be influenced by personal attitudes, perceptions, beliefs and feelings, making the method somewhat subjective (Bernard, 2018; Basias and Pollalis, 2018).

Qualitative data collection is primarily conducted through interviews and observations, two methods that provide rich insights into participants' experiences and behaviours (Cresswell and

Cresswell, 2018). Interviews can be categorised into two main types, namely, unstructured and semi-structured. Unstructured interviews allow for a free-flowing conversation, where participants respond to open-ended questions without significant interruption from the researcher (Cresswell and Cresswell, 2018). This approach facilitates a deep exploration of participants' lived experiences, enabling them to share their narratives in their own words. While this method can yield rich qualitative data, it requires considerable skill and experience on the part of the interviewer to navigate the discussion effectively and keep it coherent (Taherdoost, 2021). Semi-structured interviews, on the other hand, require the researchers to develop a set of guiding questions while also allowing for open-ended responses, which can lead to unexpected insights (Magaldi and Berler, 2020). This approach enables researchers to delve deeper into specific areas of interest while maintaining some structure to the conversation (Cresswell and Cresswell, 2018).

In addition to interviews, observations serve as a crucial data collection instrument in qualitative research (Cresswell and Cresswell, 2018). This method allows researchers to gain insights into phenomena in their natural context, capturing behaviours and interaction as they unfold in real time. Observations can provide valuable context that complements interview data, enhancing the overall understanding of the research topic (Flick, 2022). Both interviews and observations are integral to qualitative research, each offering unique strengths and challenges. When used together, they can provide a comprehensive understanding of complex social phenomena, facilitating a richer analysis and interpretation of the data (Mason, 2018).

(ii) Quantitative primary data collection methods

Two commonly used methods for quantitative primary data collection are experiments and surveys (Cresswell and Cresswell, 2018). Experiments play a crucial role in establishing cause-and-effect relationships by allowing researchers to manipulate variables in controlled environments and quantitatively measure the outcomes (Ganesha and Aithal, 2022). This method is particularly important in fields such as psychology and medicine. In contrast, surveys are widely utilised to gather data from large samples, enabling researchers to collect quantifiable information about attitudes, opinions, and behaviours (Ganesha and Aithal, 2022). Surveys are frequently employed in business and management research to answer fundamental questions about what, who, where, how much, and how many (Saunders et al., 2019). They offer versatility in administration, whether online, face-to-face, or through other formats (Polonsky and Waller, 2019).

(iii) Primary Data Collection Method employed for the current research

For this research, the survey method was chosen to collect primary data. This approach aligns with previous studies investigating online learning interaction and student satisfaction, such as those conducted by Almusharraf and Khahro (2020), Elshami et al. (2021), Mohammed et al. (2022) and Wong and Chapman (2022). The survey method is favoured for its numerous advantages, including efficiency, flexibility, and cost-effectiveness.

Survey research facilitates large-scale data collection, making it both cost-efficient and timesaving (Saunders et al., 2019). Given the researchers' two-year completion requirement for the Master's degree programme and the lack of funding for data collection, this method was particularly suitable for this research. Additionally, surveys offer convenience and ease of completion (Ganesha and Aithal, 2022). Respondents could complete the survey at their convenience, with clear questions that did not require further clarification from the researcher, thereby minimising bias in the results. The flexibility of surveys allows for various administration methods, including face-to-face, paper-based, and online formats (Polonsky and Waller, 2019). In this research, both paper-based and online (email) methods were used to administer the survey instrument. Finally, the survey method was selected for its capacity for standardisation (Saunders et al., 2019). The standardised questions in this research ensured consistency and facilitated easier data analysis. The next subsection details the survey instrument utilised in this research.

4.8 MEASURING INSTRUMENT FOR DATA COLLECTION

In research, a measuring instrument is a tool used to systematically collect data on specific variables, allowing researchers to quantify attitudes, opinions, behaviours, or other phenomena relevant to their research (Ganesha and Aithal, 2022). For survey research, the most employed instrument is a questionnaire (Saunders et al., 2019). According to Burns and Veeck (2020), a questionnaire serves as a research instrument that gathers responses from participants. For this study, a questionnaire was utilised to follow the survey data collection method.

The decision to use a questionnaire was based on its ability to effectively address the research questions while allowing for a sequential organisation of items (Saunders et al., 2019). Questionnaires are advantageous for collecting data from large samples, saving time, facilitating easy comparisons with similar studies, and enabling structured, straightforward analysis

(Kothari, 2004; Taherdoost, 2021). Moreover, they can accommodate more questions and responses than other data collection instruments, enhancing the accuracy of the results (Ahmad et al., 2019). Questionnaires have also been widely employed in research on online learning interaction and student satisfaction providing a reliable foundation for this research (Zaheer, 2015; Almusharraf and Khahro, 2020; Herwin et al., 2021).

Questionnaires can be classified as either structured or unstructured (Ganesha and Aithal, 2022). Unstructured questionnaires feature open-ended questions, allowing respondents to freely express their opinions (Ahmad et al., 2019; Saunders et al., 2019). In contrast, structured questionnaires consist of closed-ended questions, where responses are predetermined by the researcher, offering no flexibility (Taherdoost, 2021; Ganesha and Aithal, 2022). The instrument used in this research was a structured questionnaire (APPENDIX B) that contained closed-ended questions. This format ensures clarity for respondents, simplifies scoring and summarisation, and provides consistent, high-quality data (Singh, 2017; Ahmad et al., 2019; Pandey and Pandey, 2021; Taherdoost, 2021). Additionally, using a closed-ended questionnaire minimises ambiguity, facilitating easier coding and analysis (Saunders et al., 2019). The following subsection details the procedure for developing the questionnaire used in this research.

4.8.1 Questionnaire Development

When developing a questionnaire, researchers may adopt various approaches; some create entirely new questions, while others adapt items from previous studies (Saunders et al., 2019). In this study, the questions in Section A were formulated by the researcher to align with the research objectives, while the questions in Sections B and C were adapted from existing literature. The adaptation was guided by the reliability of the instruments, specifically focusing on items with Cronbach's alpha coefficients of at least 0.7. A Cronbach's alpha value between 0.7 and 1 indicates that the instrument is reliable and consistent (Malhotra, 2017).

To measure online learning interaction and student satisfaction in Sections B and C, a five-point Likert scale was employed. This scale effectively quantifies responses on ordinal data arranged along a continuum (Singh, 2019). On the Likert scale, a predictor is classified as having a 'strong' impact if it is significant and ranked by size in the upper third of predictors. It is classified as having a 'weak' impact if it is ranked in the lower third and moderate in the mid third of the distribution (Sutherland et al., 2019). The five-point Likert scale has been widely used in

previous surveys assessing student satisfaction (Ghazal et al., 2018; Almusharraf and Khahro, 2020; Kumar et al., 2021; Ozer, 2021; Chadra, Ranjan and Chowdhary, 2022). The scale ranges from 1 (strongly disagree) to 5 (strongly agree), with intermediate options for neutrality and agreement (Mohammed et al., 2022). The five-point Likert scale is preferred over a seven-point Likert scale to minimise respondent fatigue, especially given the length of the questionnaire (McGregor et al., 2018). The following subsection outlines the specific sections of the questionnaire, beginning with the cover letter.

4.8.1.1 Cover Letter

The questionnaire was accompanied by a cover letter (APPENDIX A) serving as an introductory preface. This cover letter provided essential information about the research team, including the researcher and the supervisor, along with their contact details, namely, email addresses and telephone numbers so that participants could reach out for any further clarification or inquiries. Additionally, the cover letter included details about the institution with which the research is affiliated, ensuring transparency regarding the academic context of the research. It also highlighted the research ethics approval, affirming that the research adhered to ethical standards for conducting research involving human participants.

The cover letter outlined the title of the research, clearly stating its purpose and objectives to provide respondents with a comprehensive understanding of the research's aims. This included an explanation of what the research seeks to achieve and the specific questions it intends to address, fostering a sense of involvement and importance among participants. Furthermore, the letter specified the expected time required to complete the questionnaire, allowing respondents to allocate sufficient time for their participation. This detail aimed to enhance response rates by setting clear expectations.

Finally, the cover letter sought the respondent's consent to participate in the research. It emphasised the voluntary nature of their participation and reassured them that their responses would be treated with confidentiality and used solely for research purposes. This consent process is crucial in promoting ethical standards and ensuring that participants are fully informed before engaging in the study. This was followed by Section A as detailed below.

4.8.1.2 Section A

Section A of the questionnaire was dedicated to collecting demographic data from the respondents. This section included questions regarding key demographic variables such as race, gender, and level of study. This ensured that the sample was representative, free of bias and inferable to the population (Kyei-Blankson et al., 2019).

4.8.1.3 Section B

Section B of the questionnaire focused on evaluating student satisfaction with three distinct constructs of online learning interaction, namely, learner-to-learner interaction, learner-to-content interaction, and learner-to-instructor interaction. This section of the questionnaire was designed to capture the multifaceted nature of the online learning interaction variable and its relationship with student satisfaction.

Firstly, the learner-to-learner interaction construct assessed the degree to which students engage with their peers in the online environment. Questions aimed to gauge the effectiveness and frequency of collaborative activities, discussions, and group projects. Respondents were asked to reflect on their experiences with communication and collaboration among classmates, including the perceived support and encouragement received from peers. Understanding these dynamics is critical, as positive learner-to-learner interaction can foster a sense of community and enhance the overall learning experience. Secondly, the learner-to-instructor interaction construct examined the nature and quality of interaction between students and instructors in the online learning setting. Questions aimed to assess the responsiveness, availability, and approachability of instructors, as well as the quality of feedback provided on assignments and assessments. Respondents reflected on their experiences with communication methods, such as emails, discussion forums, and virtual office hours. Lastly, the learner-to-content interaction construct evaluated how students interact with the course materials and resources provided in the online platform. Questions were designed to measure the accessibility, relevance, and engagement of the content, including readings, videos, and interactive elements. Participants were asked to express their satisfaction with the clarity and quality of the materials, as well as their ability to navigate and utilise these resources effectively. By evaluating these three constructs, Section B sought to provide a comprehensive overview of the online learning interaction variable and student satisfaction. The insights gained from this section illuminated the relationship between online learning interaction and student satisfaction.

4.8.1.4 Section C

Section C of the questionnaire assessed the relationship between online learning interaction (encompassing learner-to-learner interaction, learner-to-instructor interaction, and learner-to-content interaction constructs) and student satisfaction (expectations and experience).

As stated in the research gap in Chapter One, the primary focus of this section was to comparatively present student expectations and their actual experience. Respondents were asked to reflect on their initial expectations when entering the online learning environment and to compare these with their real-world experiences. This comparison is crucial, as discrepancies between expectations and actual experiences can significantly impact overall satisfaction levels. Questions in this section were crafted to elicit responses about various dimensions of each construct. For example, students were prompted to rate their expectations for collaborative engagement with peers and then assess their actual experiences in that regard. Similar questions addressed their expectations and experience with instructor feedback and course content, thus allowing for nuanced understanding of student satisfaction.

By evaluating both expectations and experiences, Section C aimed to offer a comprehensive picture of student satisfaction. This approach serves as a critical foundation for making informed recommendations for future enhancements of online learning interaction. The following section indicates how the different variables have been operationalised in this research.

4.8.2 Operationalisation of Variables

The operationalisation of the variables under investigation, as described by Atkinson (2023), involves converting theoretical concepts into observable and clearly defined variables. This process allows for the quantification and measurement of research items. The following subsections outline the operationalisation of both the independent and dependent variables in this study.

4.8.2.1 Operationalisation of Independent Variable

This section operationalises the three constructs (namely, learner-to-learner interaction, learner-to-instructor interaction and learner-to-content interaction) constituting the independent variable, online learning interaction.

(i) Operationalisation of Learner-to-learner Interaction

Learner-to-learner interaction refers to the various engagements and collaborative activities that students participate in within an online learning environment, as defined by Thach et al. (2021) in Chapter Three. To quantify this online learning interaction construct, a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree) was utilised to assess several key dimensions of interaction. Peer reachability evaluated the ease of connecting with peers (Alenenzi, 2022). Group dynamics measured the effectiveness of team interaction and the overall collaborative atmosphere (Elshami et al., 2022). Interaction frequency measured how often interaction occur among peers (Elshami et al., 2021). Interaction intensity gauged the depth of meaningful exchanges among learners (Mohammed et al., 2022). This structured approach provided valuable insights into the effectiveness of online learning environments. Table 4.1 captures key factors in the operationalisation of the learner-to-learner interaction construct.

TABLE 4.1: OPERATIONALISATION OF LEARNER-TO-LEARNER INTERACTION

Item		Cronbach`s Alpha
Peer reachability	I felt like I am part of a community of learners in the online courses because of the online interaction I had with other students.	0.883 (Ghazal et al., 2018)
	I felt comfortable engaging with other students in the online courses.	
Group dynamics	The other students were supportive in their interaction with me in the online courses.	0.92 (Alenezi, 2022)
	The online interaction I had with other students enhanced my ability to collaborate efficiently with them on group assignments in the online courses.	
Interaction frequency	Through online peer interaction, I could provide valuable feedback to other students in the online courses.	0.890 (Elshami et al., 2021)
	My interaction with other students assisted me in creating relationships in the courses.	
Interaction intensity	My peers valued my suggestions and ideas in the online courses.	0.757 (Mahommed et al., 2021)
	My peers provided different perspectives and ideas in the online courses.	
	My online interaction with my peers improved my ability to communicate effectively with them.	

Source: Researcher`s construction

The Cronbach's alpha values for all factors ranged from 0.75 to 0.92, exceeding the minimum threshold of 0.7. This indicated that the measures were reliable and effectively captured the intended constructs.

(ii) Operationalisation of Learner-to-instructor Interaction

As previously defined by Katsorau and Chatzipanagiotou (2021), learner-to-instructor interaction encompasses the engagement between students and their online course instructors. To measure this online learning interaction construct, the research utilised a 5-point Likert scale, where participants expressed their level of agreement with various statements, ranging from 1 (strongly disagree) to 5 (strongly agree). Key items on learner-to-instructor interaction construct have been assessed. Instructors' pedagogical style assessed the teaching methods and strategies employed by instructors to engage students (Ghazal et al., 2018). The approachability of instructors considered how accessible and welcoming instructors are to student inquiries (Baker and Lattuca, 2022). Instructors' feedback referred to the timely and constructive responses provided by instructors (Ghazal et al., 2018; Lipnevich and Panadero, 2021). The instructor support evaluated how effectively instructors assist students with their learning needs (Kim and Frick, 2022). By examining these dimensions, comprehensive understanding of how interaction with instructors impacted the overall learning experience in online environments was gained. Table 4.2 depicts the factors in the operationalisation of the learner-to-instructor interaction construct.

TABLE 4.2: OPERATIONALISATION OF LEARNER-TO-INSTRUCTOR INTERACTION

Item		Cronbach's Alpha
Instructors' pedagogical style	The instructor was knowledgeable about the course content through illustrations, real world examples etc.	0.758 (Ghazal et al., 2018)
	The instructor provided clear supporting explanations to the course content.	0.973 (Almusharraf and Khahro, 2020)
	The instructor was able to answer my questions effectively.	
Instructors' approachability	The instructor was approachable, I could communicate with them for further clarity on the course content.	0.763 Baker and Lattuca (2022)
	The instructor was quick to respond to my emails and messages during virtual office hours.	
Instructors' feedback	The instructor provided valuable feedback and guidance on my coursework.	0.758 (Ghazal et al., 2018)
	The instructor offered suggestions on how to improve in areas indicated in their feedback and grading.	
	The instructor regularly posted updates and study resources on the online platform, which helped me stay up to date with the courses.	
Instructors' support	The instructor consistently promoted online interaction among students through group discussions.	0.973 (Almusharraf and Khahro, 2020)
	The instructor made students actively participate in online class discussions through question-and-answer sessions and student presentations.	
	The instructor provided clear expectations for assignments and assessments.	

Source: Researcher's construction

All factors demonstrated Cronbach's alpha values exceeding 0.7, indicating that they were reliable measures of the constructs.

(iii) Operationalisation of Learner-to-content Interaction

Learner-to-content interaction refers to the engagement between students and the course materials they are studying (Lim and Richardson, 2022). A 5-point Likert scale was implemented to evaluate this online learning interaction construct, where respondents indicated their level of agreement with various statements, ranging from 1 (strongly disagree) to 5 (strongly agree). This

assessment focused on several critical dimensions. Course design looked at the overall structure and organisation of the course content (Su and Guo, 2021). Course content quality evaluated the relevance and richness of the course materials (Al Mulhem, 2020). Course content clarity measured how well the information is presented and understood (Su and Gao, 2021). Course content accessibility considered how easily students can access and interact with the course materials (Ghazal et al., 2018). By systematically measuring these factors, insights were gained into how effectively course content facilitates student learning and engagement. The factors operationalising the learner-to-learner interaction construct are illustrated in Table 4.3.

TABLE 4.3: OPERATIONALISATION OF LEARNER-TO-CONTENT INTERACTION

Item		Cronbach's Alpha
Course design	The course content challenged me to think critically.	0.749 (Su and Guo, 2021)
	The course content challenged me to apply what I learnt to real world situations.	
	The course content was relevant to the learning outcomes.	
Course content quality	The course content was engaging (allowed for roleplaying, had case studies, examples, self-tests etc.) and kept my attention throughout the courses.	0.824 (Ghazal et al., 2018)
	The course content was not overloaded (not too much reading material, not too many tasks/ assessments etc.), thus, manageable.	0.828 (Kumar et al., 2021)
	The quality of the online reading materials (books, articles, etc) made it easy to engage with the course content.	
Course content clarity	The multimedia elements (videos and audios, etc.) improved my understanding of the course content.	0.890 (Ayanbode et al., 2022)
	The course materials (notes, books, videos, audios, etc.) provided enough depth and detail for me to understand the course content.	
	The online course content (notes, books, articles, tests, videos, audios etc.) were presented in a clear and organised manner.	
Course content accessibility	The course materials and content assisted me to successfully complete the course.	0.856 (Kumar et al., 2021)
	The course materials were made available well in advance which made me engage with content before class sessions.	
	The course content was conveniently (easily accessible) on the online learning platforms.	

Source: Researcher's construction

The Cronbach's alpha values for all the factors ranged from 0.749 to 0.892, surpassing the minimum threshold of 0.7 recommended by Hair et al. (2021). This indicated that the measures were effective in capturing the construct under research.

4.8.2.2 Operationalisation of the Dependent Variable: Student Satisfaction

Student Satisfaction is defined as the overall contentment students feel regarding their online learning experience, particularly when their expectations are met or surpassed (Kotler and Keller, 2018). This variable was measured using a 5-point Likert scale to evaluate overall satisfaction levels. Key factors assessed include satisfaction with learner-to-content interaction, learner-to-learner interaction, and learner-to-instructor interaction. By examining these dimensions, insights into how different aspects of the online learning environment contributed to students' overall satisfaction were gained. Table 4.4 illustrates the operationalisation of student satisfaction.

TABLE 4.4: OPERATIONALISATION OF STUDENT SATISFACTION

Item		Cronbach's Alpha
Learner-to-learner	The interaction that I had with my peers through group discussions met my expectations.	0.878 (Ghazal et al., 2018) 0.944 (Baber, 2020)
	The interaction frequency I had with my peers met my expectations.	
	The ability to reach out to my peers (formally and informally) in the online learning courses met my expectations.	
	The group dynamics (support, respect, feedback) in the online learning courses met my expectations.	
Learner-to-instructor	The instructor's provision of timely feedback met my expectations.	0.973 (Almusharraf and Khahro, 2020)
	The instructor support that I received in the online courses met my expectations.	
	The instructors' pedagogical skills (presentation, interaction knowledge etc.) in delivering the online course content met my expectations.	
	The instructors' approachability met my expectations.	
Learner-to-content	The online course design (content and materials) met my expectations	0.829 (Su and Guo, 2021)
	The quality of the online course content (reading materials) met my expectations.	
	The clarity of the online course content (notes, books, articles, tests, videos, audios etc.) met my expectations.	
	The accessibility of the online course content (through multimodal elements) met my expectations.	

Source: Researcher's construction

Table 4.4 displays the factors used to operationalise the independent variable of student satisfaction. The Cronbach's alpha values for all measures range from 0.829 to 0.973, exceeding the minimum threshold of 0.7 as recommended by Hair et al. (2021). This suggests that the measures effectively assessed the constructs under investigation. The following section outlines the pre-testing and pilot study conducted prior to distributing the questionnaire to the target respondents.

4.8.3 Pre-Testing and Pilot Study

Once the questionnaire was developed, the researcher conducted a pre-test with the supervisor, a marketing expert, and a statistician to identify any potential errors and ensure that the questions and measurement scales were clear and appropriate. During this process, some double-barrelled

questions were separated and clarified, while ambiguous statements were rephrased for improved understanding.

Following the pre-test, a pilot study was conducted with a subset of the sample. According to Zikmund et al. (2019), a pilot study is a preliminary survey carried out on a small scale. For this study, the pilot sample consisted of six students enrolled at an IHL, selected for their similarity to the larger target population. These participants were excluded from the final research to maintain the integrity of the data.

The pilot study was administered over two weeks, allowing sufficient time for respondents to complete the questionnaire. Feedback gathered from this pilot study was instrumental in refining the questionnaire. Notably, an option for Honours students was added in Section A, and a space for respondents to provide their contact details was included at the end of the questionnaire for those interested in receiving an abstract of the research. Additionally, minor adjustments were made to enhance the clarity of several statements throughout the instrument. This iterative process ensured that the final questionnaire was both effective and user-friendly. The following section details the administration of the questionnaire.

4.8.4 Questionnaire Administration

After completing the preliminary processes, the questionnaire was administered to the target respondents. As outlined in Section 4.5.2.4, the target sample for this research was set at 250 respondents. The questionnaire was made available both online and in paper format. Bulk emails were sent to the entire population of registered students at the institution under study, resulting in 90 responses. However, only 61 of these responses were usable, as the remainder were either incomplete or did not meet the inclusion criteria of having participated in online learning between 2020 and 2022.

To reach the desired sample size, 215 paper-based self-administered questionnaires were conveniently distributed to students in dining halls. All distributed questionnaires were completed and returned, however, eight were found to be incomplete and were therefore excluded from the analysis. Ultimately, the target sample size was exceeded with 268 usable questionnaires, this ensured a robust dataset for quantitative analysis. This combination of online and paper-based administration helped maximise response rates and gather diverse perspectives

from the student population. The following section details the tests for validity and reliability tests that were performed on the research instrument.

4.9 VALIDITY AND RELIABILITY OF THE MEASURING INSTRUMENT

Validity refers to an instrument's ability to measure what it is intended to measure (Pandey and Pandey, 2021). There are various types of validity, such as face validity, content validity, and construct validity. According to Singh (2019), research validity depends on the degree of systematic error. The author further explains that validity can be internal or external. Internal validity is based on the absence of error in measurements, allowing for accurate inferences, while external validity focuses on the generalisation of research findings from the sample to the broader population (Singh, 2019 Gill, 2020).

To ensure face validity, the survey was reviewed by three qualified professionals in marketing and statistics. This review included a professor and a marketing lecturer, both experienced in online teaching. Based on their recommendations, modifications were made to the survey's structure and content. Additionally, the questionnaire was piloted among a conveniently selected group of students from the target population to ensure the instrument's content validity. Minor changes for clarity were incorporated based on feedback. To ensure construct validity CFA was performed. All constructs were above the minimum required 0.9 for construct validity (Hair et al., 2019).

Reliability refers to the consistency of measurement (Pandey and Pandey, 2021). Types of reliability include test-retest reliability, internal consistency reliability, and rational equivalence reliability (Singh, 2019; Hair et al., 2021). The questionnaire should yield consistent responses, with respondents providing the same answers even if questions are repeated (Pandey and Pandey, 2021). Internal consistency was measured using Cronbach's alpha, which ranges between 0 and 1. In social sciences research, a reliability coefficient of 0.70 or higher is generally acceptable (Almusharrif and Khahro, 2020; Hair et al., 2021). For this research, an acceptable Cronbach's alpha coefficient was between 0.70 and 1, as previously accepted by other student satisfaction with online learning interaction researchers (Zaheer, 2015; Singh, 2019; Almusharrif and Khahro, 2020). The following section details the data analysis techniques employed in this research.

4.10 DATA ANALYSIS

After collecting data using a questionnaire, the data was analysed. Mertler (2017) defines data analysis as the process of transforming raw data into a meaningful report. Pandey and Pandey (2021) note that the main purpose of data analysis is to uncover intrinsic facts from the collected data. Data analysis can be either qualitative or quantitative as explained in the following subsections.

4.10.1 Qualitative data analysis

Qualitative data analysis involves extracting themes from gathered evidence and organising the data to generate patterns (Ngulube, 2015; Richards, 2022). This process is crucial as it helps researchers make sense of their qualitative data. A key characteristic of qualitative data analysis is its inductive nature. Ravitch and Carl (2019) emphasise that the credibility and trustworthiness of qualitative research stem from the systematic, organised, and iterative nature of the process. Additionally, qualitative researchers must provide evidence that allows readers to assess the credibility of the research. This can be achieved by providing a clear outline of the research process, research artefacts such as pictures, recordings, secondary data and disclosing the analysis tools and approaches used (Norwell et al., 2017). Richards (2022) underscores that there are scientific rules of credibility, dependability, confirmability, and transferability that must be adhered to in qualitative data analysis. This sense-making process has five stages starting with organising and cleaning the data before sorting it. This is followed by engaging with the data to derive meanings and understanding before interpreting the data. This stage includes developing codes, categories and themes. Eventually, the data is presented into visuals and extracts (Bingham and Witkowsky, 2022). The following subsection details quantitative data analysis methods.

4.10.2 Quantitative data analysis

Quantitative data analysis employs statistical calculations to interpret data. According to Bertani et al. (2018) and Abu-Bader (2021), the main goal of statistical analysis is to establish relationships between variables. Data was analysed using the SPSS version 29 package by an experienced statistician. The package is widely used for its ability to prepare data, analyse, manage and report the findings. According to Morgan et al. (2019) and Abu-Bader (2021) the use of SPSS ensures high accuracy and quality results. Quantitative data analysis comprises descriptive and inferential statistics which are referred to in the subsections to follow.

4.10.2.1 Descriptive Statistics

According to Zikmund et al. (2019), descriptive statistics are a set of techniques used to summarise and describe the main features of a dataset. They provide simple quantitative summaries that convey essential information about the sample (Brown et al., 2018; Abu-Bader, 2021). Key components of descriptive statistics include measures of central tendency, such as the mean, which is the average of the data; the median, the middle value when the data is ordered; and the mode, the most frequently occurring value (Hair et al., 2021). Additionally, measures of dispersion, like the range (the difference between the highest and lowest values), variance (the average of the squared differences from the mean), and standard deviation (a measure of how much values vary from the mean) offer insights into the spread of the data (Pandey and Pandey, 2021). Descriptive statistics also encompass frequency distributions, which display how often each value occurs, as well as percentiles and quartiles that indicate the relative standing of a value within the dataset (Mertler, 2017; Hair et al., 2019). Overall, these techniques provide a quick and effective overview of data, serving as a foundation for more complex analyses (Sutherland et al., 2019).

For this research, descriptive data analysis was utilised to examine demographic information, focusing on measures of central tendency, frequency distribution, and variability. Brown et al. (2018) and Hair et al. (2021) highlight that the mean, median, and mode are the most common measures of central tendency, which help to identify the location of responses in a survey. The mean represents the average score of the variables, calculated by dividing the total scores by the number of observations (Dong, 2023). The median, on the other hand, is the middle value of the dataset when arranged in ascending order, providing a useful measure of central tendency that is less influenced by extreme values (Abu-Bader, 2021). The mode indicates the most frequently occurring value within the dataset, offering insight into the most common response (Zikmund et al., 2019). This approach allowed for a clearer understanding of the demographic characteristics and their distributions within the sample, contributing to more informed interpretations of the research findings.

Frequency distribution analysis examines the number of responses for each category within a dataset, making it a valuable tool for assessing the popularity of responses across different units of analysis (Hair et al., 2021). This method not only highlights the frequency of various responses but also helps identify non-responses and missing values for each variable, providing a more

complete picture of the dataset (Brown et al., 2018; Abu-Bader, 2021). In this study, frequency distribution analysis was employed to gain insights into the demographic data collected. According to Abu-Bader (2021), a variety of visual representations, including tables, charts, and graphs, were utilised to effectively illustrate the distribution of responses. These visual aids enhance comprehension, making it easier to interpret patterns and trends within the data. By presenting the findings in a clear and accessible format, the analysis contributed to a deeper understanding of the demographics and supports more robust conclusions regarding the research objectives.

Brown et al. (2018) and Hair et al. (2021) describe measures of variability as statistical tools that illustrate the differences among values in a dataset, providing insights into how responses are clustered or dispersed for a particular variable. The most common measures of variability include the range, standard deviation, and coefficient of variation (Zikmund et al., 2019). The range quantifies the difference between the maximum and minimum values in an ordered dataset, offering a simple measure of spread (Dong, 2023). Standard deviation, on the other hand, assesses how much individual data points deviate from the mean, providing a deeper understanding of the data's overall dispersion (Zikmund et al., 2019). Lastly, the coefficient of variation is particularly useful for comparing the relative dispersion between two or more datasets, as it expresses the standard deviation as a percentage of the mean (Dong, 2023). This approach to measuring variability not only enhanced the analysis of the data but also aided in identifying trends and making informed decisions based on the observed distributions. By utilising these measures, the degree of uncertainty and variability inherent in the findings was effectively communicated, thereby enriching the overall interpretation of the data. The following subsection details the inferential statistical analysis employed.

4.10.2.2 Statistical Inference and statistical significance

In addition to descriptive statistics, inferential statistics were employed to draw conclusions and inferences from the collected data (Morgan et al., 2019). This research utilised Pearson's correlation coefficients and regression analysis to draw conclusions and make inferences of the findings to the population. Details of these methods are discussed in the subsections below.

(i) Pearson's Correlation Coefficient

This metric assesses the strength and direction of the relationship between variables (Hair et al., 2019). According to Yang et al. (2021), an R-value ranging from 0 to 1 indicates a positive relationship, while an r-value between 0 and -1 signifies a negative relationship between the variables. Additionally, the strength of the relationship can be interpreted based on the r-value's proximity to zero; relationships are considered weak when the r-value is close to zero and strong when it exceeds ± 0.5 . Understanding these nuances helps researchers evaluate the degree to which changes in one variable may influence another, providing valuable insights for further analysis and decision-making. By applying this correlation analysis, potential patterns were identified and informed predictions were made about the relationships among the variables in the research.

(ii) Hypothesis Testing

To test the hypothesis, this research employs chi-square test, ANOVA test and linear regression analysis. These are crucial assessing the significance of the relationship between online learning interaction and student satisfaction to confirm or reject the proposed hypotheses (Hair et al., 2021).

Factor loadings reflect the strength of the relationship between observed variables and their respective latent constructs. A minimum factor loading of 0.7 is accepted as a strong indicator of the latent variable (Malhotra et al., 2017). Reliability was assessed using Cronbach's alpha, with acceptable values typically ranging from 0.7 to 1, while validity was evaluated through convergent and discriminant measures, ensuring that the measurement model accurately captures the intended constructs (Hair et al., 2021). In this research, a minimum of 0.7 was accepted for construct validity.

(iii) Regression Analysis

As mentioned in Chapter One, regression analysis followed a multicollinearity assessment (Shrestha, 2020). The significance of the relationship between the independent and the dependent variable are measured through regression analysis (Christopher, 2021). In this research, a linear regression analysis was useful in confirming findings from the Pearson's correlation. The technique was useful in confirming the existence of a relationship as well as its strength between online learning interaction and student satisfaction. With a sample size of 268 respondents, more

than the minimum requirement of 100 (Memon et al., 2020), linear regression analysis was possible. The coefficient of determination (R^2), a measure of the rate of change of the dependent variable as the independent variable changes (Christopher, 2021) determined both the strength (weak, zero or strong) and the direction (positive or negative) of the relationship. Residual values represent the discrepancies between observed values and those predicted by the model, highlighting areas where the model may not align perfectly with the data (Cheung et al., 2024). This research relied on the value of R^2 at the 95% confidence interval (where $p < 0.05$).

Below are some of the key assumptions that were set for linear regression:

- The independent variable should be interval or ratio data.
- The dependent variable should be ratio or interval data.
- The errors/residuals of each observation of the dependent variable should be independent from the other dependent observations.
- There must not be multicollinearity- there must not be correlation between the independent variables.
- The errors/ residuals are normally distributed.

An ANOVA test assesses the significance of survey results, aiding in decision-making regarding the acceptance or rejection of the hypothesis (Armstrong, 2019). In this research, a one-way ANOVA test was conducted to assess the significance of the interdependences between the individual constructs- learner-to-learner interaction, learner-to-instructor and learner-to-content interaction. The following section details the ethical considerations that were observed in this research.

4.11 ETHICAL CONSIDERATIONS

Ethical considerations in research are essential for protecting the rights and interests of respondents (Babbie, 2020). This research received approval (APPENDIX C) from the IHL's Human Research Ethics Committee where the research was conducted, ensuring compliance with established ethical standards. The ethical clearance was initially granted on 7 July 2023, for a period of one year and was subsequently renewed for an additional year on 7 July 2024. The application to the Committee included submission of the research questionnaire and the ethics form to determine any potential risks to respondents. The research was found to be of low risk to the respondents. This ensured their privacy, upheld their rights and ensured confidentiality.

Throughout the data collection process, the privacy, rights and confidentiality of respondents was prioritised. Identifiable information, such as names or identity numbers was not collected. Respondents who wished to receive a summary of the research were invited to provide their email addresses at the end of the questionnaire. These email addresses were treated with strict confidentiality and used solely for the purpose of sending the research abstract.

The questionnaire included a cover letter that outlined key ethical aspects of the study. It emphasised that participation is voluntary, responses would remain anonymous, and participants could withdraw from the research at any time without consequence. The cover letter also provided essential information about the researcher, the nature of the study, the intended use of the data, and details about how participants could obtain feedback on the research findings.

To further ensure ethical compliance, respondents were required to sign a consent form before proceeding to the questionnaire, affirming their voluntary participation. This process not only protected respondents but also fostered transparency in the research. Moreover, the researcher-maintained research integrity by appropriately acknowledging the contributions of other authors using the Harvard Anglia Ruskin referencing style. This commitment to ethical research practices reinforces the credibility of the research.

Finally, it is important to note that the findings of this research are exclusively for academic purposes, contributing to the body of knowledge in the field while safeguarding respondents' anonymity and confidentiality. By adhering to these ethical guidelines, the research aimed to uphold the highest standards of research integrity and respect for respondents.

4.12 CONCLUSION

This chapter discussed the research design selected for this research, based on the research onion framework. The research adopted a positivist research philosophy, which is objective and minimises bias. A quantitative research method was chosen, utilising a survey strategy for data collection. Data was gathered using a cross-sectional time horizon. The research instrument was a close-ended questionnaire that employed a 5-point Likert scale to measure the variables. A sampling approach was selected over a population approach, with a target sample of 250 students (but exceeded to 268 students) from an IHL in South Africa. A non-probability convenience sampling technique was used to select the sample. The collected data was analysed using a

statistical data analysis package. Descriptive statistics, including means, frequencies, and standard deviations, were calculated for demographic data. Inferential analyses, such as Pearson`s correlations and regression analysis were performed on the independent variable and the dependent variable. The ethical considerations for the research were also outlined. The following chapter presents the empirical results and interpret the findings.

CHAPTER FIVE

EMPIRICAL RESEARCH RESULTS

5.1 INTRODUCTION

The previous chapter provided an overview of the research methodology, focusing on data collection and analysis processes. This chapter addresses the PO, which investigates the relationship between online learning interaction and student satisfaction. To achieve this, it fulfils MO⁶ by conducting an empirical analysis of the relationship between the independent variable, online learning interaction (and its constructs - learner-to-learner interaction, learner-to-instructor interaction and learner-to-content interaction) and the dependent variable, student satisfaction (expectations and experience). Following the outlined research methodology, this chapter presents the results of the empirical data analysis. It begins by detailing the hypotheses and the corresponding model. Subsequently, the data processing procedures are described, outlining the steps taken before the data was input into the analysis model.

Descriptive statistics are then presented, offering insights into the demographic profiles of the respondents. Afterward, the results of the inferential statistics are discussed, focusing on the responses to the scaled survey items. The chapter then presents the validity and reliability testing results for the measurement instrument. Following this, the correlations between independent variable (online learning interaction) and the dependent variable (student satisfaction) are explored. Finally, the chapter concludes with a discussion on the hypothesis testing results and confirmation of the hypothesised model followed by a summary of the key findings.

5.2. HYPOTHESES AND MODEL FOR THE RESEARCH

To achieve the PO of this study, a hypothesised model was developed. The relationship between the independent variable, online learning interaction (with its constructs - learner-to-learner interaction, learner-to-instructor interaction, and learner-to-content interaction) and dependent variable, student satisfaction (expectations and experience) was derived from a review of existing literature. The hypothesised relationships are presented are as follows:

H¹: There is a statistically significant relationship between online learning interaction (learner-to-learner interaction, learner-to-instructor interaction, and learner-to-content interaction) and student satisfaction (expectations and experience).

H^{1a}: There is a statistically significant relationship between online learner-to-learner interaction and student satisfaction.

H^{1b}: There is a statistically significant relationship between learner-to-instructor interaction and student satisfaction.

H^{1c}: There is a statistically significant relationship between learner-to-content interaction and student satisfaction.

The hypothesised model was initially presented in Chapter One as Figure 1.1. It is reproduced here as Figure 5.1.

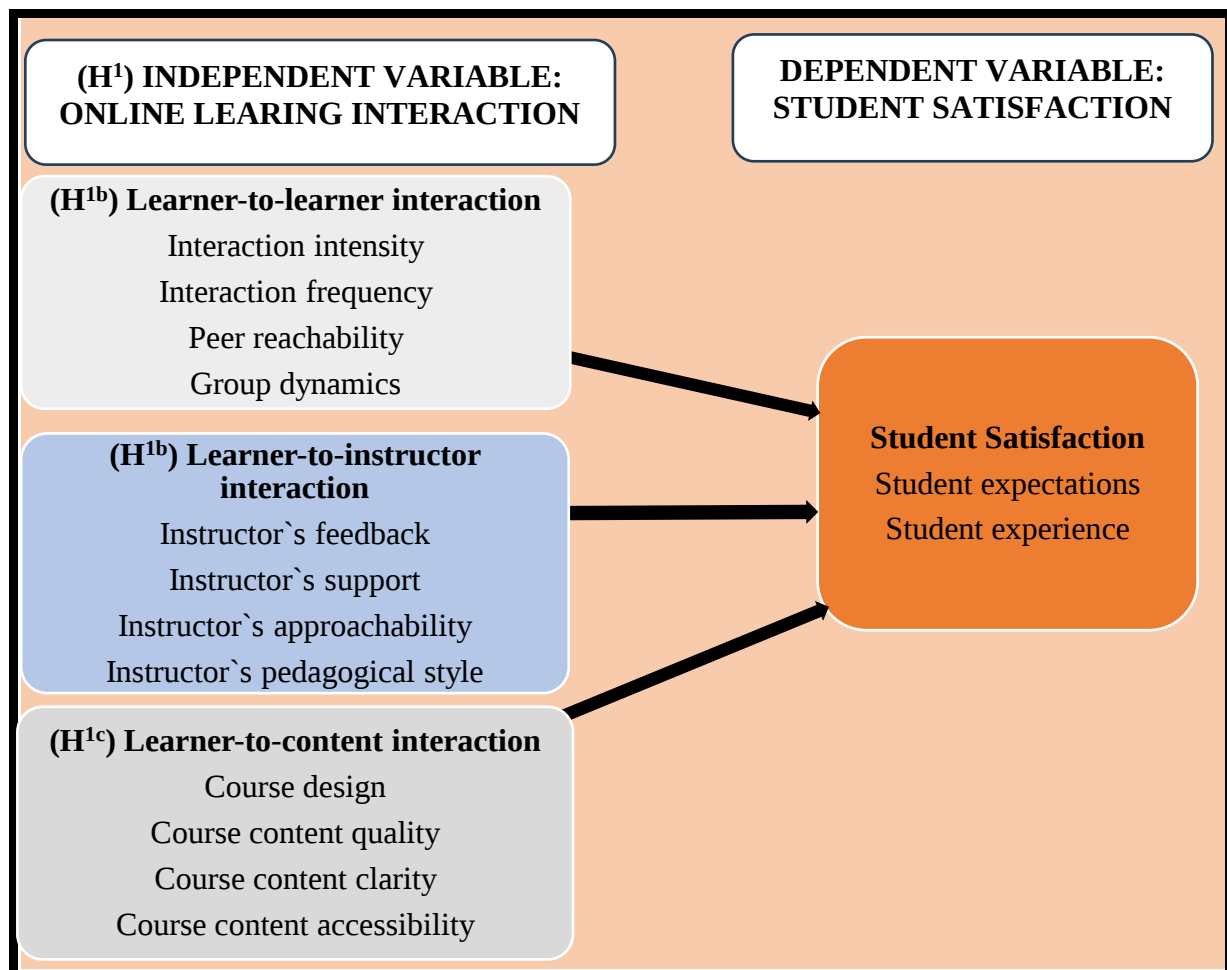


FIGURE 5.1: REPRODUCED HYPOTHESISED MODEL

Source: Researcher's construction

The hypothesised model in Figure 5.1 illustrates the relationship between the independent variable, online learning interaction (and its constructs - learner-to-learner, learner-to-instructor, and learner-to-content interaction) and the dependent variable (student satisfaction). The following section provides an overview of the data collection process for this research.

5.3 DATA COLLECTION PROCEDURE

Data for this research was collected using the sampling procedure outlined in Chapter Four of this research. The research targeted students enrolled at a specific IHL in the Eastern Cape province of South Africa. Both online and paper-based questionnaires were used to administer the survey to the selected sample.

An invitation to participate was sent via email to the registered students through the registrar's office. This approach enhanced the credibility of the research, as the email originated from a trusted and secure source, which encouraged recipients to take the invitation seriously and reduced the likelihood of it being perceived as spam. The email included a link to a Google Form where the questionnaire was hosted. Additionally, the email contained a cover letter that further validated the research, explaining its purpose and providing contact details for both the researcher and the supervisor.

Initially, the researcher anticipated that the online self-administered questionnaire would suffice for the research as emails were sent to a population of over 6 600 students. Nonetheless, the response rate for the online self-administered questionnaire was slow and poor (as detailed in Table 5.1.) in the next section. Alternatively, paper-based questionnaires were administered to supplement the online questionnaires. Since the researcher was not based at the IHL, an independent field worker was engaged to facilitate the administration process. This candidate is a holder of a postgraduate qualification and is well experienced in questionnaire administration in the field of study. To uphold the research quality, the candidate also went through some training sessions on the research and the research process to enhance their appreciation of the study. In line with the research ethics, a nominal fee of five rand (R5.00) per completed questionnaire was offered. This fee so minimal that it would not incentivise the candidate to be unethical in their practice.

The paper-based questionnaires included an introductory letter explaining the purpose of the research. Data collection took place between September and October 2023, a period chosen strategically ahead of the final examination sessions. This timing allowed respondents to avail themselves for the research. Details of the data pre-processing process are provided in the following section.

5.4 DATA PRE-PROCESSING

This is the preliminary phase of data analysis which entails data cleaning, coding and tabulation and relates to both the online and paper-based questionnaires.

5.4.1 Response Rate and Data Cleaning

The questionnaire was sent to both postgraduate and undergraduate students who met the criteria as outlined in the research methodology chapter. The research had a minimum target sample size of 250 responses. This number was exceeded as the total number of completed and usable questionnaires amounted to 268 in total as presented in Table 5.1.

TABLE 5.1: RESPONSE RATE

Description of activity	Number of responses
Online questionnaires	
Received online questionnaires	90
Total acceptable online questionnaires	61
Paper-based questionnaires	
Received paper-based questionnaires	215
Total acceptable questionnaires	207
Grand totals (online and paper-based questionnaires)	
Grand total received questionnaires	305
Grand total acceptable questionnaires	268
Response rate	87.9%

Source: Researcher`s Construction

The data cleaning process entailed checking and removing or filling the missing values on incomplete questionnaires as well as checking the response rate. Table 5.1 illustrates that, of the completed 90 online questionnaires, only 61 were acceptable. This is because most respondents were ineligible to participate in the research based on the screening questions as they did not

participate in online learning during the period of the research's focus. The 61 acceptable online responses were insufficient to draw any statistically significant conclusions on the population hence a paper-based questionnaire approach supplemented it. This involved the printing and distribution of 215 questionnaires. Upon completion, all completed paper-based questionnaires were sent via courier to the researcher and were subjected to quality check (completeness and accuracy). Eight (8) of the questionnaires were incomplete and, thus, disqualified for analysis. Ultimately, 268 online and paper-based questionnaires were acceptable. This exceeded the anticipated 250 responses and is, thus, representative of the population. The response rate was therefore calculated as (the number of questionnaires acceptable / the number of questionnaires received) *100. Thus, $(268/305) * 100 = 87.9\%$. Overall, paper-based questionnaires had a higher response rate than online questionnaires. Responses from the paper-based questionnaires were captured and transformed to the online Excel google spreadsheet. The demographic profile of the respondents is discussed in the following section.

5.5 RESPONDENTS' DEMOGRAPHIC PROFILE

The questionnaire gathered demographic information from the respondents, including their gender, ethnicity, faculty and level of study. This demographic data is valuable to the research as it helps to understand how these factors may influence student satisfaction with online learning interaction. The following subsections provide a breakdown of the different demographic aspects of the respondents.

TABLE 5. 2: RESPONDENTS' GENDER

Gender	Frequency	Percent	Valid percent	Cumulative percent
Male	107	39.9	39.9	
Female	111	41.4	41.4	81.3
Other	31	11.6	11.6	92.9
Not willing to say	19	7.1	7.1	100.0
Total	268	100	100	

Source: Statistical Analysis

Table 5.2 summarises the gender distribution of the 268 survey respondents. Of the total, 107 were male, comprising 39.9% of the responses. Female respondents numbered 111, accounting for 41.4% of the total. Additionally, 31 participants identified as non-binary or preferred a gender description other than male or female, representing 11.6% of the respondents. A total of 19

respondents (7.1%) chose not to disclose their gender. Females had a slightly higher response rate than males, with a difference of 1.5%. The lowest number of respondents were those who opted not to specify their gender. This data is visually represented in Figure 5.2.

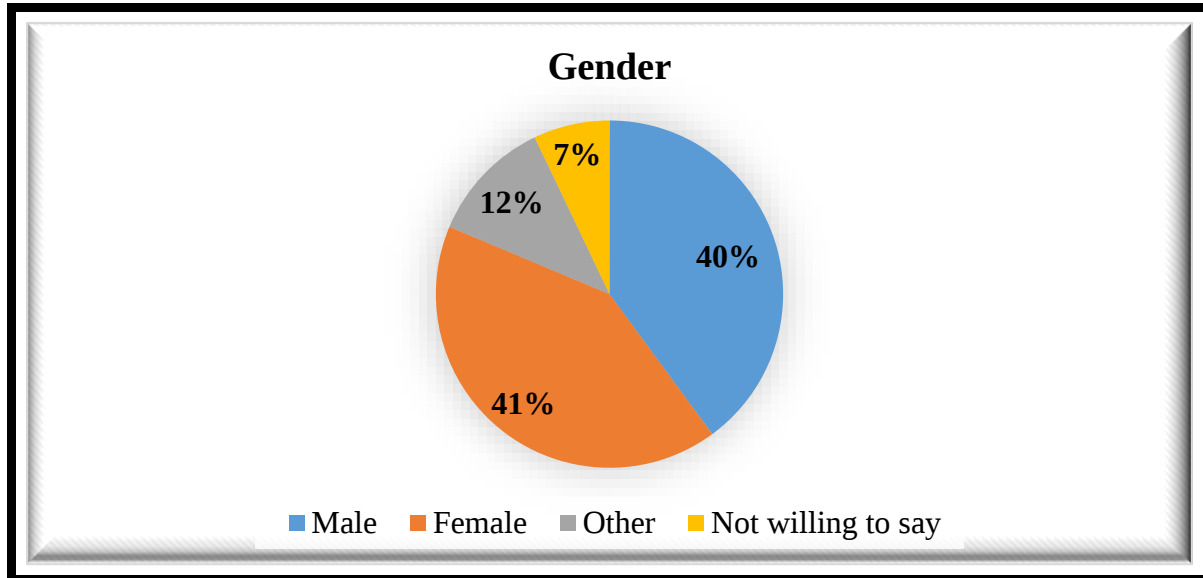


FIGURE 5. 2: RESPONDENTS` GENDER

Source: Statistical Analysis

Figure 5.2 illustrates the gender distribution of respondents who completed the questionnaires. The data is displayed using a bar graph, which effectively represents categorical values across different groups. The graph highlights that most of the respondents were female students while a few (19) were not willing to specify their gender. This shows that the research was free of bias towards a specific gender, hence the sample was representative of the population.

TABLE 5.3: RESPONDENTS` ETHNICITY

Ethnic group	Frequency	Percent	Valid Percent	Cumulative Percent
Black	149	55.6	55.6	
Asian	1	0.4	0.4	56.0
Indian	11	4.1	4.1	60.1
Coloured	38	14.2	14.2	74.3
White	43	16	16	90.3
Other	8	3	3	93.3
Not willing to say	18	6.7	6.7	100
Total	268	100	100	

Source: Statistical Analysis

Table 5.3 outlines the ethnic background of the respondents. The largest group of respondents was from the black community, with 149 individuals, comprising 55.6% of the total responses. Only one respondent identified as Asian, representing 0.4% of the total. The Indian community accounted for 11 responses, or 4.1% of the total. The Coloured community had 38 responses, which comprises 14.2% of the overall total. The White community contributed 43 responses, constituting 16% of the responses. Eight respondents (2%) identified as belonging to other ethnic groups not listed in the categories. Finally, 18 respondents (6.7%) chose not to disclose their ethnicity. The analysis reveals that the Black community had the highest number of responses, while the Asian community had the fewest.

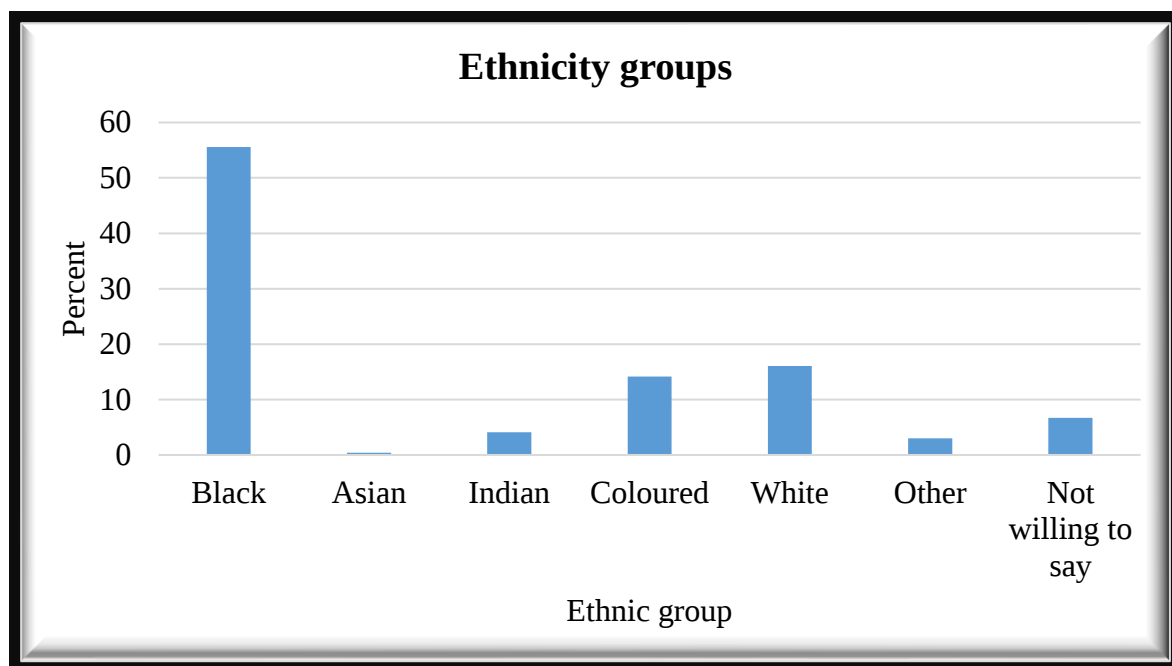


FIGURE 5.3: ETHNICITY GROUPS

Source: Statistical Analysis

Figure 5.3 visually represents the ethnicity of the respondents. The graph clearly categorises each ethnic group along with its corresponding frequency in percentage form. The largest proportion of responses came from the Black community, while the Asian community represented the smallest share. This demographic outcome is representative of the population diversity at the IHL. Considering the demographic structure of the IHL, the ethnicity results are representative of the population.

Table 5.4 below shows the respondents from each faculty at the IHL.

TABLE 5. 4: RESPONDENTS` FACULTIES

Faculty	Frequency	Percent	Valid Percent	Cumulative Percent
Law	33	12.3	12.3	
Education	28	10.4	10.4	22.7
Pharmacy	31	11.6	11.6	34.3
Humanities	101	37.7	37.7	72
Commerce	43	16	16	88
Sciences	32	12	12	100
Total	268	100	100	

Source: Statistical Analysis

Table 5.4 shows the distribution of respondents across six faculties. The Faculty of Law had 33 respondents, comprising 12.3% of the total. The Faculty of Education received 28 responses, or 10.4% of the total. The Faculty of Humanities had the highest number of responses, with 101 respondents, representing 37.7% of the total. The Faculty of Commerce had 43 respondents, accounting for 16% of the responses. Finally, the Faculty of Science received 32 responses, constituting 11.9% of the total. These responses are visually represented in Figure 5.4.

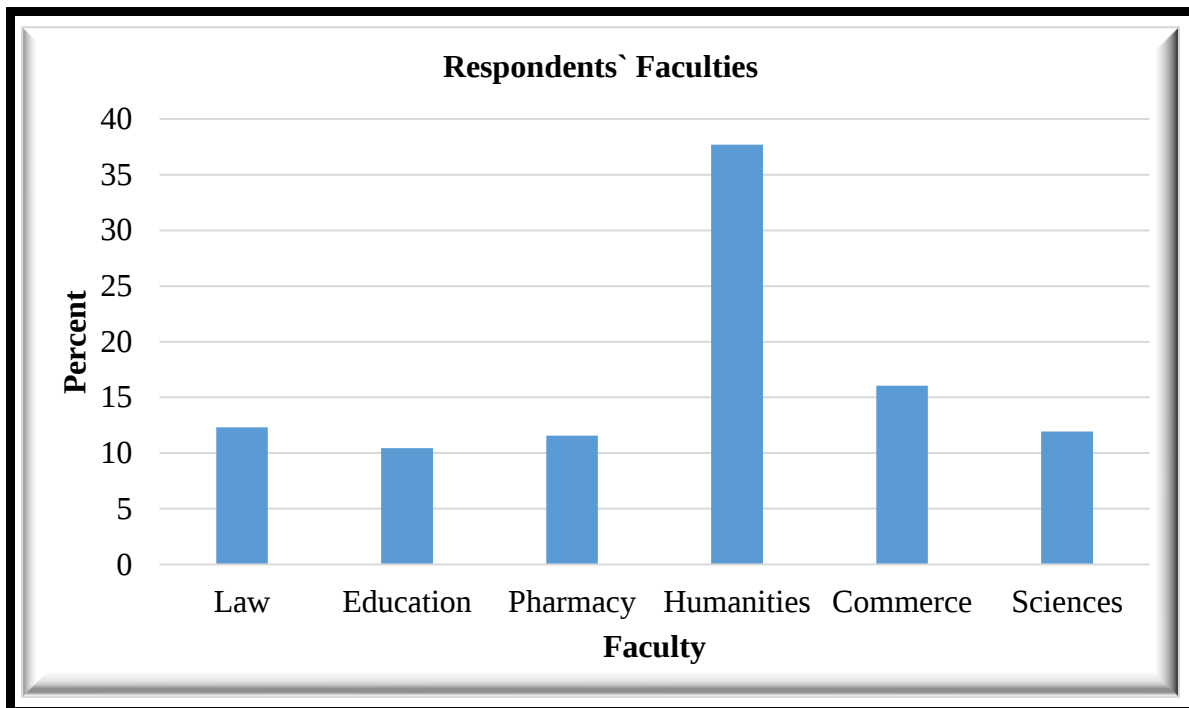


FIGURE 5. 4: RESPONDENTS` FACULTIES

Source: Statistical Analysis

Figure 5.4 visualises the distribution of respondents across faculties. It highlights that the Faculty of Humanities had the highest number of responses, while the Faculty of Education received the fewest. With generally a high number of responses from the Faculty of Humanities, the demographic distribution is reflective of the population of the IHL. Considering the enrolment statistics of the IHL, the above is representative of the student population.

TABLE 5. 5: RESPONDENTS` LEVEL OF STUDY

Current level of study.	Frequency	Percent	Valid Percent	Cumulative Percent
Undergraduate	202	75.4	75.4	75.4
Honours	35	13.1	13.1	88.4
Masters	24	9	9	97.4
PhD	7	2.6	2.6	100
Total	268	100	100	

Source: Statistical Analysis

Table 5.5 presents the respondents` levels of study. Most respondents, 202 individuals, were undergraduates, comprising 75.4% of the total responses. A total of 35 respondents were at the Honours level, representing 13.1% of the responses. There were 24 respondents at the Master`s level, accounting for 9% of the total responses. Lastly, seven respondents were at the PhD level, constituting 2.6% of the responses. This information is visualised in Figure 5.5.

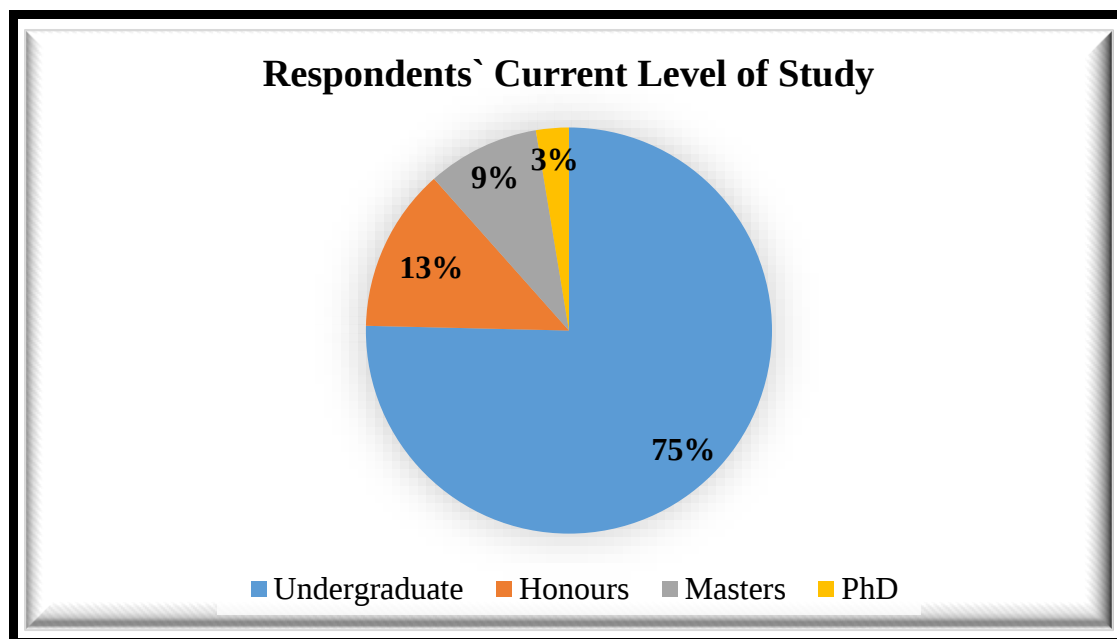


FIGURE 5. 5: RESPONDENTS` LEVEL OF STUDY

Source: Statistical Analysis

Figure 5.5 visually represents the respondents' current levels of study. The graph illustrates that most respondents were undergraduates, while the fewest responses came from those at the PhD level. This distribution is indicative of the population trends where there are more undergraduate students than postgraduates. In line with enrolment statistics of the IHL, the results in Figure 5.5 are reflective of its demographic structure, thus can be inferred to the population.

5.6 DESCRIPTIVE STATISTICS OF THE CONSTRUCTS UNDER STUDY

This section provides an overview of the descriptive statistics for the independent variable, online learning (and its constructs - learner-to-learner interaction, learner-to-instructor interaction, learner-to-content interaction), and their relationship with student satisfaction (expectations and experience). Descriptive statistics serve as the foundation for understanding the central tendencies and variability of the data (Brown et al., 2018). The measures that are being used in this research are the mean and the median, for measures of central tendency and standard deviation, measuring variability for each variable. By examining these statistics, insights into the general patterns of interaction within the research and the degree of variation in student satisfaction levels is unpacked. Additionally, the nature of the relationships between online learning interaction (and its constructs - learner-to-learner interaction, learner-to-instructor interaction, learner-to-content interaction) and student satisfaction with online learning interaction, can be assessed. Dong (2023) postulates that the average mean score is computed by summing all the scores within the dataset and dividing them by the total number of scores. For this research, a 5-point Likert scale was employed with the lowest range being 1 (strongly disagree) to 5 (strongly agree). This therefore settles the accepted mean for this research at 3. The mean scores greater or equal to 3 were maintained for further analysis. Furthermore, for standard deviation, the values within the range of ± 1 are acceptable.

The following subsections detail the descriptive statistics for each of the three constructs of online learning interaction variable - learner-to-learner interaction, learner-to-instructor interaction, and learner-to-content interaction and student satisfaction (expectations and experience), highlighting key trends and providing a summary of their distribution and central tendencies.

5.6.1 Descriptive Statistics for Learner-to-Learner Interaction

An analysis on the descriptive statistics for learner-to-learner interaction was also performed. The results in terms of the central tendency and variability are presented in Table 5.6.

TABLE 5.6: LEARNER-TO-LEARNER INTERACTION DESCRIPTIVE STATISTICS

Item	Mean	Median	Std. Deviation
I felt like I am part of a community of learners in the online courses because of the online interaction I had with other students	3.45	4	1.059
I felt comfortable engaging with other students in the online courses	3.59	4	1.025
The other students were supportive in their interaction with me in the online courses.	3.62	4	0.961
The online interaction I had with other students enhanced my ability to collaborate efficiently with them on group assignments in the online courses.	3.58	4	1.027
Through online peer interaction, I could provide valuable feedback to other students in the online courses.	3.59	4	1.026
My interaction with other students assisted me in creating relationships in the courses.	3.62	4	1.015
My peers valued my suggestions and ideas in the online courses.	3.66	4	0.883
My peers provided different perspectives and ideas in the online courses.	3.75	4	0.858
My online interaction with my peers improved my ability to communicate effectively with them	3.62	4	0.992
Overall, I was satisfied with the interaction that I had with my peers.	3.94	4	1.132

Source: Statistical analysis

Table 5.6 presents descriptive statistics for items related to learner-to-learner interaction construct. The results show the mean, median, and standard deviation results for each item. These provide valuable insights into students' perceptions of their interaction with peers in an online learning environment. The analysis of the results for the items related to online learning interaction with peers reveals a generally positive perception among students, with a few variations in responses.

The mean scores range from 3.45 to 3.94, indicating that students generally felt positively about their interaction with peers in the online courses. The highest mean, 3.94, is for "Overall, I was satisfied with the interaction that I had with my peers," showing strong agreement with the satisfaction of peer interaction. Other items with relatively high means include "My peers valued my suggestions and ideas" (mean = 3.66) and "My peers provided different perspectives and ideas" (mean = 3.75), suggesting that students found their peers' contributions valuable and diverse. The lowest mean score of 3.45, is for "I felt like I am part of a community of learners," indicating a slightly lower perception of being part of a learning community compared to the other aspects of peer interaction, though still above 3 which is the neutral midpoint.

The median for most items is 4, indicating that most students strongly agreed with the statements. This suggests a consensus that the online learning interaction was positive, with a few exceptions where responses showed slightly more diversity. For example, the item "I felt like I am part of a community of learners" had a median of 4, even though it had a lower mean, signalling that while some students felt disconnected, many still agreed with the statement.

The standard deviations range from 0.858 to 1.132, indicating some variability in student responses. Higher standard deviations, such as for "Overall, I was satisfied with the interaction that I had with my peers" (1.132) and "I felt like I am part of a community of learners" (1.059), suggest more diverse opinions about peer interaction. This indicates that while some students were highly satisfied, others may have had less favourable experiences. On the other hand, items like "My peers provided different perspectives and ideas" (0.858) and "My peers valued my suggestions and ideas" (0.883) show lower standard deviations, meaning most students shared similar positive views on these aspects of the interaction with their peers.

Overall, students rated their online peer interaction positively (above neutral), with high satisfaction regarding collaboration and communication. While there were some differences in how students felt about being part of a learning community, the overall trend suggests that the online peer interaction played an important role in their learning experience. The following section presents an analysis of the learner-to-instructor interaction construct.

5.6.2 Descriptive Statistics for Learner-Instructor Interaction

An analysis of the learner-to-instructor interaction element was also done, and the results are presented in Table 5.7.

TABLE 5.7: LEARNER-TO-INSTRUCTOR INTERACTION DESCRIPTIVE STATISTICS

Items	Mean	Median	Std. Deviation
The instructor was knowledgeable about the course content through illustrations, real world examples etc.	3,75	4	0.756
The instructor provided clear supporting explanations to the course content.	3,79	4	0.716
The instructor was able to answer my questions effectively.	3,68	4	0.775
The instructor was approachable, I could communicate with them for further clarity on the course content.	3,65	4	0.847
The instructor was quick to respond to my emails and messages during virtual office hours.	3,4	4	0.961
The instructor provided valuable feedback and guidance on my coursework.	3,71	4	0.802
The instructor offered suggestions on how to improve in areas indicated in their feedback and grading.	3,69	4	0.855
The instructor regularly posted updates and study resources on the online platform, which helped me stay up to date with the courses.	3,7	4	0.861
The instructor consistently promoted online interaction among students through group discussions.	3,6	4	0.892
The instructor made students to actively participate in online class discussions through question-and-answer sessions and student presentations.	3,65	4	0.854
The instructor provided clear expectations for assignments and assessments.	3,76	4	0.75
Overall, I was satisfied with the interaction that I had with my course instructor.	3,93	4	0.946

Source: Statistical Analysis

The descriptive statistics for learner-to-instructor interaction construct is presented in Table 5.7. Generally, it shows positive responses from students, with some variability across different aspects of instructor engagement. The analysis of the items related to instructor effectiveness and interaction in the online courses reveals generally positive perceptions from students, with some variability in responses.

The mean scores for most items range from 3.4 to 3.93, with the highest mean being 3.93 for "Overall, I was satisfied with the interaction that I had with my course instructor." This suggests that students were very satisfied with their overall interaction with the instructor. Other items that received high mean scores include "The instructor provided clear supporting explanations to the course content" (mean = 3.79) and "The instructor was knowledgeable about the course content" (mean = 3.75), indicating that students found the instructor's explanations and expertise to be strong. On the other hand, the lowest mean score, 3.4, was for "The instructor was quick to respond to my emails and messages during virtual office hours," indicating that while students were generally satisfied, there were some concerns regarding the timeliness of instructor responses to communication.

The median for all items is consistently 4, indicating that the majority of students agreed strongly with the statements. This suggests a positive overall perception of the instructor's knowledge, communication, feedback, and promotion of student engagement. However, the consistent 4 median also reflects that while many students were satisfied, there was some variability in individual experiences, especially regarding aspects like instructor responsiveness to emails.

The standard deviations range from 0.716 to 0.961, suggesting some variability in students' responses. Higher standard deviations, such as for "The instructor was quick to respond to my emails and messages during virtual office hours" (0.961) and "Overall, I was satisfied with the interaction that I had with my course instructor" (0.946), indicate that there were differing opinions about the instructor's responsiveness and overall interaction. This variability suggests that while some students were highly satisfied, others may have had a less favourable experience. On the other hand, items like "The instructor was knowledgeable about the course content" (0.756) and "The instructor provided clear supporting explanations to the course content" (0.716) show lower standard deviations, meaning that most students had similar positive views on these aspects of the instructor's performance.

Overall, the students had a positive overall perception of their instructor, especially regarding knowledge, clarity, and feedback. However, some areas, such as response time to emails and overall satisfaction with instructor interaction, showed more variability, indicating that there were a range of experiences among students. Despite these differences, the overall trend suggests

that the instructor was effective in supporting and engaging students in the online learning environment.

5.6.3 Descriptive Statistics for Learner-to-Content Interaction

Under the learner-to-content interaction element, the descriptive statistics that were used to describe data is the mean, mode and standard deviation. Table 5.8 presents the descriptive statistics analysis results for learner-to-content interaction.

TABLE 5. 8: LEARNER-TO-CONTENT INTERACTION DESCRIPTIVE STATISTICS

Item	Mean	Median	Std. Deviation
The course content challenged me to think critically.	3.73	4	0.793
The course content challenged me to apply what I learnt to real world situations.	3.55	4	0.901
The course content was relevant to the learning outcomes.	3.8	4	0.736
The course content was engaging (allowed for roleplaying, had case studies, examples, self-tests etc.) and kept my attention throughout the courses.	3.51	4	0.909
The course content was not overloaded (not too much reading material, not too many tasks/ assessments etc.), thus, manageable.	3.36	4	1.017
The quality of the online reading materials (books, articles, etc) made it easy to engage with the course content.	3.66	4	0.891
The multimedia constructs (videos and audios, etc.) improved my understanding of the course content.	3.74	4	0.759
The course materials (notes, books, videos, audios, etc.) provided enough depth and detail for me to understand the course content.	3.69	4	0.796
The online course content (notes, books, articles, tests, videos, audios etc.) were presented in a clear and organised manner.	3.71	4	0.851
The course materials and content assisted me to successfully complete the course	3.77	4	0.782
The course materials were made available well in advance which made me engage with content before class sessions.	3.41	4	1.061
The course content was conveniently (easily accessible) on the online learning platforms.	3.72	4	0.808
Overall, I was satisfied with the online interaction I had with my course content.	3.86	4	1.046

Source: Statistical Analysis

Table 5.8 presents a summary of the mean, median and standard deviation values for various elements related to learner-to-content interaction construct and its impact on student satisfaction. The results indicate a generally positive perception of the course content, with students showing agreement across all items. The mean scores range from 3.36 to 3.86, with most items scoring above the threshold of 3, signifying a favourable response. Key items such as "The course content was relevant to the learning outcomes" (mean = 3.80), "The multimedia constructs improved my understanding" (mean = 3.74), and "The course materials and content assisted me to successfully complete the course" (mean = 3.77) stand out with relatively high mean values and lower standard deviations. This mean value between 3.50 to 3.80 suggests that student satisfaction was above "neutral" (and close to "agree"). This consistent trend reflects a general agreement with the course content's effectiveness and relevance, contributing to their satisfaction with the online learning experience. Overall, students had a positive learner-to-learner interaction experience.

The medians for most items are 4, indicating that a large proportion of students rated these items highly, demonstrating strong agreement with the statements. Even in cases where there was variability in responses, such as "The course content was not overloaded" and "The course materials were made available well in advance," the central tendency remains positive, with the median score reinforcing the overall favourable assessment.

The standard deviations range from 0.736 to 1.061, which reflects some variability in students' responses. Higher standard deviations, such as those seen for items like "The course materials were made available well in advance" (1.061) and "The course content was not overloaded" (1.017), suggest that students had more diverse opinions on these aspects. This variability indicates that while some students were satisfied with how the materials were made available or the manageability of the course workload, others felt differently. In contrast, items like "The course content challenged me to think critically" (0.793) and "The multimedia constructs improved my understanding" (0.759) show relatively lower standard deviations, indicating that most students had similar views on these constructs, which they generally found beneficial to their learning.

Overall, the analysis suggests that students had a positive perception of the course content and its impact on their learning outcomes. Despite some variability, particularly in aspects related to

workload and material availability, the general trend reflects a high level of satisfaction with learner-to-content interaction.

5.6.4 Descriptive Statistics for Student Satisfaction

In addition to the descriptive statistics of the independent variable presented in the previous sections, this section presents the descriptive statistics results for the dependent variable- student satisfaction (expectations and experience). A key approach taken in this section is comparing student expectations to their experience. This addressed the research gap- where paltry research compared student expectations to their experience. Table 5.9 illustrates the descriptive statistics.

TABLE 5. 9: DESCRIPTIVE STATISTICS FOR STUDENT SATISFACTION

Items	Mean	Median	Std. Deviation
The online course design (content and materials) met my expectations.	3.58	4	0.843
The quality of the online course content (reading materials) met my expectations.	3.67	4	0.795
The clarity of the online course content (notes, books, articles, tests, videos, audios etc.) met my expectations.	3.64	4	0.885
The accessibility of the online course content (through multimodal constructs) met my expectations.	3.64	4	0.883
The interaction that I had with my peers through group discussions met my expectations.	3.62	4	0.968
The interaction frequency I had with my peers met my expectations.	3.59	4	1.017
The ability to reach out to my peers (formally and informally) in the online learning courses met my expectations.	3.65	4	1.065
The group dynamics (support, respect, feedback) in the online learning courses met my expectations.	3.63	4	1.037
The instructor`s provision of timely feedback met my expectations.	3.46	4	0.941
The instructors` support that I received in the online courses met my expectations.	3.71	4	0.847
The instructors` pedagogical skills (presentation, interaction knowledge etc.) in delivering the online course content met my expectations.	3.81	4	0.801
The instructors` approachability met my expectations.	3.79	4	0.889

Source: Statistical Analysis

The descriptive statistics in Table 5.9 highlight the relationship between online learning interaction (and its constructs - learner-to-learner interaction, learner-to-instructor interaction,

learner-to-content interaction) and student satisfaction (comparing expectations and experience). Overall, the results indicate positive feedback across various aspects of the online learning experience, affirming that students' expectations were largely met.

The course design (content and materials) and quality of the reading materials received positive ratings with means of 3.58 and 3.67, respectively. Both had a median of 4, indicating that most students were satisfied. The standard deviations (0.843 and 0.795) show moderate variability in responses. The clarity and accessibility of the course content (notes, tests, videos, etc.) were also rated positively with a mean of 3.64 for both items. The median of 4 shows high satisfaction, while the standard deviations (0.885 and 0.883) suggest some variation in experiences.

Peer interaction received mostly positive ratings across several aspects. The interaction through group discussions (mean = 3.62), interaction frequency (mean = 3.59), and ability to reach out to peers (mean = 3.65) all had medians of 4, suggesting a general agreement that these aspects met students' expectations. However, the standard deviations (ranging from 0.968 to 1.065) indicate variability in experiences, with some students possibly feeling less engaged or satisfied. The group dynamics (referring to peer interaction such as support, respect, and feedback) were also positively rated with a mean of 3.63 and a median of 4. The standard deviation of 1.037 suggests there was some variation in how students perceived the dynamics within their peer groups. While most students were satisfied, there might have been a few who experienced challenges in peer collaboration or support.

Instructor feedback (timeliness) and support were rated positively but with slightly lower satisfaction compared to peer-related aspects. The mean for timely feedback was 3.46, and for instructor support, 3.71. Both had medians of 4, indicating that most students were satisfied, though timely feedback had a lower mean and a standard deviation of 0.941, suggesting room for improvement in this area. Instructor pedagogical skills (mean = 3.81) and approachability (mean = 3.79) received the highest satisfaction scores, with medians of 4. These aspects were strongly rated, and the relatively low standard deviations (0.801 and 0.889) indicate a high level of consistency in positive responses.

The interaction that the students had with their course content, peers and instructors generally met their expectations. However, enhancing peer interaction and providing more timely feedback

could further improve student satisfaction with online learning. The following section analyses the validity and reliability of the questionnaire that was used to measure the different constructs of the research.

5.7 VALIDITY AND RELIABILITY OF THE MEASURING INSTRUMENT

Chapter Four provided a theoretical discussion of the three types of validity namely, face, content and construct validity. A pilot study was employed to test the content validity. Lastly, the construct validity was tested using the CFA measure which is discussed in the following subsection.

5.7.1 Validity and Reliability of the Independent Variable

The research ensured face validity through discussions with experts in the field namely, the supervisor and one of the marketing research lecturers. This evaluation ensured that there were no question ambiguities, the questions were clear and relevant to the research. The content validity was evaluated through engaging in a pilot study on six students at the institution. Construct validity was measured using CFA.

The data was deemed suitable to perform the CFA analysis. Three factors were extracted using Principal Axis Factoring (PAF) with a minimum factor loading of 0.7. Below are the CFA results for this research's independent variable and its constructs:

- Online learning interaction = 0.963
- Factor 1 (learner-to-learner interaction) = 0.958.
- Factor 2(learner-to-instructor interaction) =0.943.
- Factor 3 (learner-to-content interaction) =0.937.

The CFA results are above the minimum of 0.7, this confirms that all the constructs were valid. Questions that formed each factor structure were reviewed and labelled as shown in Tables 5.11-5.13. The validity and reliability results of each variable, based on the CFA and Cronbach's alpha coefficients, are presented in the ensuing sections.

5.7.2.1 Validity and Reliability of Learner-to-learner Interaction: Factor 1

The validity and reliability of learner-to-learner interaction was analysed and the results are presented in Table 5.10.

TABLE 5. 10: FACTOR 1: LEARNER-TO-LEARNER INTERACTION

Cronbach`s alpha	0.922
Item	Factor 1
I felt like I am part of a community of learners in the online courses because of the online interaction I had with other students	0.849
I felt comfortable engaging with other students in the online courses	0.825
The other students were supportive in their interaction with me in the online courses.	0.769
The online interaction I had with other students enhanced my ability to collaborate efficiently with them on group assignments in the online courses.	0.875
Through online peer interaction, I could provide valuable feedback to other students in the online courses.	0.883
My interaction with other students assisted me in creating relationships in the courses.	0.884
My peers valued my suggestions and ideas in the online courses.	0.816
My peers provided different perspectives and ideas in the online courses.	0.829
My online interaction with my peers improved my ability to communicate effectively with them	0.720
Overall, I was satisfied with the interaction that I had with my peers.	0.842

Source: Statistical Analysis

Table 5.10 displays the analysis results for the validity and reliability of learner-to-learner interaction.

The validity of the instrument was measured by the factor loading output. All the ten items have factor loadings above 0.7, which is the typical threshold for good validity (Almusharraf and Khahro, 2020). This indicates that each item is strongly associated with the underlying construct of learner-to-learner interaction. The factor loadings for most items such as “I felt comfortable engaging with other students in the online courses”, “Through online peer interaction, I could provide valuable feedback to other students in the online courses”, are well above 0.8, suggesting these items are very effective at measuring the construct. Some items like “My interaction with other students assisted me in creating relationships in the courses” and “My online interaction with my peers improved my ability to communicate effectively with them”, have particularly high loadings, indicating that they are strong indicators of the learner-to-learner interaction construct. Lastly, one item had the lowest factor loading of 0.720, but it still exceeds the 0.7 threshold, meaning it remains a valid contributor to the overall measure, though it might be slightly less central to the construct compared to other items.

The reliability test yielded a Cronbach's alpha of 0.922, demonstrating excellent internal consistency. This high Cronbach's alpha value indicates that the items are highly reliable and consistently assess the same construct -learner-to-learner interaction in online learning environments.

Overall, the factor loadings of all the ten items demonstrated a good validity, with items being well-correlated to the construct of learner-to-learner interaction. The high loadings, for example, 0.912 show that most items are strong and accurate measures, while Item 9 (0.720) is still valid, but slightly weaker compared to others.

The next section presents the analysis results for another online learning interaction variable-learner-to-instructor interaction.

5.7.2.2 Validity and Reliability of Learner-to-instructor Interaction: Factor 2

Further to the two online learning interaction constructs presented in the previous sections, a validity and reliability test was also performed on the learner-to-instructor interaction variable. To assess validity, the focus was on the factor loadings for each item, which indicate how strongly each item relates to the underlying construct—student satisfaction with online learning interaction. The loadings were categorised as strong, moderate, or low, based on their values. The results of the analysis are presented in Table 5.11.

TABLE 5. 11: FACTOR 2: LEARNER-TO-INSTRUCTOR INTERACTION

Cronbach`s alpha	0.910
Item	Factor 2
The instructor was knowledgeable about the course content through illustrations, real world examples etc.	0.631
The instructor provided clear supporting explanations to the course content.	0.688
The instructor was able to answer my questions effectively.	0.756
The instructor was approachable, I could communicate with them for further clarity on the course content.	0.742
The instructor was quick to respond to my emails and messages during virtual office hours.	0.651
The instructor provided valuable feedback and guidance on my coursework.	0.721
The instructor offered suggestions on how to improve in areas indicated in their feedback and grading.	0.727
The instructor regularly posted updates and study resources on the online platform, which helped me stay up to date with the courses.	0.642
The instructor consistently promoted online interaction among students through group discussions.	0.745
The instructor made students to actively participate in online class discussions through question-and-answer sessions and student presentations.	0.581
The instructor provided clear expectations for assignments and assessments.	0.848
Overall, I was satisfied with the interaction that I had with my course instructor.	0.768

Source: Statistical Analysis

Table 5.11 presents the validity and reliability analysis results for learner-to-instructor interaction.

Most of the items demonstrated moderate to strong factor loading (minimum 0.70), supporting their relevance in assessing the construct of learner-to-instructor interaction. Notably, items such as "The instructor offered suggestions on how to improve in areas indicated in their feedback and grading" (0.727), "The instructor was able to answer my questions effectively" (0.756), and "The instructor provided clear expectations for assignments and assessments" (0.848) have relatively high factor loadings, indicating they are key indicators of effective instructor interaction. However, a few items had lower loading s below 0.7, such as "The instructor made students actively participate in online class discussions through question-and-answer sessions and student presentations" (0.581) and "The instructor was knowledgeable about the course content through illustrations, real-world examples, etc." (0.631) were dropped.

The results also suggest that the scale used to assess instructor interaction in the course has strong internal consistency, as indicated by a Cronbach's alpha of 0.910. This high value reflects the reliability of the items in measuring a consistent construct. Of the twelve items, nine were retained since they are above the minimum acceptable 0.7 and five items were declined.

The instrument overall, shows strong validity and reliability in assessing instructor interaction, though the items with lower factor loadings may require further analysis or adjustment to improve their contribution to the overall construct. The following section presents the CFA results for the dependent variable-student satisfaction.

5.7.2.3 Validity and Reliability of Learner-to-content Interaction: Factor 3

The validity and reliability results for the independent variable, learner-to-content interaction, are presented in Table 5.12.

TABLE 5. 12: FACTOR 3: LEARNER-TO-CONTENT INTERACTION

Cronbach's alpha	0.959
Item	Factor 3
The course content challenged me to think critically.	0.601
The course content challenged me to apply what I learnt to real world situations.	0.595
The course content was relevant to the learning outcomes.	0.663
The course content was engaging (allowed for roleplaying, had case studies, examples, self-tests etc.) and kept my attention throughout the courses.	0.681
The course content was not overloaded (not too much reading material, not too many tasks/ assessments etc.), thus, manageable.	0.563
The quality of the online reading materials (books, articles, etc) made it easy to engage with the course content.	0.662
The multimedia constructs (videos and audios, etc.) improved my understanding of the course content.	0.649
The course materials (notes, books, videos, audios, etc.) provided enough depth and detail for me to understand the course content.	0.724
The online course content (notes, books, articles, tests, videos, audios etc.) were presented in a clear and organised manner.	0.808
The course materials and content assisted me to successfully complete the course	0.673
The course materials were made available well in advance which made me engage with content before class sessions.	0.617
The course content was conveniently (easily accessible) on the online learning platforms.	0.583
Overall, I was satisfied with the online interaction I had with my course content.	0.764

Source: Statistical Analysis

Table 5.12 presents the results of the reliability and validity analysis for the survey instrument. Initially, thirteen items were developed to measure learner-to-content interaction. Of the factor loadings only three factors loaded with a minimum factor loading of 0.7. Learner-to-content interaction questions have shown a lower validity and reliability compared to the other two. Contrary to previous researchers such as Su and Guo (2021), this research shows that most of the factors are less effective in measuring learner-to-content interaction construct.

Items such as “The course materials (notes, books, videos, audios, etc.) provided enough depth and detail for me to understand the course content” (0.724), and “The online course content (notes, books, articles, tests, videos, audios, etc.) were presented in a clear and organised manner” (0.808) have high factor loadings. These items are strongly valid measures of the construct, suggesting they are highly relevant to students` satisfaction with online learning interaction.

Items, such as “The course content was conveniently (easily accessible) on the online learning platforms” (0.583) and “The course materials were made available well in advance, which made me engage with content before class sessions” (0.617). While these items still demonstrate reasonable validity, their association with the core construct of student satisfaction is somewhat weaker. As such the research declined them as highlighted in Gray in Table 5.12 since they are below 0.7.

Overall, the survey instrument is reliable and generally valid in measuring learner-to-content interaction. However, most items are closer to 0.7 and could be improved to better align with the main construct.

The reliability of the survey instrument was assessed using Cronbach`s alpha, which measures the internal consistency of the items. With a Cronbach`s alpha value of 0.959, the instrument demonstrates excellent internal consistency. Typically, a value above 0.7 indicates that the items are reliably measuring the same construct (Moqbel and Amirah, 2022). In this case, the high value confirms that the instrument is highly reliable in assessing student satisfaction with online learning interaction, ensuring that responses across the items are consistent and dependable.

5.7.3 Validity and Reliability of Student Satisfaction

The student satisfaction variable incorporates a comparison of two constructs namely, student expectations and student experience. The CFA value for construct validity of student satisfaction was 0.822. This indicates that the instrument was valid. The validity and reliability of the dependent variable- student satisfaction is presented in Table 5.13.

TABLE 5. 13: VALIDITY AND RELIABILITY OF STUDENT SATISFACTION FACTORS

Cronbach`s alpha	0.903
Item	Factor
The interaction that I had with my peers through group discussions met my expectations.	0.898
The interaction frequency I had with my peers met my expectations.	0.902
The ability to reach out to my peers (formally and informally) in the online learning courses met my expectations.	0.899
The group dynamics (support, respect, feedback) in the online learning courses met my expectations.	0.849
The instructor`s provision of timely feedback met my expectations.	0.858
The instructor support that I received in the online courses met my expectations.	0.757
The instructors` pedagogical skills (presentation, interaction knowledge etc.) in delivering the online course content met my expectations.	0.838
The instructors` approachability met my expectations.	0.790
The online course design (content and materials) met my expectations	0.786
The quality of the online course content (reading materials) met my expectations.	0.803
The clarity of the online course content (notes, books, articles, tests, videos, audios etc.) met my expectations.	0.839
The accessibility of the online course content (through multimodal constructs) met my expectations.	0.734

Source: Statistical Analysis

Table 5.13 presents the reliability and validity results for the dependent variable- student satisfaction.

The construct validity of the instrument was measured using CFA by looking at the factor loadings for each item. Of the twelve items, all of them were accepted since they are above the minimum factor loading of 0.7. this shows that these factors effectively measure the dependent variable- student satisfaction (expectations and experience).

Most of the items exhibit high correlations with the factor, indicating their relevance in assessing various aspects of student satisfaction. Items such as "The interaction frequency I had with my peers met my expectations" (0.902) and "The instructor's provision of timely feedback met my expectations" (0.858) and "The clarity of the online course content (notes, books, articles, tests, videos, audios etc.) met my expectations" (0.839) show particularly strong loadings, highlighting the importance of peer interaction, instructor feedback and course content clarity in the online learning environment.

The results show a strong internal consistency, with a Cronbach's alpha of 0.903. This high value suggests that the items are reliably measuring a consistent construct related to student satisfaction with online learning interaction.

Overall, the instrument demonstrates both high reliability and validity, with items showing strong alignment to the student satisfaction variable. The following section presents the correlation analysis results of the independent and dependent variables.

5.8 INFERENCE ANALYSIS

As stated in Chapter Four, this section presents findings on the inferential analysis of the research. It relies on two techniques namely, Pearson's correlation and regression analysis. These two techniques were employed to draw conclusions and make inferences of the findings from the sample to the population of the research.

5.8.1. Pearson's Correlation Coefficients

The strength and direction of relationships between constructs were assessed using correlation analysis tools (Hair et al., 2019). To identify significant relationships among the factors in the study, correlation coefficients were calculated based on the factor scores. Before interpreting these coefficients, it is important to first confirm that the relationships are statistically significant. Once significance is established, the direction (positive or negative) and strength of the relationships can be evaluated. After determining the statistical significance and direction, the strength of the relationships was assessed using the correlation coefficient values. The interpretation guidelines for Pearson's correlation coefficients are outlined in Table 5.14.

TABLE 5. 14: CORRELATION COEFFICIENTS INTERPRETATION GUIDELINE

Correlation coefficient value	Strength	Direction
$0 = r$	None	None
$r < 0.3$	Weak	Positive
$0.3 < r < 0.5$	Medium	Positive
$0.5 < r < 0.8$	Strong	Positive
$0.8 < r < 1.0$	Very strong	Positive

Source: Adapted from Hair `et al. (2019)

In line with the hypotheses that were formulated for the study, Pearson`s correlation coefficients were calculated as presented in Table 5.15. The items with low factor loadings were excluded from the computation of Pearson`s correlation coefficients.

TABLE 5. 15: PEARSON`S CORRELATION COEFFICIENTS` RESULTS

Correlations				
Variable	Learner-to-learner interaction	Learner-to-instructor interaction	Learner-to-content interaction	Student Satisfaction
Learner-to-learner interaction	1			
Learner-to-instructor interaction	0.438**	1		
Learner-to-content interaction	0.379**	0.510**	1	
Student Satisfaction	0.703**	0.703**	0.616**	1

Correlation is significant at the 0.01 level (2-tailed).

Source: Statistical Analysis

The correlation analysis results revealed in Table 5.15 show that the relationships between the different constructs were statistically significant, and all significant relationships were positive.

The relationship between learner-to-learner interaction and learner-to-instructor interaction shows that there is a moderate positive correlation of 0.438 ($p < 0.01$). This suggests that as the level of interaction between learners increases the level of interaction between learners and instructors also tends to increase. The learner-to-learner interaction and learner-to-content

interaction correlation coefficient of 0.379 ($p < 0.01$) is moderate and positive, indicating that increased interaction between learners is associated with higher interaction with course content. Learner-to-learner interaction and Student Satisfaction have a strong and positive correlation of 0.703 ($p < 0.01$). This implies that greater interaction among learners is strongly associated with higher levels of student satisfaction.

There is a moderate positive correlation of 0.510 ($p < 0.01$) between learner-to-instructor interaction and learner-to-content interaction. This suggests that higher interaction with instructors is related to greater interaction with the course content. On the other hand, there exists a correlation of 0.703 ($p < 0.01$) between learner-to-instructor interaction and student satisfaction. This is strong and positive, indicating that increased interaction with instructors is strongly linked to higher student satisfaction.

The correlation between learner-to-content interaction and student satisfaction is 0.616 ($p < 0.01$). It is moderate and positive, suggesting that as interaction with the course content increases, so does student satisfaction.

All the correlations between constructs are positive and statistically significant, with learner-to-learner interaction showing the strongest relationship with student satisfaction. These results suggest that increasing interaction among learners, instructors, and course content can lead to higher levels of student satisfaction.

5.8.2. Regression Analysis

This section presents the results of the regression analysis conducted for this research. Findings related to multicollinearity, the regression results, and the ANOVA test were referred to. Each of these components plays a crucial role in understanding the relationships between the independent and the dependent variables, as well as in evaluating the overall significance and validity of the independent and dependent variables.

5.8.2.1. Multicollinearity Analysis

Firstly, an assessment of multicollinearity among the constructs was conducted to ensure the accuracy and reliability of the regression analysis. Multicollinearity can distort the estimation of regression coefficients and inflate standard errors, leading to unreliable results (Shrestha, 2020).

To detect potential multicollinearity, two common diagnostic measures were employed, namely, the Variance Inflation Factor (VIF) and the Tolerance level. The VIF quantifies how much the variance of a regression coefficient is inflated due to the linear relationship between the independent constructs. A VIF value greater than 10 is often considered indicative of high multicollinearity, signalling that the predictor constructs are highly correlated with each other (Shrestha, 2020; Tsagris and Pandis, 2021). On the other hand, the Tolerance level is the reciprocal of the VIF and indicates the proportion of the variance in a predictor variable that is not explained by the other predictors. A Tolerance level below 0.1 suggests that a variable is highly collinear with other predictors in the model (Tsagris and Pandis, 2021). The multicollinearity results for the independent constructs included in the research are summarised in Table 5.16.

TABLE 5. 16: RESULTS FOR MULTICOLLINEARITY

Model	Constructs	Collinearity Statistics	
		Tolerance	VIF
	Learner-to-learner interaction	0.775	1.29
	Learner-to-instructor interaction	0.67	1.493
	Learner-to-content interaction	0.71	1.408

Source: Statistical Analysis

For this study, the VIF values were found to be consistently and significantly lower than 10 (ranging from 1.29 to 1.408), and the Tolerance levels were above the threshold of 0.1 for all the independent constructs, (ranging from 0.67 to 0.775). These results suggest that there is low multicollinearity among the constructs, and thus, the regression analysis is unlikely to be skewed by multicollinearity issues. These findings support the validity of the regression model, as the lack of significant multicollinearity ensures that the relationships between the predictors and the dependent variable can be interpreted accurately without interference from redundant predictors. The following section presents the regression analysis results.

5.8.2.2. Regression Analysis of relationships between the independent variable and the dependent variable

A pre-condition for regression analysis was that the assumptions mentioned in Chapter Four were supposed to be met. The data matches all these assumptions. Also, the multicollinearity indicates that the three constructs are exclusive of each other. Therefore, a linear regression

analysis was conducted to assess the relationship between the independent variable (and its constructs) and the dependent variable. The regression analysis results provided valuable insights into the strength and direction of the relationships between these independent constructs and the dependent variable (Knapp, 2019). Each predictor's coefficient estimates, t-values, and p-values were carefully examined. To establish statistical significance, a p-value below the conventional threshold of 0.05 was required for a variable to be considered a significant predictor (Knapp, 2019). This helped to ensure that any relationships observed are not due to random chance. Additionally, the R-squared value of the model was evaluated to understand how well the independent constructs collectively explained the variance in student satisfaction. A higher R-squared value indicates a greater proportion of the variance is accounted for by the model (Tsagris, and Pandis, 2021). The results of the regression analysis, including the coefficients, t-values, p-values, and R-squared value, are presented in Table 5.17.

TABLE 5. 17: REGRESSION ANALYSIS MODEL

Dependent variable- Student satisfaction		R-square value=0.733	
Independent Constructs	Beta (b)	t-value	Sig. (p)
Learner-to-learner interaction	0.33	12.174	<0.001
Learner-to-instructor interaction	0.395	9.77	<0.001
Learner-to-content interaction	0.27	6.769	<0.001

Source: Statistical Analysis

The regression analysis in Table 5.17, indicates that the hypothesised model's R-squared value is 0.733, meaning that approximately 73.3% of the variance in student satisfaction is explained by the constructs of the independent variable- learner-to-learner interaction, learner-to-instructor interaction, and learner-to-content interaction. This suggests a strong fit, as the predictors collectively explain a substantial portion of the variance in student satisfaction.

The Beta-value for learner-to-learner interaction is 0.33, meaning that for each one-unit increase in learner-to-learner interaction, student satisfaction is predicted to increase by 0.33 units, assuming all other constructs remain constant. This positive relationship indicates that increased interaction among learners is associated with higher student satisfaction. The t-value for learner-to-learner interaction is 12.174, a large value indicating that this predictor is statistically

significant. Furthermore, the p-value is < 0.001 , well below the 0.05 threshold, confirming that learner-to-learner interaction is a highly significant predictor of student satisfaction.

The Beta-value for learner-to-instructor interaction is 0.395, indicating that for each one-unit increase in interaction with instructors, student satisfaction is predicted to increase by 0.395 units, assuming all other constructs remain constant. This suggests that greater engagement with instructors leads to higher student satisfaction. The t-value of 9.77 further supports the significance of this relationship, as it is quite large, showing a meaningful connection between this construct and student satisfaction. The p-value for learner-to-instructor interaction is also < 0.001 , confirming that this variable is highly significant in predicting student satisfaction.

The Beta-value for learner-to-content interaction is 0.27, indicating that for each one-unit increase in interaction with course content, student satisfaction is predicted to increase by 0.27 units, assuming all other constructs remain constant. While this suggests that content interaction also positively influences student satisfaction, the effect is somewhat smaller compared to interaction with peers and instructors. The t-value of 6.769, although lower than those for learner-to-learner and learner-to-instructor interaction, is still large enough to indicate statistical significance. Additionally, the p-value is < 0.001 , which confirms that learner-to-content interaction is a significant predictor of student satisfaction.

Overall, the results of the regression analysis demonstrate that the hypothesised model is a good fit for the data and that all three constructs of the independent variable—learner-to-learner interaction, learner-to-instructor interaction, and learner-to-content interaction—are statistically significant predictors of student satisfaction. The following section presents the results of the ANOVA test.

5.8.3 Analysis of Variance (ANOVA) Test

To evaluate the overall significance of the regression model, an ANOVA test was performed. The ANOVA test assessed whether there are significant differences between the model's predicted values and the actual values of the dependent variable. The ANOVA test results for this research are presented in Table 5.18.

TABLE 5. 18: ANALYSIS OF VARIANCE (ANOVA) TEST

ANALYSIS OF VARIANCE						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	80.084	3	26.695	241.626	<0.001b
	Residual	29.166	264	0.11		
	Total	109.25	267			
Dependent Variable: Student Satisfaction						
Predictors: (Constant), Learner-to-content interaction, Learner-to-learner interaction, Learner-to-instructor interaction						

Source: Statistical Analysis

In this analysis, the ANOVA results showed a statistically significant F-statistic, indicating that at least one of the constructs of the independent variable is significantly related to the dependent variable. Additionally, the p-value associated with the ANOVA test was found to be <0.001 which is less than 0.05, confirming that the regression model is significant. This suggests that the model fits the data well and provides meaningful insights into the relationship between the predictors and the outcome.

5.9 HYPOTHESIS TESTING

The hypothesised model for this research was presented in Figure 1.1. According to the model, online learning interaction variable (and its constructs- learner-to-learner interaction, learner-to-instructor interaction and learner-to-content interaction) is statistically significantly related to student satisfaction (expectations and experience). By employing Pearson's correlation coefficients analysis, this research rigorously tests and confirms/ decline the hypothesis depending on the strength and validity of the hypothesised relationships. The following subsections present the results from the Pearson's correlation highlighting the identification of the most appropriate model for this research and providing insights into the strength and direction of the interaction that contribute to student satisfaction.

5.9.1 Testing the Hypothesised Model Based on Pearson's Correlation Coefficients Results

The decision to either accept or reject the hypothesised model is outlined in Table 5.19, with the basis for this decision being the Pearson's correlation coefficient values. These values provided insights into the strength and direction of the relationships between the independent and dependent constructs, helping to determine the model's validity. Positive and significant correlation coefficients support the retention of the hypothesised model, while weaker or

insignificant correlation coefficients may prompt rejection or revision of specific components. Table 5.19 summarises these findings and explains the rationale behind the final decision regarding the model's acceptance.

TABLE 5. 19: HYPOTHESISED MODEL TESTING-PEARSON'S CORRELATION

Hypothesis	Independent Variable	Dependent Variable	Acceptable Outcome	Actual Outcome	Decision (Reject/Accept Hypothesis)
H ¹	Online learning interaction	Student satisfaction	0.5	0.70 (Strong, Positive)	Accept
H ^{1a}	Learner-to-learner interaction	Student satisfaction	0.5	0.703 (Strong, Positive)	Accept
H ^{1b}	Learner-to-instructor interaction	Student satisfaction	0.5	0.703 (Strong, Positive)	Accept
H ^{1c}	Learner-to-content interaction	Student satisfaction	0.5	0.616 (Strong, Positive)	Accept

Source: Researcher's construction

Table 5.19 summarises the decision-making process regarding the acceptance or rejection of hypotheses, based on the strength and direction of the relationships between the independent constructs and the dependent variable, using Pearson's correlation coefficients results.

Overall, H¹ has a correlation of 0.7. This demonstrates a strong and positive relationship between online learning interaction and student satisfaction. The decision to accept H^{1a} is driven by a correlation value of 0.703, which indicates a strong and positive relationship between learner-to-learner interaction and student satisfaction. This high correlation suggests that as learner-to-learner interaction increase, student satisfaction also improves significantly. Similarly, H^{1b} is also accepted, based on a correlation value of 0.703, indicating a strong and positive relationship between learner-to-instructor interaction and student satisfaction. This implies that increased interaction with instructors is strongly associated with higher student satisfaction levels in online learning environments. Finally, H^{1c} is accepted because its correlation value of 0.616 surpasses the threshold of 0.5, signifying a strong and positive relationship between learner-to-content interaction and student satisfaction. This result demonstrates that the more engaging and

interactive the content is, the greater the level of student satisfaction. The hypothesised model is reproduced in Figure 5.6.

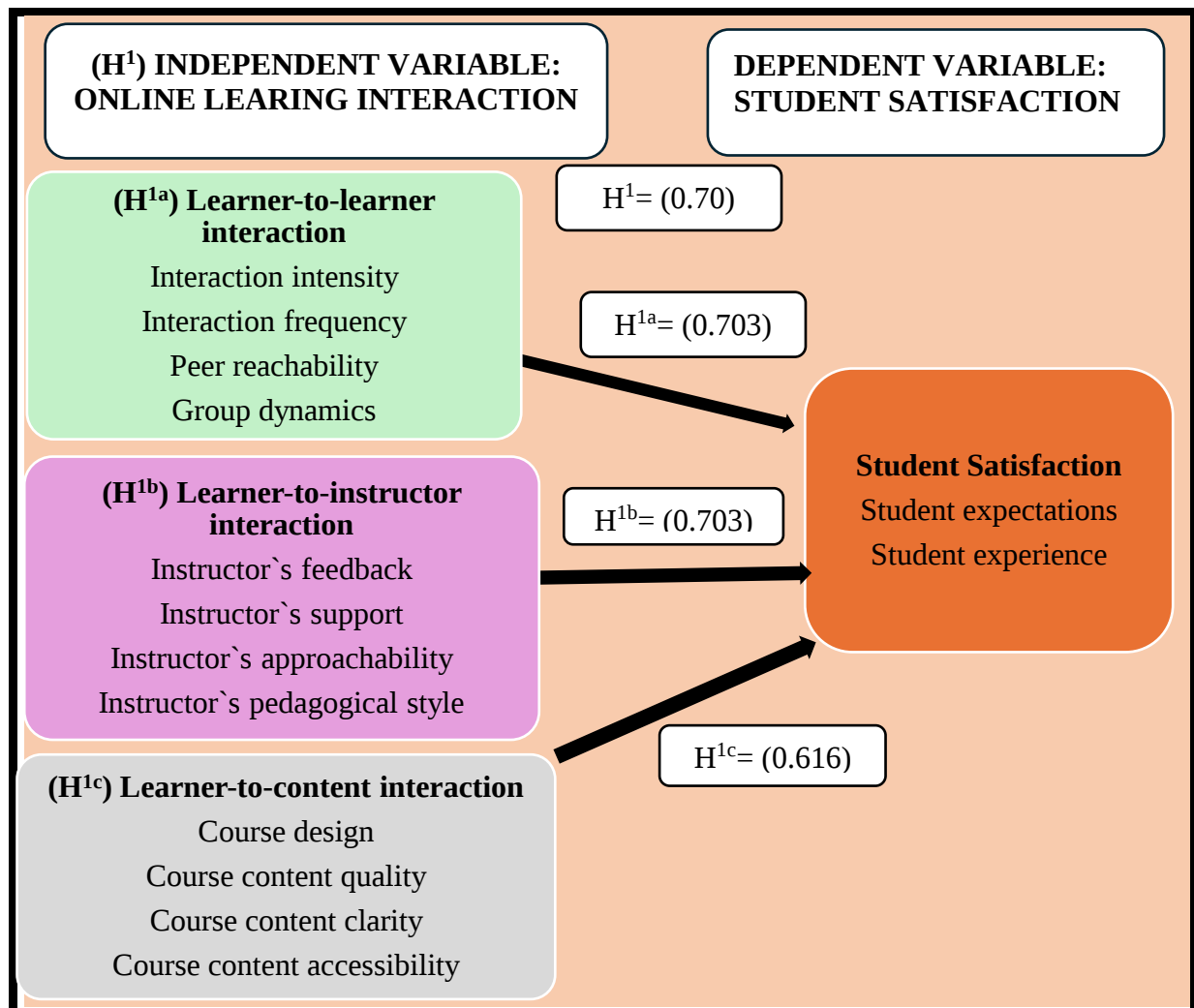


FIGURE 5. 6: REPRODUCED HYPOTHESISED MODEL

Source: Researcher's Construction

Based on the Pearson's correlation coefficient values, which indicate a positive and strong relationship between online learning interaction and student satisfaction, the hypothesised model is confirmed. Additionally, all the constructs of the independent variable exhibit high and strong factor loadings, further supporting the model's validity. Therefore, these items contribute meaningfully to the model and are included, thus, reinforcing the robustness of the hypothesised model.

The following subsection tests the hypothesised model based on the regression analysis results

5.9.2 Testing the Hypothesised Model Based on Regression Analysis Results

Building upon the hypothesised model testing discussed in the previous subsection, this subsection presents the decision to accept or reject the hypothesised model based on the results of the regression analysis. In determining these decisions, the key criterion for acceptance is that the p-value must be less than 0.05, indicating a statistically significant relationship between the constructs. When the p-value is below this threshold, it suggests strong evidence to support the hypothesised model. Conversely, values above 0.05 would imply insufficient evidence, leading to the rejection or revision of the model. Table 5.20 summarises the acceptance or rejection decisions, based on the regression analysis results.

TABLE 5. 20: HYPOTHESISED MODEL TESTING- REGRESSION ANALYSIS

Hypothesis	Independent Constructs	Acceptable p-value Outcome	Actual p-value Outcome	Accepted /Rejected
H1	Online learning interaction	<0.05	<0.001	Accepted
H1a	Learner-to-learner interaction	<0.05	<0.001	Accepted
H1b	Learner-to-content interaction	<0.05	<0.001	Accepted
H1c	Learner-to-instructor interaction	<0.05	<0.001	Accepted

Source: Statistical Analysis

Table 5.20 above presents the results of the regression analysis, which were used to determine whether to accept or reject the hypothesised model. The p-values for the independent variable, online learning interaction (and constructs- learner-to-learner interaction, learner-to-content interaction, and learner-to-instructor interaction) are all less than 0.001, which is well below the threshold of $p < 0.05$. This indicates that the independent variable (and its constructs) has a statistically significant influence on the dependent variable, student satisfaction. Given these findings, the conclusion is that there is strong evidence to support the relationships proposed in the model. As a result, H^1 , H^{1a} , H^{1b} , and H^{1c} were accepted. This confirms that there is a significant and positive relationship between online learning interaction (and its constructs- learner-to-learner, learner-to-content, and learner-to-instructor interaction) student satisfaction (expectations and experience). The following section presents a summary of the hypothesis testing results and the final model for the research.

5.10 SUMMARY OF THE HYPOTHESIS TESTING RESULTS AND FINAL MODEL

The outcome of each hypothesis can be evaluated in three possible ways: it may be rejected if the results contradict the proposed hypothesis, accepted if the findings align with the expectations outlined in the hypothesis, or the judgment may be withheld if the results are unclear or inconclusive (Hair et al., 2021). These decisions are based on the strength of the evidence, the statistical significance of the results, and their alignment with the theoretical framework guiding the research (Memon et al., 2020). In this study, the empirical findings provide a clear direction for evaluating the hypotheses. Table 5.21 summarises the outcomes of the hypotheses based on these criteria, highlighting whether each hypothesis was accepted, rejected, or if further analysis is needed.

TABLE 5. 21: SUMMARY OF THE HYPOTHESIS TESTING RESULTS

Hypothesis	Outcome
H ¹ : There is a statistically significant relationship between online learning interaction and student satisfaction.	Accepted
H ^{1a} : There is a statistically significant relationship between online learner-to-learner interaction and student satisfaction.	Accepted
H ^{1b} : There is a statistically significant relationship between learner-to-content interaction and student satisfaction.	Accepted
H ^{1c} : There is a statistically significant relationship between learner-to-instructor interaction and student.	Accepted

Source: Researchers Construction

Table 5.21 summarises the outcomes of the hypothesis testing for this research. It reveals that all the hypotheses were accepted, indicating that the empirical evidence strongly supports the proposed relationships between the independent variable (and its constructs- learner-to-learner interaction, learner-to-instructor interaction and learner-to-content interaction) and the dependent variable, student satisfaction (expectations and experience). Each hypothesis aligns with the expected outcomes, demonstrating a significant and positive influence on student satisfaction (expectations and experience).

5.11 DISCUSSION OF THE EMPIRICAL RESEARCH FINDINGS

Based on the empirical results of the validity and reliability, and the statistically significant relationships between online learning interaction and student satisfaction, this section discusses

the empirical findings, comparing them to those from similar previous research. This forms the basis for accepting or refuting the findings of this research.

5.11.1 Discussion on the Validity and Reliability of Variables

The validity results of this research align with the findings of previous studies and fall within the recommended range for validity, as outlined by Hair et al. (2021), with values exceeding 0.7. However, some of the factors especially under the learner-to-content construct demonstrated low factor loadings and they were not included and analysed further in this research. Conrad et al. (2022) argues that course content significantly impacts student satisfaction when mediated by perceived difficulty in online learning environments. Thus, the dropped course content factors dropped can be modified and be applied in future research.

The reliability results in this research are also consistent with those of Muzammil et al. (2020) in terms of student satisfaction with online learning. The Cronbach's alpha value for learner-to-learner interaction construct in this research was 0.922, closely matching Muzammil et al.'s (2020) score of 0.923. For learner-to-content interaction construct, the reliability in this research was 0.959, which is notably higher than the 0.878 found by Muzammil et al. (2020). Similarly, the Cronbach's alpha value for learner-to-instructor interaction construct in this research was 0.910, which aligns closely with Muzammil et al.'s (2020) result of 0.928 and Giray (2021) result of 0.90. These findings demonstrate a high level of consistency in reliability across the two studies. Though these findings are comparable to those from previous research, its comparable approach of the dependent variable constructs (student expectations and experience) adds value to the body of knowledge. This is so because it provides a more vivid measure and picture of student satisfaction. Besides, the research confirms that online learning interaction is statistically significantly related to student satisfaction in the South African context.

Overall, the reliability of the student satisfaction instrument in this research was confirmed, with a reliability score of 0.910, which is in line with the 0.930 score reported by Muzammil et al. (2020) and 0.93 reported by Giray (2021). This indicates that the instrument used in this research is both valid and reliable, ensuring robust measurement of student satisfaction in the context of online learning interaction. These findings further contribute to the growing body of literature on student satisfaction in online learning and provide strong evidence for the reliability and validity of the research instrument employed.

5.11.2 Discussion of Pearson's Correlation Coefficients' Findings

This research confirms a statistically significant relationship between online learning interaction and student satisfaction. The findings indicate a strong and positive correlation of 0.703 between learner-to-learner interaction construct and student satisfaction. This aligns with the results from Giray (2021), who reported a correlation of 0.47, and concluded that there is a strong relationship between learner-to-learner interaction and student satisfaction in online learning environments. The stronger correlation found in this research further supports Giray's (2021) conclusion and emphasises the importance of peer interaction in enhancing student satisfaction.

Additionally, this research reported a strong and positive correlation of 0.703 between learner-instructor interaction construct and student satisfaction. This aligns with the findings of Miao et al. (2022), who reported a correlation of 0.586 and concluded that there is a strong relationship between learner-to-instructor interaction and student satisfaction. These findings indicate that the interactions that the instructors have with students plays an important role of enhancing student satisfaction.

Lastly, this research reported a 0.616 correlation coefficient between learner-to-content interaction construct and student satisfaction, reinforcing Giray's (2021) findings that improvements in course material led to higher levels of student satisfaction in online learning. A well-structured and engaging content experience plays a crucial role in maintaining students' interest and enhancing their satisfaction with online courses.

These results also confirm the conclusions of Hettiarachchi et al. (2021), who identified interaction as a strong determinant of student satisfaction in online learning environments. The consistent and positive correlation coefficients across different online learning interaction (learner-to-learner and learner-to-content) provide compelling evidence that interaction is a critical factor in fostering student satisfaction in online education. This research adds to the growing body of literature by not only confirming previous findings but also offering further insights into how different types of interaction contribute to overall satisfaction in the online learning experience.

5.11.3 Discussion of Statistically Significant Relationships of the Variables

This section delves into discussions on the statistical significance of the relationships between the independent variable and the dependent variable. This lays the foundation for comparison with existing research, culminating in accept/decline conclusions.

5.11.3.1 Learner-to-learner interaction and student satisfaction

The findings of this research indicate that learner-to-learner interaction construct has a statistically significant and positive relationship (0.703) with student satisfaction. In other words, as interaction between learners increase, so does the level of student satisfaction. The current research's results align with the work of Baber (2020), Doo and Bonk (2020), Wong and Chapman (2022), and Bell (2022), all of whom found that learner-to-learner interaction positively and significantly influences student satisfaction, particularly in online learning environments. This alignment suggests that the shift to online learning, accelerated by the pandemic, has made virtual interaction between peers more crucial for enhancing student satisfaction.

Conversely, this result contrasts with the findings of Alqurash (2019) and Gray and DiLoreto (2016), who concluded that learner-to-learner interaction does not significantly impact student satisfaction. A possible reason for this discrepancy is that those studies were conducted prior to the COVID-19 pandemic, during a time when students had options for face-to-face interaction. Additionally, the research by Gray and DiLoreto (2016) focused on postgraduate students, which may have led to results that do not reflect the broader student population. Overall, studies on the impact of learner-to-learner interaction on student satisfaction (expectations and experience) during COVID-19 generally have positive significant outcomes than their counterparts.

5.11.3.2 Learner-to-content interaction and student satisfaction

The findings of this research reveal a positive and statistically significant relationship between learner-to-content interaction and student satisfaction. As students engage more actively with course materials, their satisfaction with the learning experience increases. These results are consistent with previous studies by Martin et al. (2020), Muzammil et al. (2020), and Lim and Richardson (2022), all of which also found that higher levels of interaction with course content led to increased student satisfaction.

This research emphasises that engagement with various course materials, such as reading materials, videos, and interactive exercises, plays a key role in enhancing student satisfaction. This aligns with Martin et al. (2020), who noted that interactive and well-structured content captures students' attention and fosters deeper learning, thereby boosting satisfaction. Likewise, Muzammil et al. (2020) and Lim and Richardson (2022) found that content designed with clear learning paths and interactive elements encourages greater engagement and empowers students, which in turn positively influences their satisfaction levels.

5.11.3.3 Learner-to instructor interaction and student satisfaction

The results of this research, as presented in this chapter, indicate a statistically significant and positive relationship between learner-to-instructor interaction and student satisfaction. This suggests that as the interaction between learners and instructors increases, students' satisfaction with the learning experience also improves. The findings highlight the importance of meaningful and consistent communication between instructors and students in fostering a positive online learning environment. When students feel supported and engaged by their instructors, they are more likely to report higher levels of satisfaction with the course.

These results confirm the work of Katsorau and Chatzipanagiotou (2021) and Thach et al. (2021), both of whom identified learner-to-instructor interaction as a crucial factor influencing student satisfaction. Thach et al. (2021) emphasised that timely feedback, clear communication, and personalised instructor support are vital components in building strong learner-instructor relationships. Similarly, Katsorau and Chatzipanagiotou (2021) found that frequent and meaningful interaction with instructors not only contribute to students' sense of academic support but also increase their overall engagement with the course content, leading to improved satisfaction. Instructors who actively participate in the learning process and provide feedback create a sense of connection and belonging for students, which is essential for their and satisfaction.

Overall, this research confirms the growing evidence that learner-to-learner interaction, learner-to-instructor interaction, learner -to-content interaction, play a central role in shaping student satisfaction in online learning environments. Each type of interaction contributes to a more engaging and supportive learning experience that is essential for student satisfaction with online learning interaction.

5.12 CONCLUSION

This chapter presented the empirical results derived from the statistical analysis and discussed the relationship between online learning interaction and student satisfaction. A total of 268 usable questionnaire responses were collected for this research. The demographic profile of the respondents indicated that the majority of respondents were female, with a predominant representation of Black students. Additionally, most participants were from the Humanities faculty and were undergraduates.

The chapter then explored the data further, presenting descriptive statistics to summarise the findings. The analysis revealed that students generally had a positive perception of the constructs under study. Although some variability was observed in certain responses, the overall trend indicated a high level of satisfaction with the key interaction constructs-learner-to-learner, learner-to-content, and learner-to-instructor interaction.

Further examination of the validity and reliability of the measuring instrument was conducted. Content validity was established through a pilot study and reviews by marketing experts. CFA was employed to assess the construct validity of the questionnaire. The instrument's convergent validity was measured using Cronbach's alpha values, which also served as a measure of reliability. The results confirmed that all constructs were reliable, and therefore, included in the subsequent analyses.

Pearson's correlation coefficients were calculated to assess the strength and direction of relationships between the constructs. The research found that all constructs exhibited positive and statistically significant relationships. Regression analysis results were also presented, confirming that a statistically significant relationship exists between the independent and dependent constructs. The chapter concluded with the testing of hypotheses, revealing that all hypotheses (H^1 , H^{1a} , H^{1b} and H^{1c}) were accepted. A final model for the research was also introduced, based on these results. The following chapter provides a summary of all the chapters in this research, offer conclusions, outline recommendations, and discuss the limitations of the study.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 INTRODUCTION

The previous chapter outlined the empirical findings derived from the statistical analysis of the collected data, focusing on the relationship between the independent variable (and its constructs), online learning interaction, and the dependent variable, student satisfaction. This chapter aims to summarise the key findings and draw conclusions based on the research conducted. Additionally, it offers recommendations that stem from the insights gained in the preceding chapters, including Chapter One (Introduction), Chapters Two and Three (the literature review), Chapter Four (Research Methodology), and Chapter Five (Empirical Results).

Furthermore, the chapter addresses the MO⁷ objective, which is to provide recommendations to both researchers and academic institutions regarding strategies to enhance student satisfaction through online learning interaction. These recommendations play a crucial role in achieving the PO of establishing the relationship between online learning interaction and student satisfaction within IHLs in South Africa. Lastly, this chapter discusses the overall contribution of the research to the existing body of knowledge, its limitations, and suggest potential areas for future research.

6.2 RESEARCH SUMMARY

This section provides an overview of the research by giving a summary of each chapter by offering a comprehensive overview of the research and summarising the key content and findings from each chapter. The aim is to provide a clear understanding of the structure and progression of the study, as well as the critical insights gleaned throughout the research process.

6.2.1 Summary of Chapter One

Chapter One of this research served as the introduction, providing an essential foundation for the research by outlining the research problem, purpose, and objectives. It introduced the central theme of the research, which is the exploration of the relationship between online learning interaction and student satisfaction, with a particular focus on the context of higher education in South Africa. This chapter presented the primary, secondary, and methodological objectives, which guide the overall direction of the research.

Primary Objective (PO)

PO: To establish the relationship between online learning interaction (learner-to-learner; learner-to-content and learner-to-instructor) and student satisfaction (expectations and experience) at IHLs in South Africa.

Secondary Objectives (SO)

SO¹: To examine the relationship between online learner-to-learner interaction with student satisfaction considering both expectations and experience.

SO²: To examine the relationship between learner-to-instructor interaction and student satisfaction considering both expectations and experience.

SO³: To examine the relationship between learner-to-content interaction and student satisfaction considering both expectations and experience.

Methodological Objectives (MO)

MO¹: To provide an overview of the relationship between online learning interaction and student satisfaction.

MO²: To conduct a detailed literature review on the South African higher education landscape.

MO³: To conduct a comprehensive literature review on the relationship between online learning interaction and student satisfaction.

MO⁴: To develop a hypothesised model depicting the relationship between online learning interaction and student satisfaction.

MO⁵: To identify and implement the research design and methodology most suitable to address the problem statement and the research objectives.

MO⁶: To conduct an empirical investigation and testing of the hypothesised model in MO⁴

MO⁷: To provide recommendations to researchers and academic institutions on online learning interaction and student satisfaction.

This chapter also introduced the research hypothesis, the hypothesised model, and provided an overview of the research questions, which guide the investigation. The research questions were as follows:

Research Questions

RQ¹: What is the relationship between online learning interaction and student satisfaction?

RQ^{1a}: What is the relationship between learner-to-learner interaction and student satisfaction?

RQ^{1b}: What is the relationship between learner-to-content interaction and student satisfaction?

RQ^{1c}: What is the relationship between learner-to-instructor interaction and student satisfaction?

Hypotheses

H¹: There is a statistically significant relationship between online learning interaction (learner-to-learner; learner-to-content and learner-to-instructor) and student satisfaction (expectations and experience).

H^{1a}: There is a statistically significant relationship between online learner-to-learner interaction and student satisfaction.

H^{1b}: There is a statistically significant relationship between learner-to-content interaction and student satisfaction.

H^{1c}: There is a statistically significant relationship between learner-to-instructor interaction and student satisfaction.

In addition, Chapter One provided a brief introduction to the structure of the research, including an outline of the South African education landscape, a literature review and the research methodology. It also provided an overview of the methods used to collect and analyse data, ensuring transparency in the research approach. The chapter set the stage for the subsequent chapters, which explored the literature, methodology, findings, and conclusions, providing a comprehensive discussion of the research's objectives.

6.2.2 Summary of Chapter Two

Chapter Two offered an analysis of the context of online learning in South Africa's IHLs. A key focus of this chapter was on the challenges faced by these institutions in implementing and maintaining online learning initiatives. These challenges included issues such as inconsistent internet access, technological inequalities among students, and the infrastructural limitations that hinder effective online education. The chapter critically assessed how these barriers affect student satisfaction, paying particular attention to the distinctive challenges South African students faced in online learning environments before, during, and after the COVID-19 pandemic.

6.2.3 Summary of Chapter Three

Chapter Three provided a comprehensive review of the existing literature, laying the foundation for the research. The chapter explored key theoretical frameworks that inform the research, including the Social Presence Theory, Transactional Distance Theory, and the CoI framework. The research adopted the latter. This theory was crucial for understanding the dynamics of online learning interaction and how they influence student satisfaction in online learning environments.

The chapter also examined previous research on the relationship between online learning interaction and student satisfaction, highlighting various constructs and findings. A central theme of the literature review was the impact of online learning interaction on overall student satisfaction, which is shaped by both student expectations and experiences. In particular, the chapter explored the three primary constructs of online learning interaction: learner-to-learner interaction, learner-to-content interaction, and learner-to-instructor interaction. It investigated how each of these interaction constructs affects different dimensions of student satisfaction (student expectations and experience), providing a nuanced understanding of how online learning environments can meet or fail to meet students' satisfaction.

In addition to the insights gained from the literature, the chapter presented a hypothesised model that integrated the key constructs of online learning interaction and their anticipated influence on student satisfaction. This model served as a conceptual framework for the empirical investigation that followed, offering a structured approach to understanding the complex relationships between these constructs. By synthesising the existing literature, this chapter not only supported the research objectives but also contributed to the development of a more comprehensive understanding of online learning interaction and its role in enhancing student satisfaction.

6.2.4 Summary of Chapter Four

Chapter Four provided a detailed explanation of the research design, methodology, and data collection techniques used to address the research questions. The research adhered to the positivist research paradigm, employing a deductive approach to testing hypotheses derived from existing theories. A quantitative research design was adopted, with surveys serving as the primary method for data collection. To gather data, the research utilised both online and paper-based questionnaires. The questionnaire was structured into three sections: Section A collected

demographic information from respondents, Section B focused on the independent variable, online learning interaction (and its constructs- learner-to-learner interaction, learner-to-instructor interaction and learner-to-content interaction), and Section C gathered data on the dependent variable (student satisfaction). The design of the survey instrument was informed by secondary data sources, including the creation of a 5-point Likert scale to measure participants` responses. The scale items were also derived from established secondary sources, ensuring the instrument`s relevance and accuracy.

A non-probability sampling technique was employed to select a sample of 268 participants, who were surveyed as part of the research. The sampling strategy, which does not rely on random selection, was appropriate for the study`s context and objectives. The chapter also outlined the data analysis procedures used to examine the collected data, starting with descriptive statistics, which provided insights into the respondents` demographic characteristics. To ensure the validity and reliability of the research instrument, the research conducted a CFA and calculated Cronbach`s alpha values. These tests assessed the internal consistency of the measurement scales used in the questionnaire, verifying that the instruments were both valid and reliable.

Additionally, Pearson`s correlation coefficients analysis and regression analysis were employed to examine the relationships between the independent and dependent constructs. These statistical techniques provided a quantitative basis for understanding the strength and direction of the relationships between online learning interaction (learner-to-learner, learner-to-content, learner-to-instructor) and student satisfaction. Furthermore, the analysis included an ANOVA the overall significance of the regression model.

The chapter concluded by discussing the ethical considerations that guided the research process, ensuring that participants` rights were protected, and that the research adhered to ethical research standards. By detailing the sampling strategy, data collection methods, analysis techniques, and ethical protocols, this chapter ensured transparency and demonstrated the rigor of the research approach, thereby supporting the reliability and validity of the findings.

6.2.5 Summary of Chapter Five

Chapter Five presented the empirical results derived from the statistical analysis conducted on the collected data. The findings were organised in alignment with the sequence outlined in the

previous chapter. The demographic profile of the respondents revealed that females were more represented in the research compared to males, those who identified as other, and those who preferred not to disclose their gender. Most respondents were Black students, with Asian students representing the smallest group. Faculty representation indicated that Humanities students were the most prominent participants, while the smallest group was from the Education faculty. In terms of academic level, the largest group consisted of undergraduate students, with the fewest participants at the PhD level.

Descriptive statistics were provided for both the independent variable (and its constructs) and the dependent variable. Across all constructs, the mean scores were above the acceptable threshold of 3, indicating that respondents generally held positive views on the items under consideration. The lowest mean score recorded was 3.45, further emphasising the overall positive sentiment toward the factors being studied. Standard deviation values ranged from 0.7 to 1.132, suggesting some variability in respondents' opinions on certain items, though there was general agreement on most aspects. The median score of 4 further reflected a broad consensus among respondents, indicating a general agreement on factors influencing student satisfaction with online learning interaction.

This chapter also presented empirical results related to the validity and reliability of the questionnaire employed in the data collection process. Cronbach's alpha values, a common measure of internal consistency, showed values above 0.9 for all constructs, well above the generally accepted threshold of 0.7. This indicates that the instrument was highly reliable. In terms of validity, factor loadings for most items were retained, with only a few items showing weak loadings being dropped. Despite these few exceptions, many items demonstrated strong factor loadings, confirming the validity of the instrument in measuring the relationship between online learning interaction and student satisfaction.

The relationship between online learning interaction and student satisfaction was further explored through several statistical tests and metrics, including Pearson's correlation matrix, multicollinearity analysis, regression analysis, and ANOVA. Pearson's correlation coefficients' results revealed a strong and positive relationship between online learning interaction constructs and student satisfaction, with the weakest correlation at 0.616 for learner-to-content interaction. To ensure the robustness of the regression analysis, multicollinearity testing was conducted,

revealing no issues with redundant predictors. The VIF values were consistently below 10, ranging from 1.29 to 1.408, while the Tolerance levels remained above the threshold of 0.1 (ranging from 0.67 to 0.775), indicating the absence of multicollinearity.

Regression analysis confirmed that all three constructs of online learning interaction—learner-to-content, learner-to-learner, and learner-to-instructor—were significant predictors of student satisfaction. The R-squared value of 0.733 indicated that these constructs explained 73.3% of the variance in student satisfaction. Beta values for each online learning interaction construct suggested a positive relationship with student satisfaction, while the large t-values further confirmed the statistical significance of these relationships. Additionally, the p-value of <0.001 for all constructs affirmed that the associations between online learning interaction and student satisfaction were statistically significant.

The results of the ANOVA test, which was used to assess the overall significance of the regression model, showed a statistically significant F-value, indicating that at least one of the independent constructs had a meaningful relationship with the dependent variable. The p-value of <0.001 in the ANOVA test further supported the model's fit, demonstrating that the regression model provides valid and insightful predictions regarding the relationship between online learning interaction and student satisfaction. This p-value, being well below the threshold of 0.05, confirms the statistical significance of the model and its ability to offer valuable insights into the predictors of student satisfaction in the context of online learning.

This chapter also tested the hypothesised model using Pearson's correlation coefficients' results and regression analysis. The findings revealed that all the independent variable constructs had a significant impact on student satisfaction, leading to the acceptance of all hypotheses (H^1 , H^{1a} , H^{1b} , and H^{1c}). The chapter concluded by presenting the final model and the chapter conclusion.

6.2.6 Summary of Chapter Six

The current chapter concludes the research by summarising the key findings and drawing conclusions from the previous chapters. It offers practical recommendations for improving student satisfaction in online learning environments, based on the empirical results. These recommendations are aimed at both academic institutions and future researchers, emphasising the importance of enhancing online learning interaction to foster a positive student experience.

Additionally, the chapter discusses the limitations of the research and suggests directions for future research in this area. Summarising each chapter highlights the logical progression of the research, from identifying the problem to analysing the data and drawing meaningful conclusions. The research contributes to the understanding of how online learning interaction influence student satisfaction, particularly in South Africa's higher education context, and provides valuable insights for improving online learning practices.

6.3 ATTAINMENT OF THE RESEARCH OBJECTIVES

The primary objective for the research was to establish the relationship between online learning interaction and student satisfaction at IHLs in South Africa. Secondary objectives that helped to achieve the primary objective were also formulated. Also, methodological objectives indicating how secondary objectives were attained, were also developed.

The primary objective, which focused on establishing the relationship between online learning interaction and student satisfaction was effectively supported by the secondary objectives SO¹, SO², and SO³. These secondary objectives investigated the three constructs of online learning interaction—learner-to-learner, learner-to-instructor and learner-to-content. To achieve these objectives, methodological objectives MO¹⁻⁴ were utilised, which were addressed in Chapters One, Two, and Three.

Chapter One provided a comprehensive overview of student satisfaction in online learning environments. In Chapter Two, a literature review of the higher education landscape in South Africa, with an emphasis on online learning, was conducted. Chapter Three presented a review of existing literature on the relationship between online learning interaction and student satisfaction. Additionally, a theoretical model outlining the factors influencing student satisfaction in relation to online learning interaction was developed in this chapter.

Chapter Four focused on MO⁵⁻⁶, where an appropriate research design and methodology were developed, followed by an empirical investigation into the independent constructs (interaction constructs) influencing the dependent variable (student satisfaction). The empirical findings were presented in Chapter Five. Finally, Chapter Six addressed MO⁷, offering recommendations for future research and suggestions for academic institutions to enhance student satisfaction in online learning environments.

The achievement of the research objectives (primary, secondary, and methodological) facilitated the answering of all the research questions. Based on the data analysis presented in Chapter Five, which revealed a statistically significant relationship between the independent variable and the dependent variable, the primary objective of establishing the relationship between online learning interaction and student satisfaction at a South African IHL was successfully met. The following section discusses the recommendations regarding the relationships between the independent variable and the dependent variable.

6.4 RECOMMENDATIONS BASED ON EMPIRICAL RESULTS

The discussions and recommendations presented in this section are based on the empirical results presented in Chapter Five.

6.4.1 Recommendations Based on Statistically Significant Relationships

The recommendations to South African IHLs based on the statistical significance relationships of the constructs presented in Chapter Five are discussed in this subsection.

6.4.1.1. Relationship between learner-to-learner interaction and student satisfaction.

Based on the findings and discussions presented in Chapter Five of this research, the following recommendations for South African IHLs are proposed to enhance student satisfaction through increased learner-to-learner interaction:

- **Create structured opportunities for peer interaction**

The empirical findings presented in Chapter Five demonstrate that learners place significant value on interaction with their peers through collaborative activities. The factor loadings related to group dynamics are notably high, above 0.80, highlighting the critical role of group collaboration in enhancing student satisfaction. IHLs should therefore design learning activities that promote regular peer engagement, such as group discussions, collaborative projects, and study groups. Virtual spaces like discussion forums, video conferences, or collaborative platforms should be integrated into the learning environment to facilitate meaningful interaction, allowing students to share perspectives, solve problems together, and increase satisfaction with their learning in the online learning environment.

- **Increase the frequency of interaction**

Having more opportunities to connect with peers has been shown to significantly enhance student satisfaction, as evidenced by the high factor loadings in Chapter Five (above 0.8). To reduce isolation and promote a sense of community, IHLs should prioritise regular peer interaction throughout students' academic journeys. This can be accomplished by integrating group activities in both synchronous and asynchronous formats, such as weekly group meetings or collaborative assignments, ensuring that peer engagement remains a continuous and essential aspect of student satisfaction.

- **Foster peer reachability and support**

The ability to connect with peers and receive their support has been confirmed as a significant factor in influencing student satisfaction. While the factor loadings were above 0.70, which was slightly lower than other items, it still served as a strong indicator of student satisfaction. Therefore, institutions should facilitate student connections by offering clear communication channels, such as messaging platforms, discussion boards, or virtual office hours. Furthermore, mentorship programmes and peer-led activities can foster a supportive environment, encouraging students to seek academic or social support, ultimately strengthening the sense of community.

6.4.1.2. Relationship between Learner-to-instructor Interaction and Student Satisfaction

Based on the research findings and discussions presented in Chapter Five, the following recommendations are made for IHLs to enhance student satisfaction through improved learner-to-instructor interaction:

- **Provide timely, personalised, and constructive feedback**

The results presented in the previous chapter demonstrated that timely, personalised, and constructive feedback from instructors plays a significant role in influencing student satisfaction, as evidenced by the high factor loadings ranging from 0.7 upwards. Therefore, IHLs should ensure that instructors provide feedback that is not only prompt but also personalised and comprehensive. Feedback should be tailored to individual student needs, helping them understand their strengths and identify areas for improvement. Instructors should be encouraged to provide specific guidance on how students can correct mistakes, enhance their understanding of the material, and improve their academic performance. Personalised feedback can

significantly increase students' satisfaction, as it shows that instructors are engaged in their learning and invested in their success.

- **Offer comprehensive support throughout the learning process**

Based on the high factor loadings of around 0.7, instructor's support plays a crucial role in influencing student satisfaction. Therefore, a comprehensive student support system involving instructors and other non-academic functions (for example, IT department and student support services) should be adopted to improve student online learning experiences throughout their learning journey by addressing both academic, personal and emotional needs. This could include regular check-ins, availability during office hours, and offering guidance when students encounter difficulties. Emotional support, such as encouraging students and fostering a positive, supportive learning environment, is equally important. By being accessible and approachable, instructors can help students feel more confident and motivated, which leads to higher satisfaction levels.

- **Adopt a balanced pedagogical approach**

The instructor's pedagogical style presented factor loadings around 0.6. This shows that students were moderately satisfied with the pedagogical styles of the instructors. IHLs are therefore recommended to prioritise instructors' development on both teacher-centred and learner-centred pedagogical approaches. This might improve student satisfaction. This involves continuous professional development opportunities focused on improving teaching strategies, ensuring instructors can engage students through a variety of teaching methods that cater to diverse learning styles. Moreover, IHLs should support instructors in staying up to date with the latest educational technologies. Training on the effective use of multimedia tools and digital platforms allows instructors to enhance course delivery and make learning more interactive, dynamic, and accessible.

- **Improve Instructor Approachability by Learners**

The empirical results have shown that learners value the approachability of their course instructors. This has been proven by high factor loadings of around 0.7. It is therefore essential that IHLs foster an environment where students feel comfortable interacting with instructors. This can be achieved by creating accessible communication channels such as discussion boards, live chats, and virtual office hours, as well as cultivating a culture of openness and mutual

respect. Instructors should be approachable, actively engaging with students both in and outside of the online classroom. Encouraging informal interaction, such as providing space for students to ask questions or seek clarification, can foster stronger instructor-student relationships and significantly enhance student satisfaction.

6.4.1.3. Relationship between Learner-to-content Interaction and Student Satisfaction

Based on the findings and discussion of results presented in Chapter Five, the following recommendations are made for IHLs to enhance student satisfaction through effective course content development:

- **Develop engaging, challenging and interactive course content**

Based on the empirical results in Chapter Five, the factor loadings on student satisfaction related to the challenging nature of content that fosters critical thinking had a minimum of 0.595 indicating a moderate to high impact. Therefore, IHLs should prioritise the development of course content that is not only informative but also engaging and intellectually stimulating. The content should challenge students' thinking while encouraging active learning. This can be achieved by incorporating diverse instructional materials, such as videos, quizzes, interactive exercises, case studies, and group discussions. By fostering learner engagement through these varied formats, institutions can encourage deeper interaction with the material and improve student satisfaction.

- **Ensure high-quality, relevant and understandable course content**

Learners indicated that quality, relevant and understandable course content gives them satisfaction with their online learning. This has been proved by factor loadings ranging from 0.563 upwards. Institutions must focus on providing high-quality, accurate, and relevant course materials that are easy to understand. This includes ensuring that content is up-to-date, factually correct, and aligned with current academic and industry standards. Clear explanations, well-structured modules, and real-world applications can make the content more relatable and engaging for students, thereby enhancing their learning satisfaction.

The manageability of course content however also had a medium factor loading of 0.563. This showed that IHLs should facilitate student understanding and engagement of course content in a structured, clear and logical manner. The content should follow a coherent flow, with each

module or unit building upon the previous one. This allows students to easily follow the material, stay engaged, and avoid confusion. Using headings, subheadings, bullet points, and summary sections can also make the content more digestible and student friendly which enhances student satisfaction.

Based on this research and the research findings by Conrad et al (2022), there seems to be a need to conduct a comparative research study between online learning interaction and face-to-face interaction specifically on student satisfaction with course content interaction.

- **Ensure accessibility of course content**

The empirical results in Chapter Five have proved that the accessibility of course content positively influences student satisfaction as indicated by 0.583 factor loading. IHLs must therefore ensure that course content is easily accessible to all students, regardless of their technological capabilities or learning needs. This involves optimising the content for various devices (for example., desktops, tablets, smartphones) and providing alternative formats for students with disabilities, such as screen reader-compatible materials or transcripts for videos. Additionally, institutions should guarantee that all digital media (videos, audio, etc.) are functional and easily accessible at any time, enabling students to engage with the material whenever it suits them.

6.4.2 Recommended Framework Based on the Research Results

Based on the results regarding online learning interaction (and its constructs- learner-to-learner, learner-to-content and learner-to-instructor) and student satisfaction (expectations and experience), Figure 6.1 presents the recommended framework. This framework illustrates how online learning can be enhanced to improve student satisfaction.

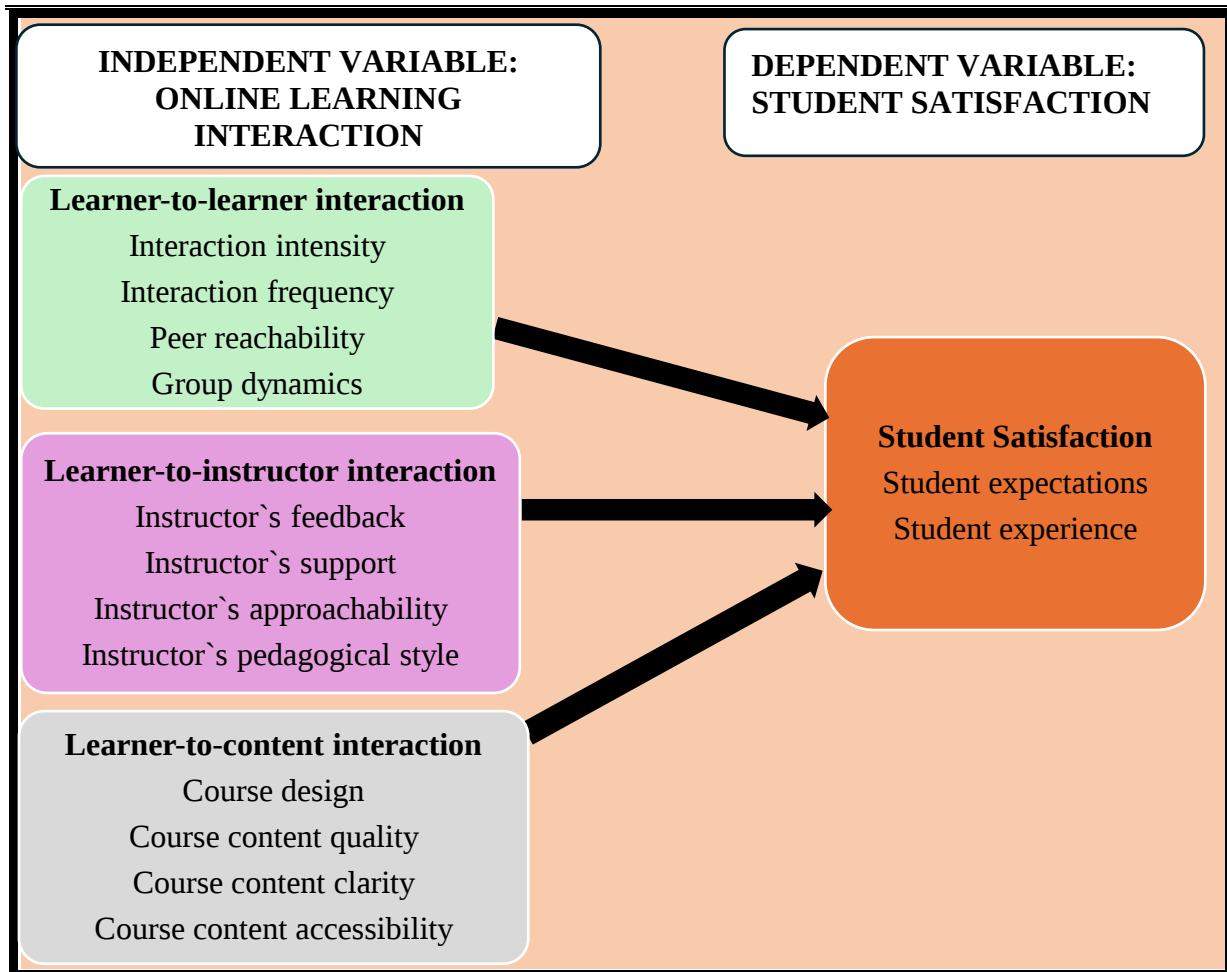


FIGURE 6. 1: RECOMMENDED MODEL FOR ONLINE LEARNING INTERACTION AND STUDENT SATISFACTION

Source: Researchers` Construction

The framework presented in Figure 6.1, suggests that student satisfaction in online learning is shaped by multiple factors, rather than being driven by a single variable. It is therefore recommended that the key constructs of online learning interaction are incorporated to enhance student satisfaction. The key factors include interaction between learners, course content, and instructors. For learner-to-learner interaction, satisfaction is enhanced by the intensity and frequency of peer engagement, easy access to peers for collaboration, and positive group dynamics that foster effective teamwork. In terms of learner-to-content interaction, student satisfaction depends on well-organised course design, high-quality content that is clear and relevant, and materials that are easily accessible and engaging. For learner-to-instructor interaction, the quality of feedback, support, instructor approachability, and teaching style play

crucial roles in creating a positive learning experience. When these constructs align with or exceed students' expectations, they are more likely to feel satisfied with their learning journey.

6.4.3 Recommendations for Future Research

Given the significant positive relationship identified between the variables in this research, IHLs in South Africa are encouraged to sustain and expand the adoption of online learning modalities in the post-COVID-19 era. A phased implementation approach could be considered, starting with selected faculties such as Humanities, where the feasibility and potential benefits may be more pronounced. This targeted strategy would enable institutions to evaluate the long-term effectiveness of online learning in specific academic contexts while addressing discipline-specific challenges.

The primary objective of this research was to explore and establish the relationship between the variables. However, future studies should go beyond this scope by employing quantitative methodologies to ascertain causality. This would deepen our understanding of not only the existence of relationships but also their underlying mechanisms. Additionally, future research should incorporate moderated or mediated analyses to uncover subtler dynamics that influence these relationships, providing a more nuanced perspective on the interplay between variables.

While this research established the relationship between variables, it did not address critical questions about the *why* and *how* behind these relationships. To fill this gap, future investigations should utilise qualitative or mixed-method research approaches to generate richer insights into the motivations, barriers, and contextual factors that shape these dynamics. Such approaches would offer a more comprehensive understanding of the phenomenon under study.

It is important to note that this research was conducted in an emergency context, heavily influenced by the constraints and pressures of the COVID-19 pandemic. To enhance the generalisability of findings, further research should explore these relationships in non-emergency contexts, where the adoption of online learning can be more deliberate and less reactive. This would provide a clearer picture of how these relationships function under normal circumstances.

The theoretical foundation of this research was the COI framework, which served as a valuable lens for understanding the phenomenon. However, future studies should consider adopting

alternative theoretical frameworks, such as the SPT, to broaden and diversify the theoretical perspectives applied to online learning research. This would contribute to a richer and more holistic understanding of the complexities involved.

This research employed a cross-sectional design due to time and resource constraints. While this approach provided a snapshot of the relationships at a specific point in time, longitudinal research—spanning a year or more—could yield deeper insights. A longitudinal design would enable researchers to track changes and developments over the course of students' academic journeys, offering a more dynamic and comprehensive understanding of the evolution of these relationships.

The research was conducted at a selected IHL in South Africa, where the closure of universities due to COVID-19 restrictions resulted in students being required to learn from home, the majority being in rural areas. This created a neutral context for the study. However, expanding the research to include other provinces in South Africa could provide a more diverse and comprehensive perspective, allowing for better generalisation of the study findings.

Lastly, this research employed an ANOVA test to test the regression model. Future research can apply ANOVA test to understand demographic characteristics such as gender, ethnicity, level of study etc. and their effects on student satisfaction.

6.5 SIGNIFICANCE OF THE RESEARCH

This research makes a significant contribution to the understanding of student satisfaction with online learning in South African IHLs. At a theoretical level, this research confirms the theoretical framework presented in this research that identifies online learning interaction—learner-to-learner, learner-to-content, and learner-to-instructor—as independent constructs influencing student satisfaction, which is the dependent variable. Additionally, by exploring these key factors, this research enriches the literature on student satisfaction (expectations and experience) in the South African higher education context.

At a theoretical level, both the literature review and the empirical findings bridge existing gaps in the South African research on student satisfaction. Student satisfaction, as a relatively new concept in higher education, has historically been overlooked, with students often seen as

products rather than active participants whose satisfaction is a priority. This research combines relevant literature on the factors influencing student satisfaction, offering a comprehensive framework that can serve as a guideline for higher education institutions in South Africa.

At a practical level, given the rising competition among IHLs in South Africa, understanding the factors that contribute to student satisfaction has become essential. This research provides a detailed analysis of these factors in the context of online learning interaction, offering valuable insights for institutions aiming to enhance student experiences and maintain competitive advantage. Additionally, the research presents practical recommendations that IHLs can implement to improve online learning interaction opportunities, ultimately fostering higher levels of student satisfaction with their online learning experiences. The next section details the limitations that are associated with this research.

6.6 LIMITATIONS OF THE RESEARCH

This research has made a significant contribution to the broader understanding of student satisfaction with online learning interaction. However, there are certain limitations within the study, which are acknowledged, and suggestions for future research are provided to address these gaps and build upon the findings. The limitations are as follows:

- This research employed a cross-sectional design, which made the data collection sensitive to the specific conditions at the time, such as the fact that data was gathered just prior to the exam period. A longitudinal study, spanning over a longer period, could provide a more comprehensive understanding of how student satisfaction with online learning evolves over time, capturing potential shifts in student satisfaction across different academic cycles spanning from a year or more.
- A survey strategy with a close-ended questionnaire was used to measure student satisfaction with online learning interaction. While this approach allowed for efficient data collection, a qualitative research methodology, such as focus groups, could offer a deeper, more nuanced understanding of the phenomenon. Qualitative data could provide insights into students' personal experiences and perceptions that quantitative methods might overlook.

- The research utilised a non-probability convenience sampling approach, which, while practical, limits the generalisability of the results to the broader higher education population in South Africa. Future studies could benefit from employing probability sampling techniques, which would provide more robust, generalisable findings that can be applied to a wider student population.
- Additionally, this research focused on an institution in a single geographical location. To increase the scope and relevance of future findings, it would be beneficial to expand research across multiple provinces in South Africa, capturing a broader range of student satisfaction.
- The research was also constrained by time and resources, as it had to be completed within the university's two-year timeframe. A low online response rate led to the decision to implement a paper-based survey approach, which extended the data collection period and necessitated the involvement of an independent fieldworker. Future research should carefully plan for adequate time and resources to streamline data collection and minimise delays.
- Despite these limitations, the empirical results offer valuable insights into how online learning interaction influence student satisfaction in South African IHLs. The measuring instrument used in this research has been validated and could be applied in future research, both in the South African IHLs and in the private higher education sector, to further explore and refine the understanding of student satisfaction in online learning environments.

6.7 FINAL CONCLUSION

For student satisfaction to be successfully achieved at IHLs in South Africa, it is crucial to foster meaningful interaction between students, their peers, the course content, and instructors. This research has provided valuable insights into the specific constructs that contribute to enhancing student satisfaction within the context of online learning. By focusing on the key factors of learner-to-learner, learner-to-content, and learner-to-instructor interaction, the research highlighted the areas where institutions can improve to better meet student satisfaction. The implementation of the recommendations derived from this research could significantly enhance

the quality of online learning interaction and, as a result, lead to higher levels of student satisfaction at South African IHLs.

Student satisfaction has become an increasingly important area of focus in the higher education landscape. As online learning continues to grow in prominence, understanding what drives student satisfaction in this context is vital. This research makes a notable contribution to the body of knowledge on student satisfaction by examining the role of online learning interaction and the factors that influence them. By exploring the dependent variable of student satisfaction, the research offers a deeper understanding of how online learning interaction can be optimised to improve the student satisfaction.

The practical recommendations provided in this research are specifically tailored for South African IHLs, with the aim of enhancing student satisfaction through more effective online learning interaction. If these recommendations are implemented, the benefits would extend beyond individual institutions, positively impacting students, institutions, and the higher education sector. Moreover, improved student satisfaction could contribute to a more competitive and high-quality higher education system in South Africa, ultimately benefiting the country's broader academic and economic landscape.

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APPENDICES

APPENDIX A: REQUEST FOR PARTICIPATION LETTER

REQUEST FOR PARTICIPATION

Date

Dear Prospective participant

RE: The relationship between student satisfaction and online learning interaction at a South African Institution of Higher Learning (IHL)

I am a master's student from the Department of Management in the Faculty of Commerce at Rhodes University. I am inviting you to participate in my study titled "The relationship between student satisfaction and online learning interaction at a South African Institution of Higher Learning (IHL)". The study aims to establish the relationship between student satisfaction and online learning interaction. The study is expected to identify the important online learning interaction constructs that influences student satisfaction. In addition, the study will assist educators in developing online learning interaction programmes that promote student satisfaction.

If you have participated in online learning during the years 2020, 2021, 2022 and/or 2023 at an institution of higher learning in South Africa, please share your views by clicking on the link provided at the end of this document to complete an online questionnaire. The questionnaire will take approximately 15-20 minutes to complete. The questionnaire has no correct or incorrect answers, and all your opinions are important. The structure of the questionnaire is as follows:

Section A: Demographic information.

Section B: Perceptions regarding online learning interaction constructs.

Section C: Perceptions regarding student expectations and experience with online learning interaction.

Please note that your participation in this survey is voluntary, and completely anonymous, and no confidential information is required. All data will be used for research purposes only. Once the research has been completed, the data will be handed to the research supervisor, Professor N. Oosthuizen of the Department of Management at Rhodes University, for storage for five years. This research has been approved by the Faculty of Commerce Higher Degrees Committee and the Rhodes University Ethics Committee.

Please contact the researcher or supervisor if you require more information regarding the questionnaire and study.

Thank you again for sharing your views on these important issues.

Yours sincerely,

Problem Zindove

Email: prohzindove@gmail.com

Supervisor: Nadine Oosthuizen

Email: n.oosthuizen@ru.ac.za

SCREENING QUESTION

Have you previously participated in full online learning tuition? (With no physical contact with content, peers and instructors)

YES
NO

If **YES**, click on the link below to proceed to the questionnaire.

<insert link to the questionnaire here>

APPENDIX B: RESEARCH QUESTIONNAIRE**STUDENT SATISFACTION WITH ONLINE LEARNING INTERACTION.****SECTION A:****DEMOGRAPHIC INFORMATION**

This section relates to your demographic information. Please answer the following questions with a click in the appropriate box.

A1. Gender

Male	Female	Other	Not willing to say
1	2	3	4

A2. Ethnic group

Black	Asian	Indian	Coloured	White	Other	Not willing to say
1	2	3	4	5	6	7

A3. Faculty

Law	Education	Pharmacy	Humanities	Commerce	Sciences
1	2	3	4	5	6

A4. Indicate your current level of study.

Undergraduate	Honours	Masters	PhD
1	2	3	4

A5. Year(s) of enrolment and level of study.

Indicate the year(s) you were enrolled when you received the online tuition. Click the box(es).

Year	Level of study			
2020	Undergraduate 1	Honours 2	Masters 3	PhD 4
2021	Undergraduate 1	Honours 2	Masters 3	PhD 4
2022	Undergraduate 1	Honours 2	Masters 3	PhD 4
2023	Undergraduate 1	Honours 2	Masters 3	PhD 4

SECTION B:

PERCEPTIONS REGARDING ONLINE LEARNING INTERACTION CONSTRUCTS.

Indicate the extent to which you agree or disagree with the following statements regarding the online learning interaction constructs (learner-to-content, learner-to-learner, and learner-to-instructor). Please mark your selection with a click in the appropriate box. Please note, your choice indicates your overall perception.

Question	Online learning constructs	Strongly Disagree	Dis-agree	Neutral	Agree	Strongly Agree
Learner-to-learner interaction						
1.	I felt like I am part of a community of learners in the online courses because of the online interaction I had with other students.	1	2	3	4	5
2.	I felt comfortable engaging with other students in the online courses.	1	2	3	4	5
3.	The other students were supportive in their interaction with me in the online courses.	1	2	3	4	5
4.	The online interaction I had with other students enhanced my ability to collaborate efficiently with them on group assignments in the online courses.	1	2	3	4	5
5.	Through online peer interaction, I could provide valuable feedback to other students in the online courses.	1	2	3	4	5
6.	My interaction with other students assisted me in creating relationships in the courses.	1	2	3	4	5
7.	My peers valued my suggestions and ideas in the online courses.	1	2	3	4	5
8.	My peers provided different perspectives and ideas in the online courses.	1	2	3	4	5
9.	My online interaction with my peers improved my ability to communicate effectively with them.	1	2	3	4	5

10.	Overall, I was satisfied with the interaction that I had with my peers.	1	2	3	4	5
Learner-to-instructor interaction						
11.	The instructor was knowledgeable about the course content through illustrations, real world examples etc.	1	2	3	4	5
12.	The instructor provided clear supporting explanations to the course content.	1	2	3	4	5
13.	The instructor was approachable, I could communicate with them for further clarity on the course content.	1	2	3	4	5
14.	The instructor was quick to respond to my emails and messages during virtual office hours.	1	2	3	4	5
15.	The instructor provided valuable feedback and guidance on my coursework.	1	2	3	4	5
16.	The instructor offered suggestions on how to improve in areas indicated in their feedback and grading.	1	2	3	4	5
17.	The instructor regularly posted updates and study resources on the online platform, which helped me stay up to date with the courses.	1	2	3	4	5
18.	The instructor consistently promoted online interaction among students through group discussions.	1	2	3	4	5
19.	The instructor made students to actively participate in online class discussions through question-and-answer sessions and student presentations.	1	2	3	4	5
20.	The instructor provided clear expectations for assignments and assessments.	1	2	3	4	5

21.	Overall, I was satisfied with the interaction that I had with my course instructor.	1	2	3	4	5
Learner-to-content interaction						
22.	The course content challenged me to think critically.	1	2	3	4	5
23.	The course content challenged me to apply what I learnt to real world situations.	1	2	3	4	5
24.	The course content was relevant to the learning outcomes.	1	2	3	4	5
25.	The course content was engaging (allowed for roleplaying, had case studies, examples, self-tests etc.) and kept my attention throughout the courses.	1	2	3	4	5
26.	The course content was not overloaded (not too much reading material, not too many tasks/ assessments etc.), thus, manageable.	1	2	3	4	5
27.	The quality of the online reading materials (books, articles, etc) made it easy to engage with the course content.	1	2	3	4	5
28.	The multimedia constructs (videos and audios, etc.) improved my understanding of the course content.	1	2	3	4	5
29.	The course materials (notes, books, videos, audios, etc.) provided enough depth and detail for me to understand the course content.	1	2	3	4	5
30.	The online course content (notes, books, articles, tests, videos, audios etc.) were presented in a clear and organised manner.	1	2	3	4	5
31.	The course materials and content assisted me to successfully complete the course.	1	2	3	4	5
32.	The course materials were made available well in advance which made me	1	2	3	4	5

	engage with content before class sessions.					
33.	The course content was conveniently (easily accessible) on the online learning platforms.	1	2	3	4	5
34	Overall, I was satisfied with the online interaction I had with my course content.	1	2	3	4	5

SECTION C:**PERCEPTIONS REGARDING STUDENT EXPECTATIONS AND EXPERIENCE WITH ONLINE LEARNING INTERACTION**

Indicate the extent to which you agree or disagree with the following statements regarding your overall expectations and experience with online learning interaction. Please mark your selection with a click in the appropriate box.

Question	Expectations and Experience	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Learner-to-learner						
1.	The interaction that I had with my peers through group discussions met my expectations.	1	2	3	4	5
2.	The interaction frequency I had with my peers met my expectations.	1	2	3	4	5
3.	The ability to reach out to my peers (formally and informally) in the online learning courses met my expectations.	1	2	3	4	5
4.	The group dynamics (support, respect, feedback) in the online learning courses met my expectations.	1	2	3	4	5
Learner-to-instructor interaction						
5	The instructor's provision of timely feedback met my expectations.	1	2	3	4	5

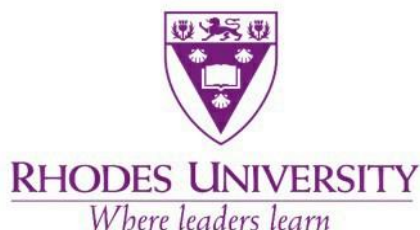
6.	The instructor support that I received in the online courses met my expectations.	1	2	3	4	5
7.	The instructors' pedagogical skills (presentation, interaction knowledge etc.) in delivering the online course content met my expectations.	1	2	3	4	5
8.	The instructors' approachability met my expectations.	1	2	3	4	5
Learner-to-content interaction						
9.	The online course design (content and materials) met my expectations	1	2	3	4	5
10.	The quality of the online course content (reading materials) met my expectations.	1	2	3	4	5
11.	The clarity of the online course content (notes, books, articles, tests, videos, audios etc.) met my expectations.	1	2	3	4	5
12	The accessibility of the online course content (through multimodal constructs) met my expectations.	1	2	3	4	5

Should you require a copy of the executive summary of the final thesis, please enter your email address in the space provided below.

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THANK YOU FOR YOUR PARTICIPATION

APPENDIX C: ETHICS APPROVAL LETTER



Rhodes University Human Research Ethics Committee
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e: ethics-committee@ru.ac.za
NHREC Registration number: RC-241114-045
<https://www.ru.ac.za/researchgateway/ethics/>

7 July 2023

Miss Problem Zindove

Email: g22z1551@campus.ru.ac.za Review

Reference: 2024-7329-8838

Dear Ms Zindove,

Re: Human ethics renewal application: The relationship between student satisfaction and online learning interaction at a South African Institution of Higher Learning (IHL).

Researcher: Miss Problem Zindove

Supervisors: Professor Nadine Oosthuizen

This letter confirms that the above Annual Report has been reviewed and **APPROVED** by the Rhodes University Human Research Ethics Committee (RU-HREC). Your Approval number is: 2024-7329-8838.

Approval has been granted for 1 year. An annual progress report will be required in order to renew approval for an additional period.

Please ensure that the Human Research Ethics Committee is notified should any substantive change(s) be made, for whatever reason, during the research process. This includes changes in investigators. Please also ensure that a brief report is submitted to the ethics committee on the completion of the research. The purpose of this report is to indicate whether the research was conducted successfully, if any aspects could not be completed, or if any problems arose that the Human Research Ethics Committee should be aware of. If a thesis or dissertation arising from this research is submitted to the library's electronic theses and dissertations (ETD) repository, please notify the committee of the date of submission and/or any reference or cataloguing number allocated.

Sincerely,

Dr Janet Hayward

Chair: Rhodes University Human Research Ethics Committee, RU-HREC

cc: Ethics Coordinator

APPENDIX D: STATISTICIAN CERTIFICATE

	Business Registration 2020/690397/07
25 November 2024	
<u>Statistician Certificate</u>	
This certificate is issued to state that the analysis performed in the dissertation THE RELATIONSHIP BETWEEN STUDENT ONLINE INTERACTION AND STUDENT SATISFACTION AT A SOUTH AFRICAN INSTITUTION OF HIGHER LEARNING (IHL) has employed appropriate statistical techniques performed by the undersigned statistician. The final interpretation and dissertation are the student's own work and responsibility, however, the guidance on results interpretation has been provided by the undersigned statistician.	
 Carmen Stindt Statistical Consultant carmen@eversci.com	