

**APPROACHES TO LEARNING AND THE INFLUENCE OF RAISING
METACOGNITIVE AWARENESS OF DEEP LEARNING AMONG
UNDERGRADUATE PHARMACY STUDENTS AT A PUBLIC
UNIVERSITY IN ZAMBIA**

By

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**A Thesis Submitted to The University of Zambia in Fulfilment of
the Requirements for the Degree of Doctor of Philosophy in
Health Professions Education**

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DEDICATION

This thesis is dedicated to the Kalungia family for the tremendous love, encouragement and moral support rendered throughout the time course of my studies. To my parents, my lovely wife Sylvia and gifted children Temwai and Mulunda, without whose sacrifice this work would not have been possible. To you I say a big thank you and may God bless you abundantly.

Glory be to the Almighty God for His faithfulness, for giving me the strength and grace to undertake this doctoral study successfully.

“I can do all things through Christ who strengthens me” – Philippians 4:13.

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ABSTRACT

This study investigated the approaches to learning and influence of a metacognitive educational intervention on deep learning among undergraduate pharmacy students. The study was necessitated by contextually relevant recurring concerns about attrition rates due to poor academic performance that remained relatively high over the years among the preclinical (Year 1 and 2) undergraduate pharmacy students at the University of Zambia (UNZA).

This study utilised a sequential multiple mixed-methods design. Firstly, a descriptive cross-sectional survey was conducted to determine the predominant approach to learning among the 2017 to 2018 undergraduate pharmacy students at UNZA. A modified Approaches and Study Skills Inventory for Students (ASSIST) questionnaire was employed to determine approaches to learning and teaching style preference. Secondly, qualitative focus groups were utilised to explore contextual factors affecting preclinical pharmacy students' learning efficacy. Lastly, a quasi-experiment was conducted to assess effects of a novel metacognitive educational intervention - a five-day elective module dubbed 'Orientation and Approaches to Deep Learning and Study Skills (OADLSS)' on preclinical pharmacy students' approaches to learning and academic performance. A modified short-version of the ASSIST was used to measure approaches to learning before and 4-weeks after the OADLSS intervention compared to a control group. Descriptive and inferential statistical methods were used to analyse quantitative data whereas deductive thematic analysis was used for qualitative data.

A strategic approach to learning was predominant among the majority (67%) of the undergraduate pharmacy students surveyed ($n = 147$). Only 25% adopted a deep approach to their learning whereas 7% were surface learners. Learning approach was statistically significantly associated with course load ($p = 0.028$) and programme stage ($p = 0.010$). Compared to pharmacy students in Year 1 level of study, those in Year 4 were 90% less likely to adopt strategic approach to learning (AOR = 0.1, 95% CI: 0.01 – 0.7, $p = 0.023$) on the B. Pharm. programme at UNZA. The majority (67%) of participants preferred teaching styles that transmitted information. Thematic analysis of qualitative focus groups yielded 4 themes, 8 subthemes and 22 categories. Managing notional time, the high course load, methods of teaching and assessment modalities, achievement motive, and the learning environment were among key contextual factors that affected pharmacy students' learning efficacy at UNZA. All the participants (100%, $n = 25$) exposed to the OADLSS elective module found it relevant and useful for enhancing their learning. Although there was not a corresponding significant increase in their deep learning scores, mean scores for strategic learning significantly reduced after the OADLSS intervention compared to the control group. When academic performance in summative assessments was compared, the Grade Point Average (GPA) scores were not significantly different between participants exposed to the OADLSS (2.51 ± 0.53 , 95% CI: 2.29 – 2.74) versus controls (2.47 ± 0.39 , 95% CI: 2.28 – 2.66; $p = 0.771$).

The predominance of a strategic approach to learning was largely influenced by the inadvertently high educational demands placed on undergraduate pharmacy students. The learning environment, educational strategies, and student-related factors were affecting learning efficacy at the university. Immediate influence of a metacognitive intervention aimed at promoting deep learning in pharmacy education was minimal. Educators and institutional policymakers can enhance interventions further by accompanying changes to the learning environment, educational

strategies, and assessment methods employed in pharmacy education. Remodelling these aspects in future research can potentially improve the quality of pharmacy education outcomes at UNZA.

Key words: Approaches to Learning, Deep learning, Educational intervention, Metacognitive awareness, Pharmacy students, University of Zambia

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ABBREVIATIONS AND ACRONYMS

AC	Abstract Conceptualisation
AE	Active Experimentation
A-level	Advanced Level
ALSI	Approaches to Learning and Studying Inventory
ASSIST	Approaches and Study Skills Inventory for Students
ATL	Approach to Learning
B.Pharm.	Bachelor of Pharmacy
CA	Continuous Assessment
CE	Concrete Experience
CI	Confidence Interval
GPA	Grade Point Average
DMED	Department of Medical Education Development
ELT	Experiential Learning Theory
FGD	Focus Group Discussion
HPE	Health Professions Education
IQR	Interquartile Range
LMIC	Low-Middle Income Country
OADLSS	Orientation and Approaches to Deep Learning and Study Skills
O' level	Ordinary Level
p	Probability value
PharmEd-QI	Pharmacy Education Quality Improvement

Pharm. Tech.	Pharmacy Technology
RASI	Revised Approaches to Studying Inventory
RO	Reflective Observation
SDF	Staff Development Fellow
UNZA	University of Zambia
UNZASOM	The University of Zambia, School of Medicine
VARK	Visual, Auditory, Reading and Kinaesthetic learning model
WAIS	Wechsler Adult Intelligence Scale

DEFINITION OF TERMS

Academic performance

The extent to which a student achieves the set learning outcomes or educational objectives as measured using Grade Point Average (GPA) scores attained in assessments on a course or study programme (McKenzie & Schweitzer, 2001).

Approaches to learning

Qualitatively distinct ways and methods that students go about their learning, adopt motive strategies for engaging a learning task and take to studying, depending upon the perceived objectives of the course or study programme. Categorized as: deep, surface, and strategic approach to learning (Marton and Saljo, 1997).

Assessment

Systematic method of obtaining information about what has been learnt, including the level of learning attainment, using structured tests and other sources of evaluation to draw inferences about characteristics of learners, people, objects, or programmes (AERA, APA, and NCME, 1999).

Attrition rate	Proportion (normally expressed as a percentage) of students that drop out of the study course or programme over a specified time frame due to either academic difficulty or failure to attain the set standard progression requirements (Maher <i>et al.</i> , 2013).
Course	In a curriculum, this refers to a building block of a programme, consisting of a time-limited component, usually over one term, one semester or an academic year and usually ending with a summative assessment (Uys and Gwele, 2005).
Credit	A numerical value which indicates the amount and rigour of learning to complete a course, module, training programme, degree and other qualification, based on the concept of notional hours (Isleta-Palatino, 2014).
Curriculum	A formal blueprint of planned learning experiences offered in a single programme (Uys and Gwele, 2005).
Educational objectives	The observable behavioural targets which a student who has completed an academic course or study programme

is expected to demonstrate and/or apply after completion of a learning process (Uys and Gwele, 2005).

Educational strategy

A theoretical approach to achieve the overarching aims or objectives of the training programme and directs the operation of the training situations, schedules, methods of facilitating and evaluating the learning to the extent that it creatively uses the pedagogical conception that is used (Harden *et al.*, 1984).

High-stakes assessment

An assessment where the result attained is used to make a significant decision that has consequences on the status, progression or future of a student (Harlen, 2007).

Intelligence quotient

A total score derived from one of several standardized tests designed to assess human intelligence (Taub and Benson, 2013).

Learning

A relatively permanent change in behaviour; which includes observable activity, internal processes such as thinking, attitudes, and emotions. Manifests itself after an educational process (Burns, 1995).

Learning environment	A social system that includes the setting, the learner, peers, teachers, and the purposes of interactions, including the formal and informal rules that govern the interactions in which learning occurs (American Medical Association, 2007).
Learning style	The attitudes and behaviours which indicate an individual's preference towards learning (Honey and Mumford, 1992).
Lesson plan	An outline of the instructor's road map of what students need to learn and how it will be done effectively during the learning activity (Milkova, 2012).
Meaningful learning	An active, constructive, holistic and long-lasting outcome of learning characterised by good retention and good transfer performance of knowledge, skills and attitudes acquired from an educational process (Newble and Cannon, 2002).
Metacognition	The knowledge, awareness and control of one's understanding and performance through critical

awareness of, and self-reflection on, one's thinking and learning (Brown, Armbruster and Baker, 1986). With regard to approaches to learning, this study addressed metacognitive awareness (what is known) and metacognitive regulation or control (knowing when, where, and how to use learning strategies (i.e. what one does or can do).

Module

A self-contained unit of study within a programme or course which can be evaluated separately (modular instruction) or at the end of the course (Uys and Gwele, 2005, Grant, 2010).

Notional hours

The amount of time it takes for an average student to master, use and achieve specific course intended learning outcomes to a certain course or module (Isleta-Palatino, 2014).

Pass rate

Proportion (normally expressed as a percentage) of examinees that successfully attain the set 'pass' standard and satisfy progression requirements of an academic course or programme (Maloney, 2020).

Preclinical

Stage or level of pharmacy training where students undertake foundational pharmaceutical and health science subjects before undertaking clinical-based learning activities and clerkships. On the Bachelor of Pharmacy programme offered at the University of Zambia, this refers to Year 1 and 2 (that is, 2nd and 3rd year) level (Kalungia *et al.*, 2019).

Programme

A coherent set of courses, leading to a certain degree, diploma or certificate. (Uys and Gwele, 2005).

Rote learning

An outcome of learning characterised by the memorisation of information based on repetition. The student seeks only to retain and later to recall some information, result or process, without necessarily making cognitive connections between the new learning and their existing network of understanding (Haylock, 2007).

Self-efficacy	An individual's belief in his or her capability to successfully complete a particular academic task (Bandura, 1989).
Study habits	External factors that facilitate the process of studying, in this case; comprehensive study routines that include how often a student engages in studying sessions, reviews the learning material, self-evaluates, rehearses explaining the material, and studying in a conducive environment (Credé, 2008).
Study skills	An array of skills used by a student to tackle the process of organizing and tackling studying, retaining information, and dealing with academic tasks. In this context, it refers to processes of learning and studying, time management, organizing and processing information; including motivation and attitude towards learning (Pritchard, 2008).
Summative assessment	Evaluation of students' level of learning and attainment of the set educational objectives at the conclusion of a defined instructional period (typically at the end of a

course, semester/term, academic year, level of study or programme) by use of tests, examinations and/or project work (Downing and Yudkowsky, 2009).

CHAPTER 1 : INTRODUCTION

1.1. Background

Globally, training of health professionals is shifting paradigms from a focus on educational processes to educational outcomes (Norcini *et al.*, 2013). Similarly, in response to the changes in new scientific discoveries, technological trends and growing disease burden, as well as the advanced competencies required of pharmacists for contemporary and future practice as health professionals, pharmacy education is transitioning from primary focus on drugs and medicinal products to patient care (International Pharmaceutical Federation, 2014). This is because pharmacists today are expected to deliver a range of patient-centred pharmaceutical care services designed to meet the complex needs of patients and communities they serve (Ried and Posey, 2006, Smith *et al.*, 2010, Saramunee *et al.*, 2014). Consequently, contemporary pharmacy training curricula should be tailored towards ensuring students attain requisite competencies (knowledge, skills and attitudes) required to practice as healthcare professionals. This, therefore, requires, in addition to quality teaching, pharmacy students adopting learning approaches that enable them to acquire, express and apply knowledge, professionalism, critical-thinking, problem-solving and life-long learning skills (Ofstad and Brunner, 2013, Gilliam *et al.*, 2018).

In contemporary health professions' education (HPE) practice, what the learner does and becomes has become important in defining educational outcomes (Biggs and Tang, 2011). This study contended that educational strategies enshrined in curricula and how educators go about facilitating learning have the potential to influence how students approach their learning. Approaches to Learning (ATL), as earlier described by Marton and Saljo (1997), refer to qualitatively distinct ways and methods that students go about their learning, adopt motive strategies for engaging a learning task and take to studying, depending upon the perceived

objectives of the course or study programme (Marton and Saljo, 1997, Lublin, 2003). Educational research has elucidated a tripartite model that identifies three main ATL as follows: ‘Deep’, ‘Surface’, and ‘Strategic’ ATL respectively (Marton and Saljo, 1997; Entwistle *et al.*, 2001, Lublin, 2003). ‘Deep’ ATL involves seeking meaning, understanding and transforming knowledge, making use of and connecting evidence. Students that utilise a deep ATL thrive on intellectual challenge and strive to understand information and ideas for themselves (Entwistle *et al.*, 2001, Entwistle and Peterson, 2004, Stover and Seemiller, 2017). ‘Surface’ ATL is characterised by student’s intention to accomplish the bare minimum requirements of the syllabus, routine memorisation, lack of purpose and fear of failure, whereas ‘Strategic’ ATL involves organised studying where the student’s intention is to maximise efficiency and efficacy when studying, paying special attention mainly to assessment demands so as to achieve high grades (Marton and Saljo, 1997, Entwistle *et al.*, 2001, Lublin, 2003).

A growing body of evidence suggests students’ ATL can influence educational outcomes (Brown *et al.*, 2015, Tsingos *et al.*, 2015b, Dolmans *et al.*, 2016). As earlier explained by Entwistle and Ramsden (1983), the student’s motive characterises each ATL (Entwistle and Ramsden, 1983). Whether motives towards adopting a particular ATL are dynamic and influenced by prevailing educational exposures or are fixed traits among student groups remains to be further elucidated through scientific research. Interestingly, it has been observed that under similar conditions, same learning environment, same lecturers, same courses, same teaching system, same institutional practice, same enrolment criteria, same time course of learning activities for specific academic courses and same education level; some students in higher education perform well academically while others do not (Cerna and Pavliushchenko, 2015, Enns *et al.*, 2016). Questions arise as to what aspects predominantly influence this difference in educational outcomes and strategies to best facilitate the learning of diverse students. This is a phenomenon amenable to scientific interrogation. Scholars argue

that there is a good reason to believe that many of the teaching approaches, curriculum structures and, particularly, the assessment methods, may be inhibiting the use of the deep ATL and perhaps supporting and rewarding the use of the surface, or strategic ATL (Newble & Cannon, 2002).

In Zambia, the University of Zambia (UNZA) – the country’s oldest and largest public university, has been training pharmacists since 2001 (Kalungia *et al.*, 2019). Currently, it is the only public university locally training pharmacists at undergraduate and postgraduate levels. The university offers a 4-year full-time undergraduate Bachelor of Pharmacy (B.Pharm.) degree programme whose curriculum structure consists of two principal stages of training as follows: preclinical and clinical stage, respectively. In the preclinical stage (BPharm year 1 and 2), students undertake basic pharmaceutical and health science subjects which are pre-requisite to the clinical stage (BPharm year 3 and 4) where they undertake clinical subjects and experiential learning exposures in the relevant pharmaceutical care domains, in addition to undertaking a final year research project (Kalungia *et al.*, 2019).

The teaching and learning approach on health science-based programmes at UNZA is predominantly lecture-based, supplemented by group tutorials, laboratory practical sessions, field placements and clinical clerkships. Similarly, this is the current approach to teaching and learning adopted for undergraduate pharmacy students at UNZA. In the preclinical stage of pharmacy training (BPharm Year 1 to 2), students are taught predominantly using lectures and laboratory practical sessions, whereas in the clinical stage (BPharm year 3 to 4), a combination of lectures, group tutorials and clinical clerkships are used. Summative assessments for undergraduate pharmacy students at UNZA largely consist of continuous assessment tests, assignments, and written examinations.

Since inception, the B.Pharm. curriculum has undergone regular review, with the most recent being in 2017 – all in an effort to make the training programme more responsive to contemporary demands of local and international pharmaceutical practice. Arguably, in all its iterations, much emphasis has been placed on content coverage of the B.Pharm. curriculum whereas little attention has been explicitly paid to understand how individually or collectively pharmacy students actually learn, including the factors that negatively influence the learning outcomes of students.

Scholars have argued that the ideal educational environment is not just about the quality of teaching alone but that which promotes students' motivation to acquire, master and apply a deep understanding of the learnt material, as well as develop self-directed and independent study skills (Elliot and Church, 1997, Entwistle and Ramsden, 2015). It is with such an approach to teaching and learning that pharmacy training programmes must aspire to instil in their students so that competent pharmacists with critical thinking, problem-solving and life-long learning skills are produced for the health sector at all times (Ofstad and Brunner, 2013).

Recent evidence about ways a student in higher education tackles their day-to-day academic tasks has drawn attention to the need to think of learning as the outcome of a whole range of interacting influences and factors. These influences depend, in part, on the educational environment (Yusoff and Arifin, 2015, Enns *et al.*, 2016, Ezeala, 2016), individual characteristics of learners, their approaches and their experiences in education (Entwistle and Ramsden, 2015). Factors may also depend on current learning experiences within the academic courses they are taking (Entwistle *et al.*, 2002), the quality of teaching (Ellis, 2018), and on the nature of the assessment procedures (Rowntree, 2015). At UNZA, there is currently insufficient evidence and frameworks which allow educators and policymakers to better understand how their students learn and why some students do well, while others do poorly when undertaking

Health Professions' Education (HPE) programmes. Such evidence is required to inform the development of best educational practices and policies that support learning for diverse student groups so that they effectively acquire valuable competences to practice and perform in accordance with the high expectations of their respective professions, the society, and the healthcare industry in general when they graduate.

In Zambia's pharmacy education sector, definitive research that interrogates how students prefer to learn pharmaceutical sciences has been lacking. This present research targeted the quality improvement of learning outcomes for university students undertaking pharmacy education in Zambia. Improved learning outcomes for pharmacy students were premised, in the long term, to positively impact on the quality of pharmacists graduating from the university who will, in turn, go on to provide quality pharmaceutical care services, train others, and manage health system resources as they practice their profession.

1.2. Statement of the problem

1.2.1. Background to the research problem

At UNZA School of Health Sciences, there was a recurring concern that attrition rates due to high failure rates and poor academic performance among preclinical (B.Pharm. Year 1 and 2) undergraduate pharmacy students had remained relatively high over the years. This was despite largely enrolling perceivably intelligent and high achieving students (as adjudged from their previous high school O' level, A-level and other educational attainment scores) that are selected through a highly competitive admission process at all entry points of the B.Pharm. programme. The programme admits students using main quota selection into Year 1 (for those who meet the point-based quota selection criteria after successful completion of foundational A-level study in the School of Natural Sciences); direct entry into Year 1 (for those that have completed requisite A-level subjects and/or other relevant qualification admissible); and direct

entry into Year 2 (for those with a diploma in pharmacy technology who meet the university admission criteria) (Kalungia *et al.*, 2019).

A preliminary desk review of overall attrition rates on the B.Pharm. programme from 2011 to 2016 (Figure 1.1) revealed higher fail rates among preclinical level (B.Pharm. Year 1 and 2) students compared to their clinical level counterparts (B.Pharm. Year 3 and 4), respectively.

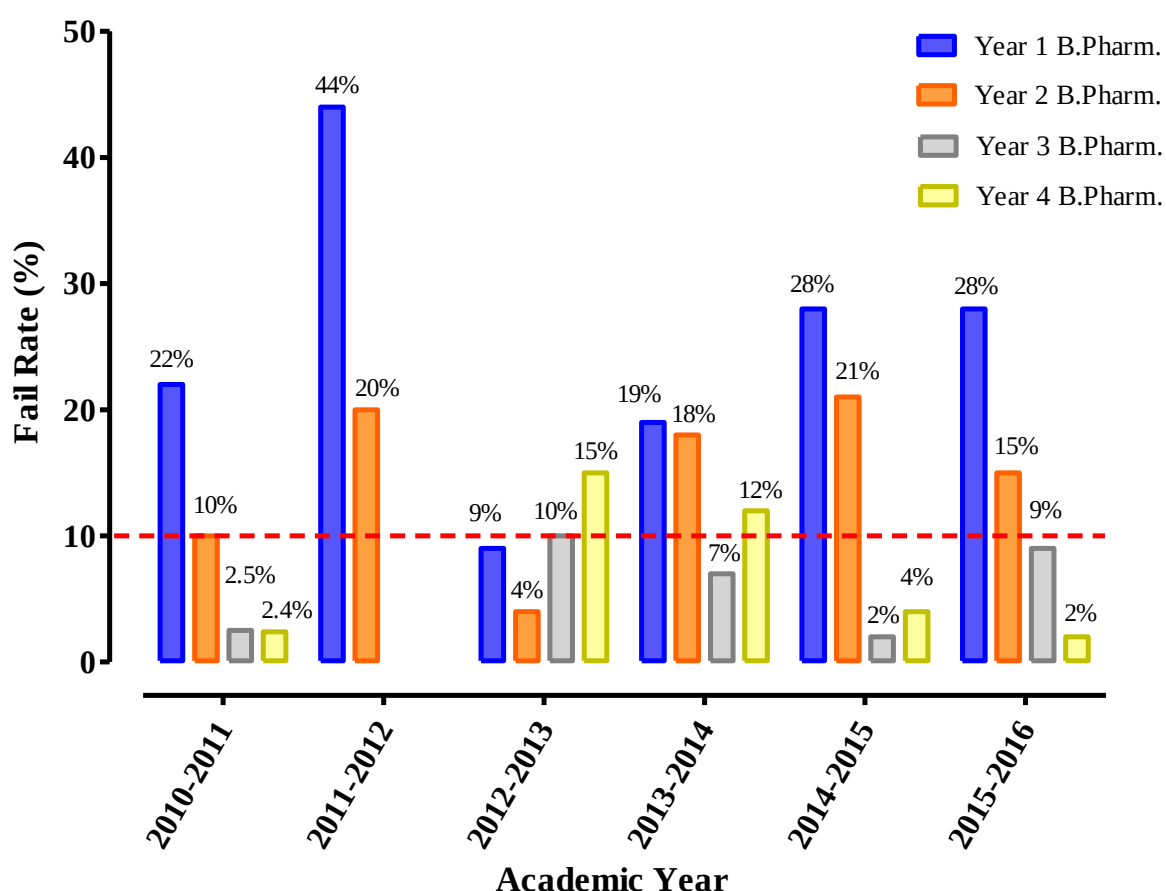


Figure 1.1. Attrition rates among cohorts of undergraduate pharmacy students 2010 to 2016. (Data Source: UNZASOM Senate Examination Reports, 2010 – 2016)

In the six years reviewed, attrition among Year 1 and Year 2 undergraduate pharmacy students at UNZA averaged 25% and 17% respectively, taking class sizes into account. Though attrition rates vary by institution and context, an average attrition rate below 10% was considered acceptable for an undergraduate pharmacy degree programme (Hassel *et al.*, 2007).

The relatively high attrition rates among preclinical pharmacy students at UNZA were a cause for concern. Whereas this comparison of attrition rates between preclinical and clinical pharmacy students provided valuable retrospective insight into the core problem at hand, available information fell short of capturing the attributes of students at risk of attrition, and reasons for the prevailing attrition rates. Consequently, findings of this present study were premised to elucidate key factors likely to explain this occurrence, and tentative interventions that may be considered. In pharmacy education, the imperative need to conduct diagnostic studies to identify, with the aim of addressing, factors associated with or encouraging suboptimal academic performance among students cannot be understated.

Prior to this study, it was not known how undergraduate pharmacy students at UNZA prefer to learn and the contextual factors that impacted their learning efficacy, studying habits and academic performance in assessments. This research interrogated these attributes of learners in more detail in an undergraduate pharmacy student population at the university.

1.2.2. Justification of the study

Existing educational research evidence suggests students' approaches to learning (ATL) may enhance or undermine educational outcomes (Brown *et al.*, 2015, Tsingos *et al.*, 2015a). Other evidence also demonstrated that passive, surface learners rarely do well in medical schools whereas an active, deep learning approach was more likely to be associated with higher quality learning outcomes in the health sciences (Mattick *et al.*, 2004). The motivation and relevance of this study was founded on the premise that locally, it was not known whether pharmacy students' existing ATL and teaching style preference were a response to the educational environment (Ezeala, 2016), and inadvertent educational demands placed on students or were a pre-existing tendency (Beaten *et al.*, 2016). Either way, knowing about these attributes warranted educational interventions.

Considering the recurring relatively high attrition rates prevailing among cohorts of undergraduate pharmacy students at the university (Figure 1.1), this research was timely and drew its importance on two philosophical directions: Firstly, this research contributed contextually relevant local evidence of how ATL influence students' educational outcomes on a health professions programme in Zambia, including elucidation of the predominant contextual factors underpinning this influence that can be addressed. Secondly, a growing body of evidence has diagnosed that most students undertaking health science programmes lack good learning and study skills (Hosseini *et al.*, 2006, Didarloo and Khalkhali, 2014, Ezeala and Siyanga, 2015) - a situation which can negatively impact on their self-efficacy during academic tasks such as assessments (Wernersbach, 2011, Bernacki *et al.*, 2015). Recent local evidence also diagnosed that undergraduate pharmacy students at UNZA lacked adequate study skills (Ezeala and Siyanga, 2015). A 2016 survey report on teaching and learning contribution at UNZA's School of Medicine disseminated by the Department of Medical Education Development (DMED) at UNZA highlighted that the majority (86%) of undergraduate students enrolled at the School of Medicine rated education quality, assessment quality and teaching contribution of lecturers as average (5/10 score). Moreover, undergraduate pharmacy students perceived their course workload as heavy and pace of courses as fast (UNZA-DMED, 2016). In another recent study of undergraduate medical, pharmacy and physiotherapy students at UNZA, though students perceived their educational environment as being more positive than negative (Ezeala, 2016), contextually specific and relevant educational interventions to address these learning gaps are therefore required.

Each of these important pieces of reviewed evidence informed an eminent gap in the local context. This study envisaged addressing the gap by locally designing, developing, experimenting and evaluating an educational intervention aimed at raising metacognitive awareness of deep learning approaches and study skills evidenced to be associated with

meaningful learning outcomes. This evidence was required to inform possible future educational strategies and teaching practice in HPE not only in Zambia but other settings where the evidence was applicable. In consonant with Norcini and Banda's (2011) argument, educational research evidence demonstrating quality improvement of learning outcomes is required to inform the health educational reform agenda of the 21st century (Norcini and Banda, 2011).

1.3. Research questions

This study investigated the following overarching research question: How does raising metacognitive awareness of deep learning and studying strategies influence the approaches to learning and academic outcomes among undergraduate pharmacy students at UNZA?

To adequately address this question, the following sub-questions were derived to focus and guide the phases of the investigation:

Phase 1 sub-questions:

- i. What approach to learning is predominant among the undergraduate pharmacy students?
- ii. Which teaching style is predominantly preferred by undergraduate pharmacy students at the university?

Phase 2 sub-question:

- iii. What are the contextual factors impacting the learning efficacy of undergraduate pharmacy students on the B.Pharm. programme at UNZA?

Phase 3 sub-question:

- iv. Does raising metacognitive awareness of deep learning and studying strategies using a structured educational intervention (a 5-day adjunct elective module dubbed

‘Orientation and Approaches to Deep Learning and Study Skills’) influence changes to the approaches to learning and academic outcomes of pharmacy students?

1.4. Research objectives

1.4.1. General objective

To determine the influence of raising metacognitive awareness of deep learning and studying strategies on approach to learning and academic outcomes among undergraduate pharmacy students at UNZA.

1.4.2. Specific objectives

1. To determine the predominant approach to learning among undergraduate pharmacy students enrolled in 2017 to 2018 academic year.
2. To explore contextual factors impacting the learning efficacy of students on the B.Pharm. programme.
3. To assess the effect of a metacognitive educational intervention (a 5-day adjunct elective module dubbed ‘Orientation and Approaches to Deep Learning and Study Skills’) on approaches to learning and academic performance of preclinical pharmacy students.

1.5. Outline of the thesis

This thesis was arranged into six (6) chapters. Chapter 1 provides background to the study, outlines the research problem at hand and why it was investigated, including the relevance and importance of the study. Aspects of the limitations encountered and the delimitations are also described. Importantly, this chapter presents the aims and objectives of the study as guided by the research questions that informed the focus of scientific enquiry.

In Chapter 2, the dominant theoretical concepts and empirical evidence about how students learn, and the relationships these have with educational outcomes were reviewed. A three-phased approach was taken to the review of literature. Firstly, the review identified and described relevant theories about learning and how these theories informed the present study. Secondly, an empirical review of relevant published evidence from studies on the subject of ATL and how the different approaches impact on academic performance of university students was undertaken. This identified emergent gaps in the existing evidence that this study conceptually envisaged addressing. Lastly, the review highlights empirical evidence of contextual factors scholars have found to affect learning experiences and academic performance of undergraduate pharmacy students in other settings. The chapter then describes and explains the conceptual framework underpinning this research.

The methodology underpinning this study is outlined in Chapter 3. This chapter describes the research paradigm, design, and methodology employed to investigate the research questions posed. In this chapter, details of the study populations, sampling, data collection tools, methods and procedures data were collected and analysed are described. Importantly, aspects pertaining the ethical considerations of the study were also addressed in this chapter.

The results of the study are presented in Chapter 4 of this thesis. The presentation of results ensured that critical details and descriptions of the findings followed the logical derivation of relevant conclusions. Figures, tables, and charts were utilised to illustrate the quantitative results whereas emergent themes, subthemes and descriptive verbatim quotes were used to explain the qualitative findings accordingly.

Chapter 5 discusses the results, derives meaning and contributions made, explains the implications and impact of the results, and subsequently creates new evidence that can be

utilised for decision-making in educational practice. Relevant literature to substantiate, compare and draw the meaning of the results were also discussed therein.

This thesis wraps up with Chapter 6 which presents the factual and conceptual conclusions derived from the relevant findings that answered the research questions. Based on the derived conclusions, recommendations for decision-making were addressed to the relevant stakeholders, educational policymakers, and implementers of pharmacy education programmes. It is hoped that readers of this thesis will find it valuable for enhancing positive strides towards quality improvement of health professions education.

CHAPTER 2 : LITERATURE REVIEW

2.1. Introduction

In this chapter, relevant published literature was reviewed. From the literature, key theories and empirical evidence provided a clear understanding of what learning is and how it can be effectively facilitated in the various educational settings, including the principal approaches to learning (ATL) adopted by students on HPE programmes which other scholars investigated elsewhere. Importantly, the review focussed on relevant existing evidence linking pharmacy students' ATL to their educational outcomes. This chapter further outlines and explains the conceptual framework underpinning this study as constructed and informed by existing theoretical and empirical evidence.

2.2. Situating approaches to learning within the context of learning theories

Learning theories are an organized set of principles explaining how individuals acquire, retain, and recall knowledge (Kelly, 2012). A clear understanding of what learning is and how it can be effectively facilitated in an educational setting was an important aspect of this study. Notwithstanding that learning, its causes, processes and outcomes have been viewed by scholars using different lenses, one universally agreed principle is that learning involves a relative change in behaviour, endures over time, and occurs through experience and educational processes (Burns, 1995, Brockbank and McGill, 2007). Furthermore, learning involves acquiring and modifying knowledge, skills, beliefs, attitudes, strategies and actions (Schunk, 2012). Leading theorists have identified and legitimized three main learning domains. These are the cognitive, psychomotor, and affective domain, respectively (Bloom, 1956, Krathwohl, 2002). Original and revised taxonomies, for example, Bloom's taxonomy of the cognitive domain; Dave's classification of psychomotor ability; and Krathwohl's classification of the

affective domain, by which each learning domain is characterized and measured have not only been extensively described (Amin and Khoo, 2009), but also widely utilised in HPE evaluations (Su and Osisek, 2011, Adams, 2015).

Having defined what learning is, and the domains within which it occurs, it can therefore be argued that the most objective way of determining whether learning has taken place is through evaluating outcomes based on what the learner says or writes (that is; cognitive articulation of acquired knowledge), and does (that is; psychomotor and affective demonstration of acquired skill or behaviour) in a given discipline or field. Learning is therefore adaptable, intuitive, inferential and observable through outcomes (Popham, 2008, Suskie, 2018). As described by Downing and Yudkowsky (2009), there are various methods of assessing learning in HPE and can include: direct observations of skills and behaviours; assessing written responses on tests or examinations, quizzes, papers and projects; oral responses, self-reports, and ratings by observers, judges or examiners, and peers (Downing and Yudkowsky, 2009).

To effectively facilitate learning, it has become imperative for students and educators to examine and reflect on their individual approaches, beliefs and assumptions about learning (Blossing and Ertesvåg, 2011, Benade, 2015). Once this is generally clear to the student, it follows that the most relevant theoretical perspectives begin to emerge in the course of their learning. From an evaluation perspective, Dunn & Griggs (2000) earlier highlighted that one important outcome towards facilitating learning has been a paradigm shift of focus in instructional strategies from identification of a 'one approach fits all students' to identification of instructional strategies responsive to students with selected characteristics, particularly when the students are confronted with challenging academic tasks (Dunn and Griggs, 2000).

Although conceptual differences exist between learning theories and models of approaches to learning, the two concepts exchange fundamental cross-talk. Why this is so is because learning theories such as behaviourism, cognitivism, and constructivism, as described by Ertmer and Newby (2013), inform instructional design (Ertmer and Newby, 2013) and to a great extent ways that students adapt their learning.

Literature describes epistemological perspectives of behaviourism, cognitivism, and constructivism as leading learning theories applied in educational practice. This review considered these perspectives and how they can be applied in contemporary undergraduate pharmacy education contexts. The epistemological perspective of behaviorism follows that learning is through passive absorption of a pre-defined body of knowledge promoted by reiteration and reinforcement, that is, positive reinforcement (for example, reward) or negative reinforcement (for example, penalty) (McLeod, 2015). In terms of application in contemporary pharmacy education practice, behaviourism can be appropriately applied to learning routine tasks (such as pharmaceutical procedures in the pharmacy) or for fast, easy recall of facts learnt in the pharmaceutical sciences. This theory is, however, not ideal where learning for understanding is required. With cognitivism, learning involves active assimilation and accommodation of new knowledge to existing cognitive structures (schemas) which build up notional mental frameworks for storing, remembering and understanding information (Pritchard, 2008). This theory finds application in learning that involves building on and improving educational experiences (for example, experiential learning in pharmaceutical sciences, including the advancing of prior learning from diploma to degree level pharmacy). Learning that occurs when new knowledge is constructed from educational experiences and added on to an individual's current structure of knowledge, understanding and skills is what informs the epistemological perspective of constructivism (Wray and Lewis, 1997). In pharmacy education, constructivist approaches find useful application to facilitate learning that

involves students actively constructing their own understanding through active systems of intentional mental constructions (metacognition), situated processes, and contexts (social, cultural or educational), including representations derived from experiences. It was this epistemological perspective that guided consideration to apply constructivism to drive the conceptual framework of this study. The underlying principles espoused by the behaviourism, cognitivism, and constructivism learning theories explained above can be used as guidelines to help select instructional tools, techniques and strategies that promote learning to take place (Kelly, 2012, Khalil and Elkhider, 2016). Importantly, constructivism, as a learning theory, did inform useful components of the conceptual framework of this study. In utilising this learning theory in this study, the researcher argued that HPE programmes like pharmacy should aim at training students to actively construct own understanding of pharmaceutical concepts through active systems of intentional mental constructions (metacognition), situated in processes and contexts of pharmaceutical practice, including representations derived from experiences with the various practicum learning environments students are exposed to. It should be clear from the onset that the intention of this study was to neither establish nor quantify metacognitive ability of learners (pharmacy students) but to embed the theoretical principle of metacognition in an educational intervention to moderate learning behaviours of learners. As espoused by John Flavell (1987), metacognition deals with enhancing knowledge of, awareness about, and control of one's cognitive learning. In pursuing this argument, the following were considered: firstly, the level of knowledge the learners expect to harness in pharmacy education; secondly, the thought processing demands (of the content proposed in the educational intervention); and lastly, the desired state (that is; adoption of deep learning as an outcome). Although with constructivism, outcomes are not always predictable because learners construct their own knowledge based on their perceived need for it (Kelly, 2012). These were important considerations for the conceptual framework of this study.

Whereas in a number of pharmacy schools that use traditional curriculum models, teaching and learning approaches often transition predominantly within objectivism and behaviourism theories of learning, it can be argued whether such approaches attain meaningful learning outcomes in the learners. Educators operating within a purely objectivist paradigm believe that a course must present a body of knowledge to be learned - consisting fundamental principles, facts, terminology, formulas, and theories alike, the effective transmission of this body of knowledge becomes the central focus of the educator (Bates, 2016). Using this approach, it is not surprising that lectures and textbook readings are authoritative, informative, and organized in the course or curriculum. In objectivism, the student's responsibility is to accurately comprehend and reproduce the knowledge handed down, within the guiding epistemological framework of the discipline. Course assignments and assessments would, therefore, require students to identify 'correct answers' and perhaps explain or justify them accordingly. Original or creative thinking must still operate within the standards of an objectivist approach (Bates, 2016). This, arguably, is somewhat a limitation to developing critical and independent thinking for a learner at undergraduate level. This is because an 'objectivist' educator has much control of what and how students learn, chooses what is important to learn, the sequence of learning, the learning activities, and how learners are to be assessed (Bates, 2016). Complementing this approach are behaviourist educators who believe the objectivist approach must be accompanied by a certain stimulus (reward or punishment) and reinforcement that models behaviour and drives learning (Skinner, 1968).

Constructivism, as a theory of learning, emphasises the importance of conscious decision-making, free will and social influences on learning. Constructivists educators believe that meaning or understanding is achieved by assimilating information, relating it to existing body of knowledge, and cognitively processing it, that is, thinking or reflecting on new information (Bates, 2016). Making a learner cognisant of this ability and learning how to

construct their learning, reflect on the process, and make self-advancement decisions is an attribute of metacognition. Constructivists argue that individuals consciously strive for meaning to make sense of their environment in terms of past experience, what they have learnt, and their present state. This is one of the attributes of deep learning approach. Consequently, constructivists educators promulgate a dogma that learning is a constantly dynamic process and that understanding of concepts or principles develops and becomes deeper over time. How this could tentatively be mediated using a targeted instructional intervention was the subject of this study.

2.3. Theories and models of learning approaches

Early conceptions of learning and the ways individuals learn differently, as postulated by several renowned theorists such as Cronbach (1957), Marton & Saljo (1976) and Skinner (1983), gave rise to the consideration of ATL and learning styles. Honey and Mumford (1992) described learning style as a description of the attitudes and behaviours which indicate an individual's preference towards learning (Honey and Mumford, 1992). Since the learning style theory recognises that a learner's cognitive, affective, psychological, and sociological patterns determine their educational outcomes, it is therefore expected that instructors might tailor their teaching style in congruence with their students' learning styles (Romanelli *et al.*, 2009). However, many such theories have been criticised for being mere measures of learner's personality and do not adequately reveal what makes identical instruction effective for some learners but ineffective for others (Kirschner, 2017). Research evidence has however revealed and demonstrated strong relationships between students' ATL and studying strategies, their conceptions of learning, and perceptions of their academic context (Richardson, 2005).

The following are leading theories and models of learning approaches considered relevant in the context of this study and have demonstrable wide application in a number of educational settings worldwide:

2.3.1. Marton and Saljo's model of Approaches to Learning and Studying

Earlier work by Marton & Saljo (1976) established that high-level understanding of course material by students was related to deep learning approach whereas superficial or low-level understanding was related to surface learning approach (Marton and Saljo, 1976, Entwistle and Ramsden, 1983, Marton and Saljo, 1997). Their works conceptualized an emergent model of 'Approaches to Learning' which centred around four main modes of learners' orientations: meaning, reproduction, achieving, and holistic orientation, respectively (Cassidy, 2004). Learners' tendencies towards these combinations categorises their learning into a tripartite model consisting three main construct categories: 'Deep learning' - where intention is to understand, relate ideas, use of evidence, and actively learn for application; 'Surface learning' - where intention is to reproduce, characterised by unrelated memorization, passive learning, and fear of failure; and lastly, 'Strategic learning' - where intention is to excel and there is study organization, time management, and alertness to assessment demands (Cassidy, 2004, Entwistle, 1998, Entwistle *et al.*, 2002, Entwistle *et al.*, 2013b, Marton and Saljo, 1997). A fourth category was also described as: 'Apathetic learning' approach - where the learner lacks direction and lacks interest.

In educational psychology, concepts such as ATL strongly focus attention on the need for educators to be aware of the types, motives, levels of internal cognitive processing and differences in the way students go about their academic work and how these variables are affected by different types of teaching, instruction and assessment regimens (Entwistle *et al.*, 2002, Khalil and Elkhider, 2016). The tripartite model of ATL suggests that students' own experiences (Entwistle *et al.*, 2002), conceptions of learning (Marton and Saljo, 1997),

epistemological beliefs (Hofer and Pintrich, 1997), and motivation for studying (Clayton, 2016) and learning orientations (Beatty *et al.*, 2005) can influence the quality of learning – attributes which can be measured and evaluated using validated tools. The tripartite model of ATL reliably informed fundamental aspects of the conceptual framework underpinning this study and provides useful validated methods for evaluating students' ATL in the local context. For instance, the 'Revised Approaches to Study Inventory' (RASI) developed in 1995 by Entwistle and Tait identified three approaches to learning: deep; surface; and strategic, respectively and three study skills: lack of direction; academic self-confidence and metacognitive awareness of studying, respectively (Cassidy, 2004). Entwistle and colleagues (2002) developed the 'Approaches to Learning and Studying Inventory' (ALSI) from a previous earlier version of the RASI and ASSIST tool (Entwistle *et al.*, 2002). The strength of this inventory builds on its extensive use in psychometric measurement and evaluation of approaches to learning (deep, surface, strategic); constructive thinking (relating ideas); and study skills among others (Simelane-Mnisi and Mji, 2017, Entwistle *et al.*, 2013a). Currently, the original and short versions of ASSIST inventory continue to be widely utilised for educational research in many international universities (Coffield *et al.*, 2004, Diseth *et al.*, 2006, Diseth, 2007, Subasinghe and Wannianchi, 2009, Brown *et al.*, 2015, Simelane-Mnisi and Mji, 2017).

It is worth distinguishing approaches to learning from cognitive or learning styles. On the one hand, Marton and Saljo's model describes approaches to learning in qualitatively distinct tripartite dimensions with the emphasis, as argued by Entwistle and colleagues, being the learning intention, level of engagement and involvement with the learning task (depth of processing applied) by the learner. Kolb (1984) and other scholars on the other hand, promulgated a learning style theory encompassing a number of components that are not mutually exclusive.

2.3.2. Kolb's experiential learning theory

The Experiential Learning Theory (ELT) postulated by David Kolb described learning as the process where knowledge is created through the transformation of experience (Kolb *et al.*, 2000). According to this theory, knowledge, therefore, results from the combination of grasping and transforming experience. The ELT conceptualised learning as the holistic engagement of affective, perceptual, cognitive, and behavioural processes (Kolb *et al.*, 2000). Kolb's model has enjoyed popularity in HPE (DeCoux, 2016, Fewster-Thuente and Batteson, 2018) as it portrays learning in a four-stage hypothetical learning cycle that forms two orthogonal bipolar learning dimensions, that is; two dialectically related modes of grasping experience: (i) Concrete Experience (CE; which favours experiential learning), and (ii) Abstract Conceptualisation (AC; where learner preference is for conceptual and analytical thinking in order to achieve understanding). The other two are dialectically related modes of transforming experience: (i) Reflective Observation (RO; characterised by reflective thinking and extensive consideration given to the task before and generating potential solutions before attempting action), and (ii) Active Experimentation (AE; involving active trial & error learning), respectively (Kolb *et al.*, 2000). The learner's relative positioning along these dimensions defines their learning style which Kolb and colleagues (2000) described as convergence, divergence, assimilation, and accommodating, respectively (Cassidy, 2004).

It is important for educators to understand the dominant role learner experience plays in the learning process. According to Sims and Sims (1995), the ELT proposed that the foundation of learning resides not in schools, books, or even teachers; rather, it rests in the experiences of the learners (Sims and Sims, 1995). This democratic approach to education emphasizes self-directed learning and the creation of a suitable educational environment. The Learning Style Inventory (LSI) developed by Kolb in 1971 (and regularly updated thereon after) has been widely used to measure learning styles of students in various trades, settings

and environments (Cassidy, 2004, DeCoux, 2016). The LSI is used to identify the four statistically prevalent learning styles as follows: Diverging, Assimilating, Converging, and Accommodating style, respectively (Kolb *et al.*, 2000). While some scholars, for instance, Kirschner (2017) have expressed concerns about measuring learning styles, the psychometric properties of Kolb's LSI, its reliability and validity, though widely debated, have been verified by plethora of research evidence (Verez *et al.*, 1991, Tsingos *et al.*, 2015a, DeCoux, 2016).

While Kolb's model explores learning from a four-stage hypothetical cycle of concrete experiences, abstract conceptualisation, reflective observations, and active experimentation that are continuous and interactive processes, Marton and Saljo's model arguably presents an alternative angle. It talks about learning from the notion of intention as an adaptive option (strategy-based) than a style that might be more automatic (trait-based) in a given learning task situation. Although Kolb's theory suggests that a potential for change in style exists, it shares close cross-talk with Dunn and Dunn's traits model of learning style, except for aspects of instructional preference and social interaction (Cassidy, 2004).

2.3.3. Dunn and Dunn's learning style model

In their book, Dunn and Dunn (1999) described learning style as a biologically and developmentally determined set of personal characteristics that make the identical instruction effective for some students and ineffective for others (Dunn and Dunn, 1999). In this regard, their model seemed to suggest that how an individual learns is determined through personal reactions to each of the elements of their learning style when concentrating on new and challenging academic tasks. Dunn and Dunn's learning style model is based on the following assumptions: firstly, that most individuals can learn; secondly, different people have very different learning strengths (that is; visual, auditory, kinaesthetic, and tactual); and lastly, instructional environments, resources, and approaches should respond to diverse learning style strengths (Dunn and Dunn, 1999, Dunn and Honigsfeld, 2013). Their model supposed that a

person's learning style is comprised of both biological and developmental characteristics that make identical instructional environments, methods, and resources effective for some learners and ineffective for others (Dunn and DeBello, 1999). Some scholars, however, argued that although individual instructional and perceptual preferences may exist, Dunn and Dunn's model was not recommended for use in educational practices until a number of issues regarding the model, and the evidence in the literature have been resolved (Klitmøller, 2015).

Arguably, the traits-based model of learning style debate associating learning to human physiological characteristics such as personality is at variance particularly in the context of Burn's (1995) conceptual definition of what learning is – a relatively permanent change in behaviour that manifests after an educational process. Whereas Dunn and Dunn remain advocates of the traits model of learning, Fleming brings to the discourse the perceptual modality theory of learning preferences.

2.3.4. Fleming's Visual, Auditory, Reading and Kinaesthetic (VARK) model

The VARK model by Neil Fleming consolidated the sensory modality notion that learners are identified by their preference for visual, aural (auditory), reading and writing, or kinaesthetic learning (Leite *et al.*, 2010). Fleming's VARK model measures four perceptual sensory modalities as follows: Visual learners learn best by seeing (through graphics displays and visual aids); Aural (auditory) learners learn best by listening and hearing information (through lectures, discussions, and so on); Reading and writing learners best learn by taking in written information displayed as text or words (through textbooks and written notes); and Kinaesthetic (tactile) learners learn best by doing and experiencing (through active experimentation) (Fleming, 2016). Arguably, Fleming's VARK model deals with only one dimension of the complex amalgam of preferences that make up a person's learning preference. According to Fleming, outputs of the VARK questionnaire focus on the ways in which people

prefer information to come to them, and the ways in which they prefer to deliver their communication (Fleming, 2016). A number of studies (Balasubramaniam and Indhu, 2016, O'Mahony *et al.*, 2016, Giuseppe *et al.*, 2019) have utilized the VARK model to evaluate different attributes of student learning styles and preferences in HPE. However, existing evidence also suggests the VARK model is less robust on aspects of personality, motivation, social preferences, physical environments, or introversion-extroversion attributes of learners (Cassidy, 2004, Fleming, 2016).

From the foregoing theoretical review, the various leading models and theories all seem to suggest that understanding how students learn individually and collectively was not only likely to help educators recognize the causes of some academic problems the students may face, but lead to better planned and differentiated instruction that achieves meaningful learning outcomes. The present study interrogated this alleged possibility further.

2.4. Relationship between approaches to learning and academic performance

In trying to understand whether the nature and extent of the relationship between ATL and academic performance is a supposed assumption or is indeed well-established by scientific evidence, it was important to consider the emerging literature on the practice of assessment.

Assessment remains one of the key factors with a most powerful influence on how students learn (Norcini *et al.*, 2013, Harden and Lilley, 2018), including how they tackle and approach learning tasks (Lublin, 2003). Harlen and Deakin-Crick (2002) provided perhaps one of the most concise descriptions of what assessment is. They described assessment as any activity planned and executed in a systematic manner to gather evidence and make a judgement about learning (Harlen and Deakin-Crick, 2002). With most HPE programmes globally undergoing paradigm shifts from focus on educational processes to learning outcomes (Norcini *et al.*, 2013), coupled with the increased competence (knowledge, skills and attitudes) demands

of contemporary health professions' practice, valid, reliable, high fidelity, and defensible assessments remain a vanguard of quality assurance and high-stakes decision-making (for progression, graduation, and licensure) in most HPE programmes (Norcini and McKinley, 2007, Norcini *et al.*, 2013).

In the context of HPE, it can be argued that George Miller's hierarchical pyramid of clinical competence published in the early 1990s remains perhaps the most widely acclaimed evidence-based model that continues to inform contemporary assessment practice in HPE around the world today. According to Miller's pyramid, different assessments methods can be used to assess different levels of cognitive ability ('knows' level), application of knowledge ('knows how' level), and psychomotor skill or performance ('shows how' and 'does' levels respectively) (Miller, 1990). Miller (1990) would likely agree that whereas lower-order cognitive ability ('knows' level) is best measured using written objective tests such as selected response methods (multiple-choice items, or the traditional true/false statements), and to a great extent constructed response methods (such as short answer questions), higher-order cognitive ability including procedural knowledge competence ('knows how' level) such as application of the acquired knowledge to problem-solving and performance of skilled tasks ('shows how' and 'does' levels) require performance-type assessments such as Objectively Structured Clinical Examinations (OSCE) or 360-workplace evaluations (Downing and Yudkowsky, 2009).

A growing body of evidence shows that methods used for assessing learning can influence students' ATL. Scouller (1998) earlier showed that assessment methods such as recall multiple choice and short answer questions promoted surface learning approaches whereas more open forms of assessment such as essays, authentic problem-solving and project reports encouraged a deep ATL (Scouller, 1998). Lublin (2003) also argued that higher-order educational objectives (as guided by the Bloom's taxonomy of educational domains) were

more likely to encourage students to take a deep ATL in the subject or course (Lublin, 2003). Assessment tasks should, therefore, mirror and reward the level of set objectives rather than mere recall of information (which is considered a lower order cognitive ability). However, there are other scholars that argued to the contrary that perhaps the focus should not only be on the assessment methods themselves but also the students' perceptions of the teaching (Trigwell *et al.*, 1999, Lempp and Seale, 2004, Ramnanan and Pound, 2017) and the practice of assessment (that is; assessment purpose, mode and procedures) (Entwistle, 1998, Struyven *et al.*, 2003) as possible factors that may directly affect students' learning. Therefore, in view of the significant role quality and reliable assessments play in aligning ATL and academic outcomes for learners, it can be argued that in addition to the three educational-research driven reforms suggested by Norcini and Banda (2011) for increasing capacity and quality of HPE in the 21st century (Norcini and Banda, 2011), additional quality assurance modalities, including peer review processes towards attaining quality learning outcomes as a goal for health professionals, are required to mainstream evidence-based assessments methods that contribute to that goal.

To help demonstrate the relationship between students' ATL and academic performance, Svensson (1977) years ago conducted an experiment to detect deep and surface learning approaches among 30 first-year education students. His study revealed that these attributes compared differently with academic performance in assessments. In his experiment, among the students classified as 'deep learners', 90% passed their end of year examinations, while only 23% of those classified as 'surface learners' passed their examinations. Svensson's study further demonstrated that students adopting a deep learning approach also tended to spend relatively longer time studying (Svensson, 1977). Though this is currently considered relatively old evidence, Svensson's findings showing that students who adopted deep learning of their subjects understood better hence performed better in assessments demonstrated that

possible predictive relationship between deep ATL and academic performance may exist. The present study interrogated this link further.

Earlier, Snelgrove & Slater (2003) conducted a cohort study on nursing students using a 42-item study process questionnaire measuring surface, deep, and achieving (strategic) ATL and found a positive and significant correlation between deep approaches to learning and students' GPA scores. Negative correlations were found between surface learning approach and students' GPA scores (Snelgrove and Slater, 2003). In the UK, Mattick and colleagues (2004) utilised the Approaches to Learning and Studying Inventory (ALSI) to determine medical students' ATL. They found that not only did medical students score highly on the deep ATL scale compared to other students in higher education programmes at the institution, a deep ATL was also associated with higher academic scores (Mattick *et al.*, 2004). Similarly, in Colombo, Subasinghe and Wanniachchi (2009) who assessed students' ATL using Biggs's Revised Two Factor Study Process Questionnaire found a positive correlation between ATL and academic performance where students with a deep approach achieved higher performance and vice versa. They further suggested that motivating medical undergraduates towards a deeper approach to learning and studying would be beneficial to them in achieving the expected long term academic and professional goals (Subasinghe and Wanniachchi, 2009). A meta-analysis by Richardson and colleagues (2012) also showed that ATL, assessment-related anxiety and stress were predictors of students' academic performance (Richardson *et al.*, 2012).

A systematic review by Feeley & Biggerstaff (2015) exploring links between academic success, learning styles and approaches to learning among medical students in UK highlighted that whereas learning styles did not correlate with examination performance, learning approaches did, that is; those students with strategic and deep ATL performed consistently better in medical school examinations, respectively. They argued that students' ATL can change and more adaptive approaches may be learnt in due course (Feeley and Biggerstaff,

2015). The present study interrogated this aspect further, using a structured metacognitive educational intervention to ascertain whether students' ATL were modifiable and adaptable in the local context of undergraduate pharmacy education.

McManus and colleagues (1998) conducted a prospective longitudinal cohort study to investigate whether clinical experience and ATL among two cohorts of undergraduate medical students correlated with their final examination performance. They found that the use of deep and strategic ATL in the final year of medical school predicted better performance in the final examination, but the same measures at the time of selection for admission into medical school, including grades in A-level examinations did not relate either to study habits, clinical experience or predict examination performance (McManus *et al.*, 1998). A valid and noteworthy suggestion from their study findings was that medical schools wishing to admit students who will gain the most knowledge and skills from clinical experiential learning should not use A-level examinations results alone but could do well to also assess the student's ATL beforehand. Clearly, the predictive value of a student's ATL to educational outcomes cannot be understated.

Students' ATL can also be influenced by content and context. In Zambia, Mulundu (2014) found that internal contexts such as interest (motivation) and anxiety (fear of failure) can affect ATL (Mulundu, 2014). Where a learner feels threatened or under pressure to respond to educational demands on particular learning syllabi which have little personal relevance or interest to them, it follows that a surface ATL is likely to be adopted (Entwistle, 2012). Thus, it can also be inferred that a surface ATL follows somewhat closely to lack of interest in the learning content and context (Beaten *et al.*, 2016). In the context of HPE programmes like pharmacy, such an ATL is unlikely to be desirable.

Farkas and colleagues (2016) examined relationships between course performance versus study time, VARK learning style, and career plans among students enrolled in an undergraduate anatomy and physiology course at a large urban university in the USA. Out of 492 students they surveyed, the majority (78%) reported spending 15 or fewer hours per week studying. Study time and overall course score correlated significantly ($r = 0.111$, $p = 0.013$) mainly due to lecture performance. Time spent studying was not significantly associated with either learning style or career choice (Farkas *et al.*, 2016). Their findings suggested that specific career goals and study time, not learning preferences were associated with better academic performance. This evidence further suggests room exists to investigate the putative influence of study skills interventions on the educational outcomes of students.

Whereas much of the published evidence reviewed has been derived from settings with relatively more developed education systems and institutional settings, a further study particularly conducted in diverse academic settings, particularly in developing country education systems is needed to collaborate the evidence.

2.5. Impact of study skills courses on student retention and academic outcomes

A few studies have examined and supported the effects of study skill courses, modules, and workshops on student academic success and retention. Polansky and colleagues (1993) examined the effect of study skills training and career counselling on the retention of at-risk students using four intervention groups as follows: study skills only group, career counselling only group, combined treatment (study skills and career counselling) group, and no intervention group, respectively. The study skills only group and career counselling only group each participated in four 90-minute sessions across 2 weeks. The third intervention group received a combined treatment and participated in both interventions and met for six sessions across 3 weeks, with one session of each intervention per week. The fourth group received no

treatment. Students were considered to have been ‘retained’ if they were enrolled in school for two consecutive semesters after the end of treatment. Their findings showed that all (100%) of the study skills only participants were retained, in comparison to 33% of the control group. The majority (88%) of participants in the study skills alone group were considered significantly more successful academically with GPA >2.0 than those in the other treatment and control groups, respectively. The authors concluded that study skills training that focused on time management, goal setting, learning styles, and relaxation appeared to be an effective way to improve the retention of students at risk for dropping out of school (Polansky *et al.*, 1993). Evidence of such interventions and their design aspects informed the present study. Moreover, such evidence requires further collaboration with other similar or related experiments conducted in higher education settings and diverse student populations. Important for this study, evidence from Polansky and colleagues (1993) addressed issues of the construct validity of study skills courses as educational interventions.

In a study conducted at Utah State University in the USA, Warnersbach (2011) examined pre- and post-test levels of academic self-efficacy among college students enrolled in a study skills course in comparison to students not enrolled in such a course. Students identified as academically underprepared demonstrated lower levels of study skills and academic self-efficacy than students enrolled in the course. Students that undertook the study skills course had greater increases in academic self-efficacy than comparison students (Wernersbach, 2011). In another earlier study, Klomegah (2007) examined the extent to which academic self-efficacy, self-set goals, assigned goals, and ability predicted academic performance, and whether these constructs were better predictors of college success than the traditional variable of high school grade point average (GPA) attained. Their study sample consisted of 103 university undergraduate students taking sociology courses at the university. Findings indicated a moderate positive correlation between self-efficacy and academic performance as

measured by course grade attainment (Klomegah, 2007). In this present study, academic outcomes were measured using GPA scores attained by undergraduate students in the formal summative assessments undertaken in academic courses taken during the academic year and retention on the B.Pharm. programme. In this study, a student was considered retained when they met the 'pass all' progression criteria to advance to the next level or year of study on the B.Pharm. programme at UNZA.

Tait & Entwistle (1996) earlier argued that study skills advice and training have been criticized as being ineffective largely because they were so often offered as an adjunct to a course and students often had difficulty in transferring the advice given into their own learning contexts. They further argued that if study skills advice was to have maximum impact, it needed to be presented as an essential component of a course or academic programme and to be provided as soon as the need became apparent. This was possible, however, only if faculty were themselves sufficiently familiar with what types of study skills advice were required by their students (Tait and Entwistle, 1996). The present study gave due consideration, as was evidenced by Chan and Bauer (2016), that most students admitted to programmes in higher education institutions experience academic difficulty not because they lack ability or efficacy to learn but because they lack awareness of, and skill in learning and studying strategies (Chan and Bauer, 2016). As an intervention, participants in the present study were exposed to a 5-day structured study skills elective module consisting a variety of deep learning and studying strategies using specific metacognitive approaches (such as critical thinking, organizing and managing study time, synthesizing and utilising evidence, and utilising educational resources in a way that enhances students' understanding) that have been evidenced to work (Wong, 2009, Hodges *et al.*, 2012). A 2-hour module session exposure per day for 5-days was used in this study. Impact evaluation in form of post-test measurement of ATL was conducted 4-weeks after the intervention.

In terms of the time allocation for the OADLSS intervention and impact evaluation, the basis of exposure time frequency (2-hour sessions per day), duration (5-days) and post-intervention impact evaluation period (4 weeks) used in this study was informed by evidence from literature. Evidence from related studies elsewhere shows that ‘brief’ but targeted exposure to educational interventions among students undertaking health professions training programmes produce positive impact on behavioural change, knowledge, skills and attitudes in the specific subject area. For instance, Spollen and colleagues (2010) examined the effectiveness of a 2-hour workshop on behavioural change counselling for medical students using a pre- and post-test randomised control trial design involving 35 second-year medical students. They found that students’ attitudes towards behavioural change counselling were positive when measured at baseline and 4-weeks post-intervention. Similarly, other studies whose educational interventions were brief (2 to 10 hours exposure) and results showed positive impact on learning and behavioural change among students undertaking health professions programmes include Poirer and colleagues (2004), White and colleagues (2007), Martino and colleagues (2007), and Bell and Cole (2008) (Poirer *et al.*, 2004, White *et al.*, 2007, Martino *et al.*, 2007, Bell and Cole, 2008).

In the context of pharmacy education, this review of the literature did not come across previous studies or empirical evidence that investigated the use of an educational intervention that promoted deep learning using the metacognitive and cognitive constructivist instructional design. There was, however, a wealth of supporting literature that suggested that an instructional design based on cognitive constructivism can influence the attainment of meaningful learning, critical thinking and problem-solving skills (Cisneros *et al.*, 2002, Kang *et al.*, 2010, Entwistle, 2013). It was on this basis that the present study developed and experimented a novel adjunct educational intervention in a population of undergraduate pharmacy students at UNZA to provide ground-breaking evidence.

The foregoing evidence reviewed suggests that well designed educational interventions that focus on equipping students with study skills have the potential to improve learning outcomes. By assessing the potential effect of a novel, locally designed learning and study skills elective module as an educational intervention on learning approaches of undergraduate pharmacy students, this study envisaged contributing to the current and future body of existing evidence.

2.6. Factors affecting learning and academic performance of pharmacy students

A number of diagnostic studies have investigated factors that affect learning and academic performance among undergraduate pharmacy students in various educational settings. Their findings demonstrate numerous interrelated factors. Sansgiry and colleagues (2006) examined, using a cross-sectional design, factors that affected academic performance among pharmacy students enrolled at the University of Houston in the USA. They found that academic competence (that is, proficiency of students to understand and manage courses taught in the curriculum), test competence (that is, students' ability to manage and cope with the amount of study material for examinations), and test anxiety influenced academic performance (Sansgiry *et al.*, 2006). Their findings collaborated the earlier evidence by Powell (2004) who also demonstrated that anxiety management by students influenced their academic performance (Powell, 2004). Similarly, in Nigeria, a study by Sariem and colleagues (2014) also highlighted that admission scores were predictors of academic performance (Sariem *et al.*, 2014). Similar findings were also demonstrated in a study conducted on undergraduate pharmacy students in Malaysia (Azmi *et al.*, 2014). It was interesting to elucidate in the present study, the predominant contextual factors affecting or influencing how undergraduate pharmacy students learn and perform in academic assessments at UNZA, and how the contextual factors collaborate the existing evidence.

Recent evidence showed an association between students' motivation, attendance of scheduled educational activities and academic performance (Deane and Murphy, 2013, Landin and Perez, 2015, Alexander and Hicks, 2016). Other related studies have highlighted factors that affect academic performance to include the following: students' previous education background and academic admission points (Kyoshiba, 2009, Newman-Ford *et al.*, 2009), socio-cultural and socio-economic factors (Diaz, 2003, Sirin, 2005, Devlin, 2013), including language competence (Martirosyan *et al.*, 2015, Dafouz and Camacho-Miñano, 2016) and class attendance (Harb and El-Shaarawi, 2006). It can be argued however, that a recurring disadvantage to employing factor diagnosis is that it may be confounded by context specificity, lack of generalizability, and leads an impression that one path exists in predicting learning and academic performance by not ascertaining whether multiple combinations of multiple factors do converge or operate in parallel, including which factors are more potent or efficacious to address. Sternberg's theory of mental self-governance held that students' learning strategies together with their intellectual ability levels play an important role in academic performance (Sternberg, 1986, Sternberg, 1997). From this theory, the present study set out to assess whether constructivist approaches such as raising metacognitive awareness of and promoting deep learning strategies using a structured educational intervention among undergraduate learners could positively influence their ATL and academic outcomes. The findings are described in subsequent chapters.

2.7. Focussing the reviewed literature on the research problem and conceptual framework

The theories from literature reviewed suggest there exists linkage between how students learn and their academic outcomes. However, strongly corroborating the existing evidence is required to either explore emerging hypothesis or further confirm existing hypotheses in this regard. The literature informed the prospect of developing metacognitive awareness and

decision-making among learners emerges as one way such hypothesis can be examined. The existing literature also pointed to many complex and context-specific interacting factors that may impact on students' learning and academic performance. Among the plethora of factors, this study conceptualized that students' ATL may be among key modifiable factors worth interrogating.

Having located this study in the existing literature and its point of departure, it was prudent that a focus be explicitly demonstrated that the stated problem of poor academic performance driving high attrition rates among at-risk pharmacy students at UNZA could potentially be influenced by a myriad of putative factors, among which ATL could be a prominent feature that was worth investigating in the context of this study. Arguably, attrition and poor academic outcomes can be attributed to, among other things; lack of motivation, poor adaptation (Bailey and Phillips, 2016), and students' inability to deal with educational demands of a training programme (Hassel *et al.*, 2007). These include increased demands on a personal investment in notional time required to comprehensively study material taught and personal effort to attain the requisite expected knowledge, skills and attitudes expected (Isleta-Palatino, 2014). With all such factors at play within and around to the student, it was possible that attrition, including poor academic outcomes, may further rise if interventions are not put in place to support and make learning meaningful for students at the university.

Despite the increased demand for pharmacy education to produce the much-needed health workforce, as adjudged from the growing number of students entering pharmacy degree programmes countrywide, it cannot be assumed that all students who start on the training programme will successfully complete and attain meaningful learning outcomes unless they are adequately supported with evidence-based ways to best learn and acquire requisite competencies to practice their profession. Therefore, a thrust towards improving the quality of learning through scaffolding deep approach to learning was the focus of the present study.

Whether raising metacognitive awareness of deep learning and studying strategies could influence ATL and academic outcomes among undergraduate pharmacy students at the university was an overarching question this study embarked to answer and was conceptualised in the framework described below.

2.8. Conceptual framework

This study was founded on interrogating a contextually relevant problem of high attrition rates due to low academic performance observed among undergraduate pharmacy students at UNZA over the years. High attrition and failure rates have implications for the student, faculty, and the training institution. For the student, it can lead to increased education costs for sponsors, loss of psychological self-esteem following exclusion from the programme or length of time spent to complete the study programme. For the university, high attrition rates reduce throughputs of much-needed health professionals graduating from the respective programme into the health workforce, negatively reflects on pedagogical effectiveness of faculty and potentially affects the attractiveness of the institution to prospective students (Mlambo, 2011).

A two-tier conceptual framework outlines the philosophical underpinnings of this study. The first tier of the conceptual framework (Figure 2.1) begins by exploring putative links that potentially influence student's academic performance and impact on educational outcomes. From reviewed literature, educational and institutional system-related factors, assessment practice, and student-related factors emerge as moderators. The framework illustrated not only shows how these putative factors may contribute to the core problem, but endeavours to further isolate and focus the entry points of this study. Underscored in the theoretical framework are the attributable elements that this study focussed the interrogation on possible modifiable factors with the potential to influence the learning outcomes.

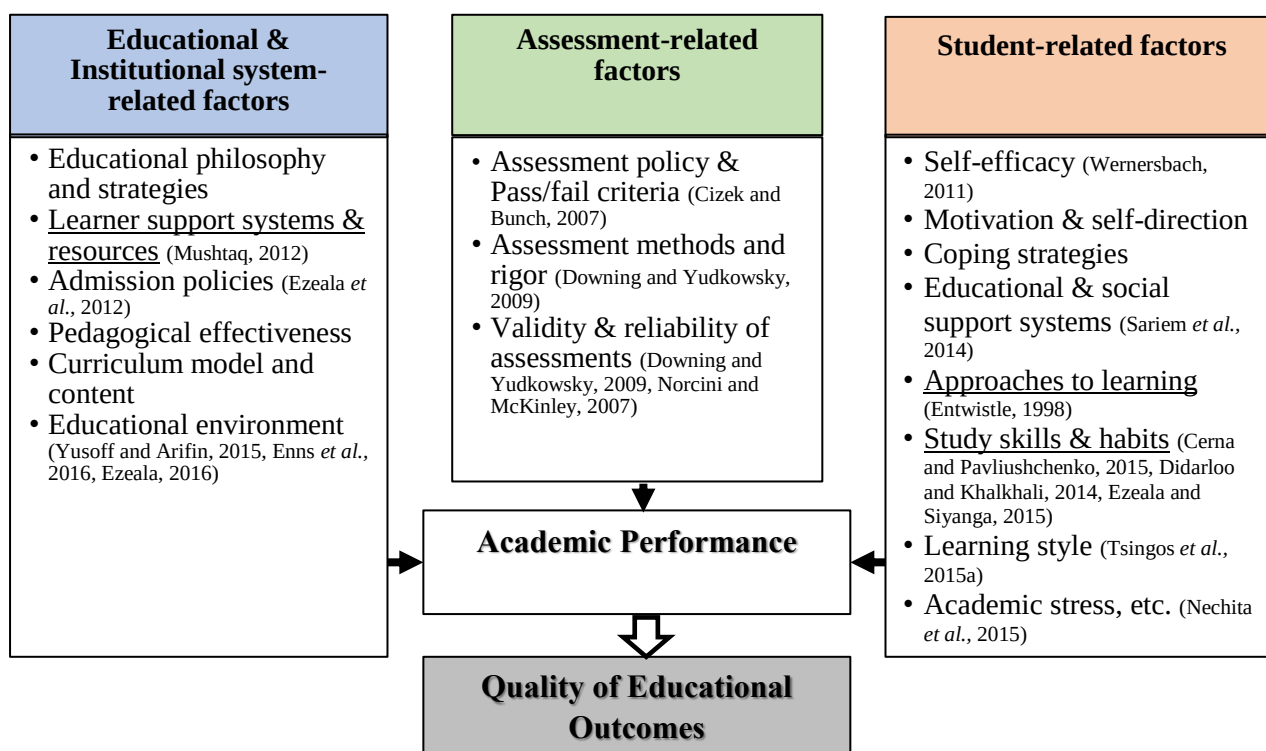


Figure 2.1. Conceptual framework of putative factors influencing students' academic performance and outcomes

The second part of the conceptual framework of this study (Figure 2.2) draws focus on interrogating whether, to moderate pharmacy students' ATL (a student-related factor), a learner support or resource in form of a structured exposure to, and transactional mediation of the principles of deep learning and study skills using an educational intervention would promote a deep ATL and improve academic outcomes.

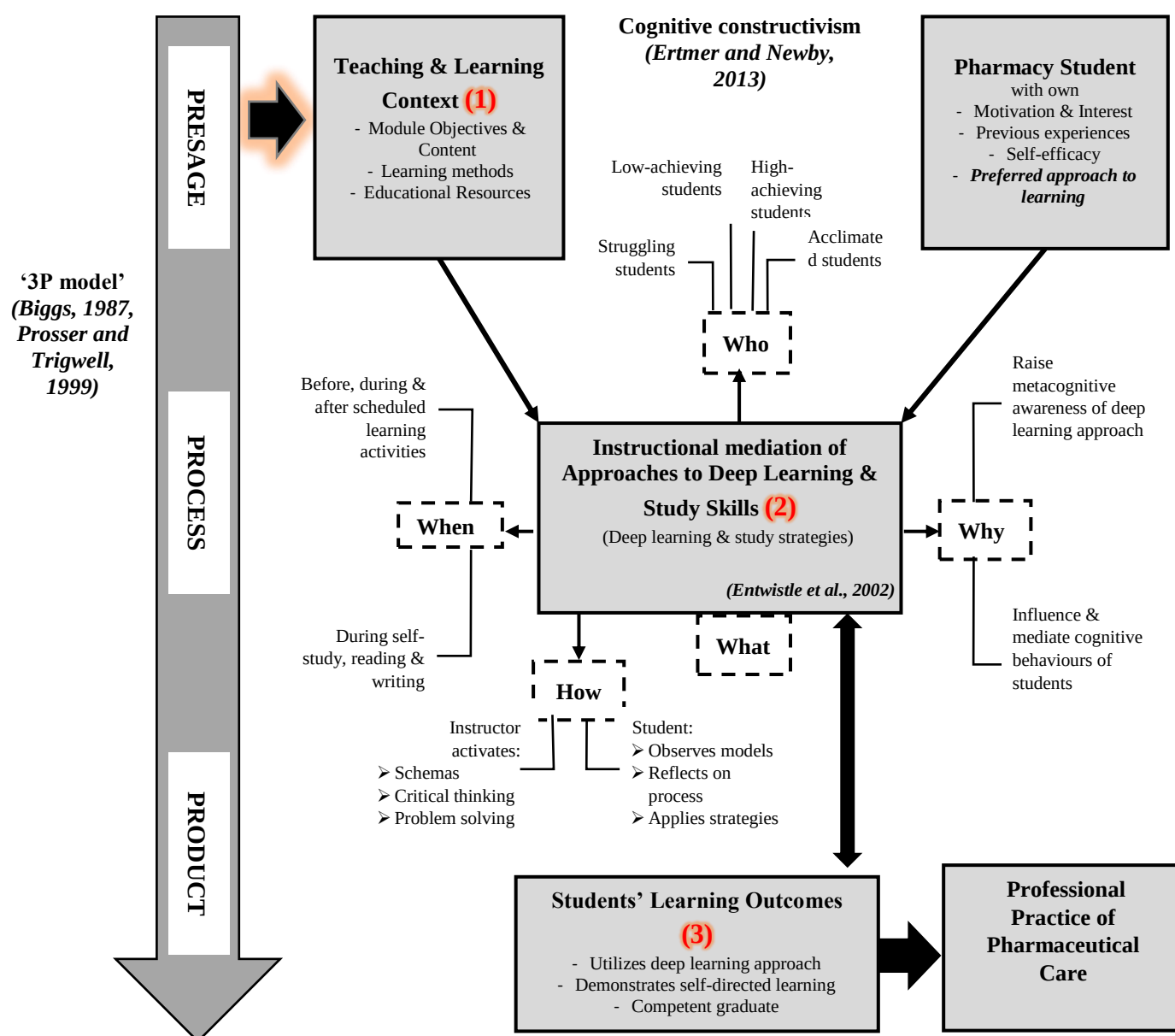


Figure 2.2. Conceptual framework of instructional mediation of deep learning and study skills using Biggs' 3-P model.

Theoretically, the conceptual framework illustrated above integrated interactive elements of the cognitive constructivism theory of learning (Ertmer and Newby, 2013) within Biggs' presage-process-product model (Biggs, 1987, Prosser and Trigwell, 1999). As a presage, cognitive constructivism approach was applied to conceptually drive stages of the process of raising metacognitive awareness of deep learning and study skills through structured

instructional mediation provided by the ‘OADLSS’ elective module. Metacognition, as described by Baker and colleagues (1986), refers to the process used to plan, monitor, repair, review and assess one’s understanding and performance (Baker *et al.*, 1986, Bransford *et al.*, 2000). It includes critical awareness and self-reflection on one’s thinking and learning. Bransford and colleagues (2000) asserted that metacognitive practices increase students’ abilities to transfer or adapt their learning to new contexts and tasks (Bransford *et al.*, 2000). Further evidence also suggests that metacognitive practices help students become aware of their strengths and weaknesses as learners, enable them to gain a level of awareness above the subject matter, including thinking about tasks and contexts in different learning situations and themselves as learners in those different contexts (Zohar and David, 2009, Weimer, 2012). This study contended that among primary reasons why metacognition was significant in the local educational context was that if learners were not aware of best ways to learn pharmaceutical sciences or their learning of the same was breaking down and what they could do about it, their educational outcomes could potentially be affected.

Literature suggests that good teaching can influence students to take a deep approach. Biggs defines good teaching as the encouragement of a deep approach to learning (Biggs, 1999, Lublin, 2003). Characteristically, students who take a deep approach have the intention of understanding, engaging with, operating in and valuing the subject. Deep learners actively seek to understand the material in the subject, interact vigorously with the content, make use of the evidence-base, demonstrate inquiry and evaluation, take a broad view and relate ideas to one another, and are motivated by interest in what they are learning. In addition, they demonstrate ability to relate new ideas to previous knowledge, relate concepts to everyday experience, and tend to read and study beyond the course requirements (Lublin, 2003). It is these attributes the educational intervention tried in this study sought to promote among preclinical pharmacy students at UNZA using a metacognitive approach.

In consonant with Pintrich's (2000) earlier assertion, the conceptual framework of this study also held the strong view that students that have metacognitive awareness about the different kinds of strategies that promote deep learning, critical thinking and problem-solving were more likely to utilise them in their day-to-day learning tasks (Pintrich, 2002). This awareness may, however, require to be cognitively constructed. In the second tier of the proposed conceptual framework (Figure 2.2), the product (outcome) was examined, after the adjunct educational intervention, through students' ATL adopted in learning tasks and academic performance in assessments. The philosophical argument was that facilitating learning should be perceived as the creation of an educational environment that enables the learner to develop cognitive reasoning abilities (Floden, 2001). Whether metacognitive practices such as those employed in this present study to use an adjunct educational intervention targeting individual students' thoughts, feelings, and behaviour about deep learning and studying strategies potentially influences their cognitive organization and adoption of a deep ATL (observable behaviour) and their academic outcomes in the local context of pharmacy education was subjected to scientific enquiry. The basis of this study's objective henceforth emerges from the conceptual framework.

Though earlier scholars' work in this area initially focussed on examining student's learning by observing teaching content instruction (Seidal and Shavelson, 2007, Pianta and Hamre, 2009), the point of departure and line of contribution of this study was in the fact that there still remains increasing need to examine learning from the perspective of the learner's approach as a response to instruction in an educational setting (Pellegrino *et al.*, 1999). This is particularly important for HPE programmes like pharmacy that shape developmental trajectories for national health service delivery systems which the graduates from such programmes will eventually go on to operate once they enter to practice their health profession. As guided by Schunk (2012), principles of instruction common among the different learning

theories available are as follows: learners progress through stages/phases of the learning process; material for instruction should be organized, sequenced and presented in cognitive steps; learners require adequate interaction and practice with the material, feedback and review; social constructs and models, including motivation to studying play a facilitating role in learning (Schunk, 2012). This was the context within which the structured educational intervention (OADLSS elective module) in this study was developed, validated, and experimented.

In conclusion, the reviewed literature suggested there possibly exists linkage between students' ATL and their academic outcomes. However, strongly corroborating the existing evidence, exploring and confirming hypotheses in this regard is required. The prospect of developing metacognitive awareness and decision-making among learners emerges as one way such hypothesis can be examined. Locally, there was strong ground to investigate the validity of this putative linkage and how undergraduate pharmacy students' ATL are influenced by factors existing in their educational context at UNZA. The existing literature also pointed to many complex and context-specific interacting factors that may impact on students' learning and academic performance. Among the plethora of factors, this study conceptualized that students' ATL may be among key modifiable factors worth interrogating.

CHAPTER 3 : METHODOLOGY

3.1. Introduction

This chapter outlines the methodology employed to investigate the problem and address the research questions posed. Details of the theoretical and methodological considerations of the research design, how each of the study objectives was measured, including the methods employed to measure, analyse, and interpret the data collected are described in details in this chapter.

3.2. The research paradigm and its ontological and epistemological foundations

A paradigm, as defined by renowned American philosopher of science Thomas Samuel Kuhn (1922 - 1996) in his book 'The Structure of Scientific Revolutions', is a philosophical way of thinking (Kuhn, 1962). In educational research, the term paradigm is used to describe a common 'worldview' shared by researchers (Mackenzie and Knipe, 2006, Kivunja and Kuyini, 2017). This worldview is the perspective, thinking, 'school of thought', or set of shared beliefs, that informs the meaning or interpretation of research data (Kivunja and Kuyini, 2017). Simply stated, a research paradigm expresses philosophical assumptions and perspectives held by researchers when they conduct studies (Johnson and Christensen, 2010, Creswell, 2012, Mertens, 2014). The understanding is that a research paradigm represents a specific way of perceiving and outlining how one seeks answers to scientific inquiry. Key philosophical issues and characteristics of a research paradigm are its ontological, epistemological and methodological dispositions that give order to understanding the different scientific approaches adopted by researchers (Guba, 1990, Denzin, 2010).

As described by Ormston and colleagues (2014), ontology is concerned with the nature of reality and what there is to know about the world, whereas epistemology describes the relationship between the researcher and the reality including how this reality is captured or

becomes known (Ormston *et al.*, 2014). In the context of the present study, its epistemology was concerned with how reality and knowledge external to the researcher was uncovered and its ontology was concerned with identifying the overall nature of existence of a particular phenomenon in the local educational environment.

Despite the ongoing debate in literature contesting ontological and epistemological grounds of research, each research paradigm remains valid and informative when used sensitively and appropriately in context to answer an appropriate research question. The dominant research paradigms have four main taxonomies as follows: positivist, interpretivist, critical realist, and pragmatist, respectively (Kivunja and Kuyini, 2017). On the one hand, a positivist paradigm advocates an ontological and epistemological worldview that one overarching truth exists which can be verified by objective generalizable theory (Bunniss and Kelly, 2010). According to Kivunja and Kuyini (2017), research situated within this paradigm relies on deductive logic, formulation of hypotheses, testing the hypotheses, offering operational definitions and mathematical equations, calculations, extrapolations and expressions, to derive conclusions about causes and effect relationships in nature (Kivunja and Kuyini, 2017). The interpretivist paradigm, on the other hand, promulgates an assumption that reality and the ways of knowing it is subjective and socially constructed (Guba and Lincoln, 1989). Emphasis is placed on understanding the individual and their interpretation of the world around them (Kivunja and Kuyini, 2017). Black (2006) suggested that interpretivist researchers are receptive to capturing meanings in human interactions (Black, 2006). Research conducted within the interpretivist paradigm is more concerned with criteria of trustworthiness and authenticity which include: credibility, dependability, confirmability and transferability (Kivunja and Kuyini, 2017).

The critical realist paradigm (also called critical theory) straddles between the positivist and interpretivist paradigms despite situating the research in social justice domains. It is for

this reason that it is often referred to as a transformative paradigm (Kivunja and Kuyini, 2017). As argued by Fleetwood and Ackroyd (2004) and also reinforced by Modell (2009), critical realism has been advocated as a potential way of bridging the polarized positions of the positivist and interpretivist research paradigms (Fleetwood and Ackroyd, 2004, Modell, 2009). In his paper, Modell (2009) raised a point stating that:

“Critical realism is based on a tripartite, ‘stratified’ ontology divided into the domains of real objects and mechanisms, actual events and empirical experiences. It rejects the possibility of ‘naïve’ realism, pivoting on the existence of a singular, objective world, which is readily observable and made knowable without being ‘filtered’ through the theories employed by researchers” (Modell, 2009).

Leading theorists and scholars such as Alise and Teddlie (2010), and Biesta (2010) have advocated the pragmatist paradigm of research. They argued an ontology which would provide methodologies seen to be most appropriate for studying a phenomenon at hand. The pragmatist paradigm undertakes to research with more practical and pluralistic approaches that could allow a combination of methods that in conjunction could answer the enquiry on the actual behaviour of participants, the beliefs that stand behind those behaviours, and the consequences that are likely to follow from different behaviours (Kivunja and Kuyini, 2017). Proponents of the pragmatist paradigm suggest that educational research should generate knowledge that is relevant for the day-to-day practice of educators, informs educational practice actions and activities, and more importantly, supports and guides decision-making (Biesta and Burbules, 2003).

By nature of the research questions posed, the present study adopted a pragmatist research paradigm. This was on merit that this paradigm advocates a relational epistemology (that is, relationships in research best determined by what the researcher deems appropriate to

that particular study), a non-singular reality ontology (that there is no single reality and all individuals have their own and unique interpretations of reality), a mixed methodology (that is, a combination of quantitative and qualitative research methods), and a value-laden axiology (conducting research that solves a problem, benefits people and context) (Kivunja and Kuyini, 2017). The present study was riding on the supposition that the quality of research was defined by the integrity and transparency of the research process and its methods, rather than on the superiority of any one particular research paradigm (Bunniss and Kelly, 2010). By not only seeking to objectively determine how, but also understand motives, meanings, reasons, and other subjective experiences which were time and context-bound to influence pharmacy students' learning at UNZA, this study endeavoured to solve a contextually relevant problem and observed phenomenon in the local educational environment. Focussing on problem-solving, users of the pragmatist paradigm believe philosophically in using multiple procedures that work to understand a particular research problem under study (Creswell, 2012). In consonant with Biesta and Burbules (2003), the gist of pragmatism is not that the world of science is closer to reality than the world of everyday life, rather objects of knowledge are instruments for action. Different objects and different worlds, therefore, provide us with different opportunities and possibilities for action. Accordingly, this perspective influenced the methodology of research adopted by this study, accentuating the use of multiple methods of inquiry to gain different perspectives on the problem at hand (Biesta and Burbules, 2003) and arrive at well informed logical conclusions.

3.3. Research design and methodology

A research design refers to the overall strategy a researcher chooses to integrate the different components of the research in a coherent and logical way, thereby ensuring the research problem is effectively addressed (Trochim *et al.*, 2015). Accordingly, it informs the blueprint for the collection, measurement and analysis of data. As described by Bunniss and

Kelly (2010), a methodology is the nature of the approach to research (Bunniss and Kelly, 2010).

This study employed a sequential explanatory multiple mixed-methods design to investigate the learning approaches and influence of raising metacognitive awareness of deep learning and studying strategies on pharmacy students' academic outcomes at a public university in Zambia. A multiple methods design enables use of more than one approach in a study at the methodological level (Mafuba and Gates, 2012, Creswell and Creswell, 2017). In this study, multiple methods were used in a sequential explanatory manner whereby initial descriptive quantitative and qualitative findings were subsequently explained using experimental findings (Figure 3.1). Sequentially combining quantitative and qualitative methods produces in-depth results of great relevance to researchers, programme managers, and policy-makers (Nicolau *et al.*, 2017). As described by Mafuba and Gates (2012), sequential multiple methods involve the use of results obtained through one data collection method to determine the direction and implementation of subsequent stages of a research project (Mafuba and Gates, 2012). Systematically, this study was conducted in a three-phased sequential approach – with each phase adopting a different method.

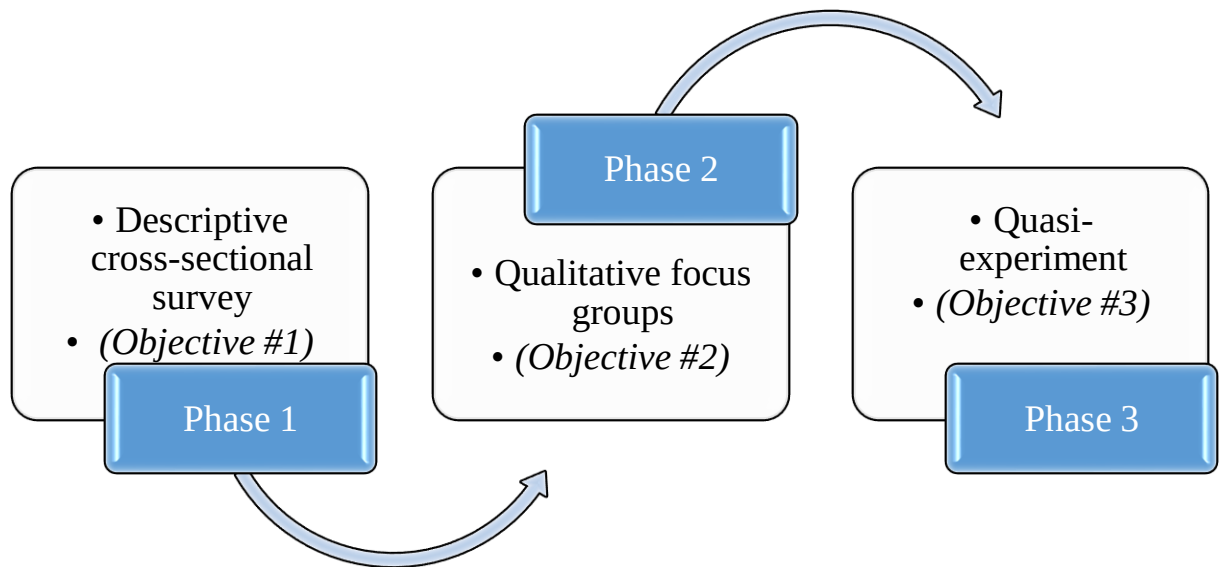


Figure 3.1. Sequential multiple mixed-methods flow plan of the study phases.

The first phase determined, using a quantitative, observational, descriptive cross-sectional design, the predominant approaches to learning adopted by undergraduate pharmacy students. In the second phase, a qualitative study design was employed to elucidate contextual factors influencing pharmacy students' learning efficacy and academic performance. Lastly, the third phase utilised a quasi-experimental design to assess the potential modifying effect of a structured educational intervention targeting deep learning and studying.

As a strength, the sequential multiple mixed-methods design provided effective controls in that each of the three phases of this study provided independent findings that made it possible for the theoretical drive of each phase to be clarified without ambiguity. Moreover, this design helped to further explore the significance of how findings cross-talking at the epistemological, theoretical and methodological level respectively, could enhance research that seeks to solve contextual problems (Mafuba and Gates, 2012). The design adopted by this study sits well within the pragmatist paradigm of research in that it allowed the researcher adjust and refine each subsequent phase following the findings from the preceding phase of the study (Mafuba

and Gates, 2012). This aspect was important because an explanatory sequential approach made it easier to methodologically collect different type of data from each phase, theoretically relate and confirm convergent findings from each method, and clarify the epistemological continuum of the research evidence.

3.3.1. Phase 1

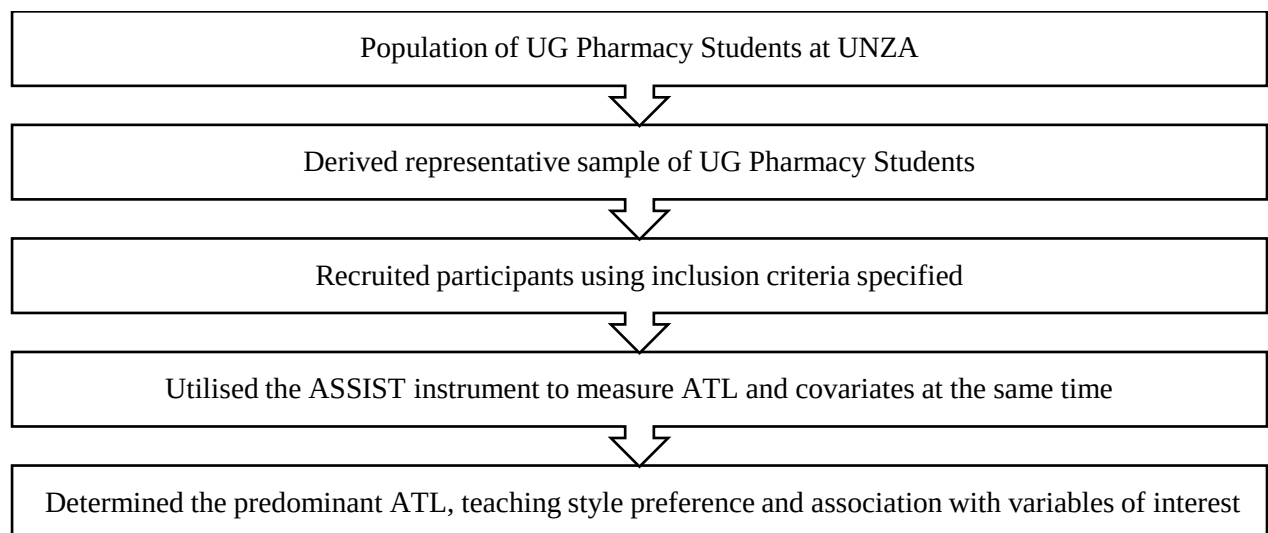
3.3.1.1. Objective

To determine the predominant approach to learning among undergraduate pharmacy students enrolled in 2017 to 2018 academic year at UNZA.

This study adopted Marton and Saljo's tripartite model of approaches to learning which remains a core construct of many instruments and inventories used to evaluate student learning in higher education (Lonka *et al.*, 2004).

3.3.1.2. Study design

Since the objective was to determine the predominant ATL among the population of undergraduate pharmacy students (year 1 to 4) enrolled in 2017 to 2018 academic year, a descriptive cross-sectional design was utilised. Descriptive studies are concerned with describing the characteristics of a particular individual, group or population (Kothari, 2004). This is a type of observational study that analyses data from a representative sample of a population at one specific point in time (Setia, 2016). Since in a cross-sectional design, the outcome of interest (ATL) and the exposures in the study participants was measured at the same time, this design was suitable to adequately measure the first specific objective of the present study. Furthermore, the cross-sectional design was able to determine associations between exposure variables and the outcome of interest (ATL). Figure 3.2 illustrates the conceptual flow plan by which the Phase 1 of the study proceeded.



UG: undergraduate, ATL: Approaches to Learning, ASSIST: Approaches and Study Skills Inventory for Students.

Figure 3.2. Flow plan of the cross-sectional study to explore the predominant ATL and teaching style preferences among pharmacy students at UNZA.

3.3.1.3. Study setting and period

The study was conducted at UNZA, School of Health Sciences in Lusaka, Zambia.

Field data collection was undertaken from November to December 2017.

3.3.1.4. Study population

Undergraduate pharmacy students undertaking full-time study on the Bachelor of Pharmacy (B.Pharm.) programme at UNZA were the population of interest. The study considered a homogenous population of pharmacy students enrolled in the 2017 to 2018 academic year which commenced October 2017 and ended December 2018.

3.3.1.5. Sample size

A representative sample was determined using the survey formula: $n = z^2 \cdot P(1-P) / e^2$ and corrected for a finite population using Cochran's equation as follows: $\text{new } n = n / 1 + (n-1 / N)$; where z -value = 1.96 (representing 95% confidence level), P = prevalence estimate at 25%, e = margin of error at 5%, N = population size (based on B.Pharm. programme enrolment

capacity of 350 students across all four academic year levels when quota enrolment is full). The computed sample size of 158 was adjusted to 160 as the target sample. This was, in part, due to deriving the sample from a finite population existing in strata (that is, cohorts of pharmacy students in each level/year of study from Year 1 to 4) and sample size calculated assuming not less than 80% power with 5% margin of error (alpha-level of 0.05) with a target response rate of at least 95%. Out of this target, a total of 150 participants were attained for this phase, representing 94% response rate. Notwithstanding, the sample attained was still sufficiently powered to derive statistical inference.

The sample was stratified by level/year of study using 25% proportionality in order to attain representation of participants from across the different years of study on the B.Pharm. programme as shown in Table 3.1.

Table 3.1. Sample size distribution and response rate for Phase 1 study

Year/Level of Study	Targeted Participants, n	Total Attained, n	Response Rate, %
Year 1 B.Pharm.	40	33	82.5%
Year 2 B.Pharm.	40	43	107.5%
Year 3 B.Pharm.	40	40	100%
Year 4 B.Pharm.	40	34	85%
Total	160	150	94%

3.3.1.6. Inclusion and exclusion criteria

Only undergraduate pharmacy students studying full-time across the years of study (Year 1 to 4) on the B.Pharm. programme at UNZA were considered. This was in order to maintain a homogenous sample. Undergraduate pharmacy students on the part-time mode of

study (that is, those not taking the full complement of academic courses or re-attempting only one or two courses on the programme) during the academic year were excluded.

3.3.1.7. Data collection tool

This study adapted with minor modifications the Approaches and Study Skills Inventory for Students (ASSIST) questionnaire to determine undergraduate pharmacy students' ATL and teaching style preferences. To the original version of the ASSIST, very minor modifications on demographic questions and wording of selected construct items were made to contextualise them to local pharmacy education. The ASSIST inventory – a validated self-administered questionnaire (Appendix 2A) developed by Tait, Entwistle and McCune (available at: <http://www.etl.tla.ed.ac.uk/questionnaires/ASSIST.pdf>) comprises three main sections evaluating: Conceptions of Learning (6 items); Approaches to Learning and Studying (52 items); and Teaching Style Preferences (8 items) using self-reflection statements/items rated on a 5-point Likert scale. The inventory uses a Likert technique which involves asking students to rate the extent of their agreement (on a rated scale) with a series of related items that cover the aspects of a specific construct. Summing these responses across items produces a scale score for each construct. Each main construct (that is, deep, surface and strategic learning) from the ASSIST inventory has conceptually distinct aspects (sub-scales), which are related to the main construct (Entwistle *et al.*, 2013b). Table 3.2 illustrates the distinct main construct scales and sub-scales of the ASSIST inventory.

Table 3.2. Construct scales and sub-scales of the ASSIST questionnaire

Section	Main Scale	Sub-scales	Number of items
1. Conceptions of Learning	Learning as reproducing knowledge	-	4
	Learning as transforming taught material	-	5
2. Approaches to Learning and Studying	Deep	Seeking meaning	4
		Relating ideas	4
		Use of evidence	4
		Interest in ideas	4
		Monitoring effectiveness*	4
	Strategic	Organised studying	4
		Time management	4
		Achieving	4
		Alertness to assessment demands	4
	Surface	Lack of purpose	4
		Unrelated memorizing	4
		Fear of failure	4
		Syllabus-boundness	4
3. Teaching preference	Supporting understanding	-	4
	Transmitting information	-	4

(*also loads on strategic approach)

The ASSIST inventory was developed from an epistemological model that evolved from a wide body of quantitative and qualitative empirical evidence (Entwistle, 1997). Notwithstanding earlier critiques (Webb, 1997), the ASSIST inventory has undergone several iterations as it continued to be developed, in line with the evolving general understanding of student learning. The development and use of self-report inventories to evaluate diverse aspects of students' learning, studying and teaching have been increasingly used in many higher education settings over several decades. This practice has not only been attributed, in part, to increasing requirements for academic accountability (Entwistle and McCune, 2004), but it also parallels a general increase in, and need for knowledge of how students learn.

A plethora of studies (Reid *et al.*, 2005, Reid *et al.*, 2007, Walker *et al.*, 2010, Wickramasinghe and Samarasekera, 2011, Samarakoon *et al.*, 2013, Brown *et al.*, 2015, Valadas *et al.*, 2017, Curtis *et al.*, 2018, Chonkar *et al.*, 2018) have utilised the ASSIST inventory specifically to evaluate different aspects of students' learning in health sciences. Interestingly to note among the many studies that have utilized the ASSIST tool, few have evaluated ATL and teaching style preference of pharmacy students. To the best of the researcher's knowledge, this study was the first to utilise the ASSIST to explore ATL among undergraduate pharmacy students in Zambia. In a related study conducted in Zambia, Mulundu developed a modified version of the ASSIST tool to evaluate health professionals' and students' ATL in the context of HIV short courses (Mulundu, 2014). Other studies conducted elsewhere have previously investigated associations and relationships between ASSIST item scores and academic performance (Reid *et al.*, 2007, Diseth, 2007, Subasinghe and Wanniachchi, 2009, Valadas *et al.*, 2017). The present study envisaged to further contribute evidence to validate the use of the ASSIST tool to evaluate students ATL, particularly within the Zambian context of pharmacy education.

3.3.1.8. Data collection procedure

The ASSIST questionnaire was distributed to pharmacy students using a systematic random selection from each class during the first term of the 2017 to 2018 academic year. The basis of conducting the survey during the first term of the academic year was to detect early the ATL of undergraduate pharmacy students who were in their commencement (preclinical) years and those who were in more advanced formative (clinical) years on the B. Pharm. programme. This not only helped draw comparisons of prevalent ATL between the preclinical versus clinical level students, but also to inform and enable timely remedial interventions to be tried in the cohort. Systematic random sampling is a type of probability sampling method in which sampled participants derived from a larger population are selected according to a random

starting point and a fixed, periodic interval (also known as a sampling interval) (Kenton, 2018). For this study, the sampling interval was calculated by dividing the population size by the desired sample size as follows: $k = N / n = (350 / 160) = 2.2$. Therefore, every 2nd pharmacy student on the official class registers of students in each cohort (Year 1 to 4 classes, respectively) enrolled in the academic year was selected to participate in the study.

The ASSIST was distributed to participants enrolled from each B.Pharm. class during the first term of the academic year. To complete the questionnaire, participants were required to respond to each item on a 5-point Likert scale. Table 3.3 shows the interpretation of each of the Likert scale responses on the ASSIST as adapted (Entwistle *et al.*, 2013b).

Table 3.3. Likert-scale response categories on the ASSIST questionnaire and their numerical scale values (adapted from Entwistle *et al.*, 2013)

Likert response	Numerical scale value	Descriptive meaning
<i>Disagree</i>	1	Item is never or only rarely true of me
<i>Disagree somewhat</i>	2	Item is sometimes true of me
<i>Unsure</i>	3	Item may or may not be true of me half of the time
<i>Agree Somewhat</i>	4	Item is frequently true of me
<i>Agree</i>	5	Item is always or almost true of me

The construct scales derived from the ASSIST inventory were designed to measure the extent to which a student takes a deep, surface, or strategic approach to learning and studying a particular course or learning activity. Where the student has a strong preference or bias for a particular construct item, they were likely to ‘Agree’ or ‘Agree Somewhat’ with the statement in the questionnaire and select the Likert responses rated 5 or 4. Where a student has a relatively weak preference or bias for a particular approach the item addresses, they were likely to ‘Disagree’ or ‘Disagree somewhat’ with the statement and tick the responses rated 1 or 2, accordingly. Where the student was ambivalent towards the preference addressed by the item, they were likely to select ‘Unsure’ which was rated 3 on the Likert scale (Table 3.3).

3.3.1.9. Data analysis

Data from participants ($n = 3$) with incomplete questionnaires, including those with multiple or non-discriminating scores for ATL categories were inputted but excluded from the final analysis. Consequently, from the total of 150 participants attained, only data from 147 participants that successfully completed the ASSIST questionnaire in full were included in the analysis. Descriptive and inferential statistics were used to analyse the data. Participants' responses to the ASSIST items were aggregated as follows: firstly, the ratios of summed scores were calculated by the addition of numerical values of Likert scales (where 'Agree' = 5; 'Agree somewhat' = 4; 'Unsure' = 3; 'Disagree somewhat' = 2; 'Disagree' = 1); Secondly, since there is inherently a variation in the number of sub-scales for each main ATL scale category on the ASSIST (that is, 'Deep' scale comprises five sub-scales whereas 'Strategic' and 'Surface' scales each comprise four subscales, respectively), one sub-scale on the 'Deep' scale was omitted to normalize the ATL scales to four sub-scales each for ease of comparison.

Cronbach's alpha coefficient was used to determine the internal consistency of the ASSIST scales and sub-scales to detect the intended measure. For ease of comparison, ATL item scores in each main scale (that is; 'Deep', 'Strategic' and 'Surface', respectively) were grouped and aggregated to reach an overall total score divided by the number of contributing sub-scale items for each participant, allowing a maximum score of 20 and a minimum score of 4 per sub-scale, respectively. For ATL scales, the greater the differential between the scores for 'Deep' vs. 'Strategic' vs. 'Surface' learning, the greater the dominance of the respective ATL. Where the difference between scores in each scale was small, the dominance for either ATL or teaching style preference was considered relatively weak (that is, the participant had no strong bias towards either ATL or teaching style preference, respectively). The scale with the highest total score was considered indicative of the predominant ATL and teaching style preferred.

The Shapiro-Wilk test for normality confirmed continuous data were not normally distributed hence non-parametric statistical tests were employed. Likert scores for each subscale were summed and presented as median (M) and interquartile range (IQR). Fisher's exact test was used to determine the association between ATL, teaching style preference and demographic variables. Kruskal-Wallis equality of populations rank test followed by Dunn's post-test was used to compare ranked sums of ATL categories among demographic variables while Wilcoxon signed-rank test was used to determine whether there were significant differences in median scores within each ATL scale. Correlation between students' ATL and teaching style preference scores were determined using Spearman's correlation coefficient. Since the ATL scale consisted of three outcome categories (i.e. 'Deep', 'Strategic' and 'Surface' learning), a stepwise backward multinomial logistic regression model was constructed to ascertain the association between dominant ATL, age, sex, year of study, prior learning, mode of admission and course load, respectively. The regression likelihood ratio chi-square was 27.98 ($p = 0.0056$) which was considered a significant model fit. For statistical inference, a two-tailed p-value of less than 0.05 was accepted as significant. All statistical analyses were done using Stata 13 software (*Stata Corp, College Station, TX, USA*).

3.3.2. Phase 2

3.3.2.1. Objective

To explore contextual factors impacting the learning efficacy of preclinical pharmacy students on the B.Pharm. programme at UNZA.

3.3.2.2. Study design

In order to effectively address the objective, an exploratory qualitative study was conducted. The qualitative design was suitable as it enabled understanding of phenomena in a natural setting, giving due emphasis on the implications, experiences and perceptions of the

participants (Bogdan and Biklen, 1997). This orientation facilitated the exploration, elucidation and explanation of participants' experiences and perceptions of factors they frequently encountered in the educational setting and learning environment. This phase of the study utilised focus groups to explore experiences and multiple perspectives of the preclinical undergraduate pharmacy students in order to gain a much deeper understanding of diagnostic factors influencing their learning and academic performance. Focus groups enabled for purposive sampling and recruitment of participants who share characteristics and experiences of the phenomenon. It also enabled the utilisation of a robust and efficient data collection method.

3.3.2.3. Setting and context

The University of Zambia (UNZA) is the largest and oldest public university in Zambia that has been providing higher education programmes in various professional disciplines since 1966. The language of instruction at UNZA is English. The university has two main physical campuses situated in Lusaka. The Great East Road campus is the main site housing the schools of Education, Humanities and Social Sciences, Law, Natural Sciences, Engineering, Mines, Agricultural Sciences, and Veterinary medicine, respectively. The Ridgeway campus situated about 7km from the Great East Road campus houses the schools of Medicine, Health Sciences, Public Health, and Nursing Sciences, respectively. This study was conducted at the School of Health Sciences which currently has three departments as follows: Pharmacy, Physiotherapy, and Biomedical Sciences, respectively. The Department of Pharmacy, first established in 2000, offers a four-year full-time Bachelor of Pharmacy (B.Pharm.) degree programme that currently has an annual enrolment capacity of approximately 350 undergraduate pharmacy students across the four years of study. Admission criteria into the B.Pharm. programme is open to candidates with advanced level (A-level) attainment in prescribed science subjects, or those

with a Diploma in Pharmacy Technology in addition to the pre-requisite general education qualification required for admission into the University.

3.3.2.4. Population and sampling

For this phase of the study, the population of interest were the preclinical (Year 1 and 2) undergraduate pharmacy students enrolled in the 2017 to 2018 academic year at UNZA. This population was considered because, as described in Chapter 1 of this thesis, there was preliminary evidence of relatively high attrition rates recorded in preclinical cohorts over the recent years compared to their clinical counterparts (Figure 1.1). In line with the design of the study, pharmacy students in the preclinical stages of the B.Pharm. programme at UNZA were considered an information-rich population to provide useful insights into their learning experiences that address the study objective.

According to official registers of Year 1 (2nd year) and 2 (3rd year) pharmacy students enrolled on the B.Pharm. programme in the 2017 to 2018 academic year obtained at the Department of Pharmacy, there were 175 preclinical pharmacy students enrolled in Year 1 and 2, respectively. As guided by Barbour (2008), the purpose of qualitative sampling is to reflect the diversity within the population under study rather than aspiring to recruit a representative sample (Barbour, 2008). To recruit participants for this phase of the study, a convenient sampling technique was used to recruit male and female participants from the Year 1 and 2 B. Pharm. classes, respectively. Initially, an open invitation to participate accompanied by a detailed information sheet about the study was circulated to year 1 and 2 B.Pharm. classes via their notice boards and with assistance from the respective class representatives who posted the invitations on the class media platforms. A total of 32 pharmacy students (16 from Year 1 and 16 from Year 2 B. Pharm. class) responded to the invitation and were recruited in this phase of the study.

There were 20 male and 12 female participants recruited in phase 2 of this study. For purposes of organising and conducting focus group discussions (FGDs), the participants were distributed into smaller focus groups. Each focus group consisted of seven to nine participants that were scheduled to hold moderated discussions. None of the recruited participants dropped out of the focus groups. Despite being purposive, the sample was considered robust enough for representative views and perspectives on the subject matter with the full purpose of the study in mind. Participants were drawn only from the population of interest (that is, preclinical undergraduate pharmacy students) while excluding those from populations not suited with the purpose of the study (Stalmeijer *et al.*, 2014).

3.3.2.5. Study period

The study considered students that were enrolled in the academic year which commenced October 2017 ending December 2018. Field data collection was conducted from January to March 2018.

3.3.2.6. Data collection procedure

Focus group discussions (FGDs) were used to collect qualitative data. As described by Stalmeijer and colleagues (2014), a focus group is organized to explore a specific set of issues. It is focussed in the sense that it involves some kind of collective activity distinguished from the broader category of group interview by its explicit use of the group interaction as research data (Stalmeijer *et al.*, 2014). In their book, Krueger & Casey (2009) described a focus group study as a carefully planned series of discussions designed to obtain perceptions on a defined area of interest in a permissive, non-threatening environment. Each discussion is led by a skilled moderator. The discussions are relaxed, and often participants enjoy sharing their ideas, experiences and perceptions (Krueger and Casey, 2009).

For this study, FGDs as a method of data collection were suitable for two main reasons; firstly, they made the most of the communication and interactions between participants in order to generate contextually rich interactive data. Secondly, they were used to both explore hypothesis and explain phenomena affecting or impacting pharmacy students' learning efficacy at the university. Moreover, when compared to one-on-one interviews and other qualitative techniques; FGDs elicit a multiplicity of perceptions, experiences and information within a group context (Stalmeijer *et al.*, 2014). Notwithstanding their merits, FGDs are not without their concerns and challenges particularly with representativeness (especially with a topic that was tied to specific contexts of representation of a population). As guided by Stalmeijer and colleagues (2014), these concerns largely depend on not only the paradigmatic and methodological lenses through which research is understood but also the strength of evidence derived (Stalmeijer *et al.*, 2014). Nonetheless, the methodological design of this study ensured a healthy balance of participant numbers was attained from each category of the population of interest (preclinical undergraduate pharmacy students at UNZA). Representativeness was therefore not an obvious concern in this study.

A semi-structured interview guide (Appendix 2C) consisted of open-ended questions developed by the researcher with assistance from a local expert in qualitative research. The same set of questions were used for each focus group. In consonant with suggestions by Saunders and colleagues (2018), an effort was made to operationalise the principle of data saturation – a point of informational redundancy in a way that was consistent with the research question of this study (Saunders *et al.*, 2018). Iterative data collection and analysis was undertaken to ensure the dependability of findings generated.

Four FGDs were scheduled and successfully conducted at suitable time slots and outside of formal learning activities and accorded by the grouped participants. Each FGD

session lasted not more than 60 minutes in duration. The researcher facilitated and moderated all the FGD held in a relaxed environment that had a round-table free sitting arrangement. The boardroom at UNZA Department of Medical Education Development, School of Medicine was used. For each FGD, the moderator obtained consent from the participants to have the proceedings of the discussion audio-recorded verbatim. Two digital voice recorders (*Bell pro-series DVR-5005I from Bell Office, Korea*) were used. All FGDs were conducted in the English language.

3.3.2.7. The researcher

The FGDs were facilitated and moderated by the researcher (Aubrey C. Kalungia) who is a male Zambian national and a Lecturer at UNZA, School of Health Sciences for over 5-years. Despite the investigator being a faculty member at UNZA where the participants were undertaking their education, there was no undue influence on discussion proceedings in any way. In fact, participants were motivated by the nature of the discussion topic, the non-formal and social set-up of the discussion sessions, including the cordial learner support environment provided by the venue where the FGDs were conducted. Arguably, this atmosphere made participants feel at ease, expressive and able to interact fully. A research assistant (B.H, a part-time Tutor at UNZA, Department of Pharmacy) helped schedule and organise the FGDs. He also observed, monitored and double-recorded the proceedings at each FGD session. The researcher was erudite in qualitative techniques utilised in this study. Prior to the study, the researcher also undertook orientation sessions in the use of qualitative research methods and techniques. These were facilitated by local experts in qualitative research based at UNZA. This helped enhance credibility to the study undertakings.

3.3.2.8. Data analysis

Open-ended responses to discussion questions were grouped and thematically analysed using Clarke & Braun's top-down, step-wise deductive (theoretical) thematic analysis procedure (Clarke and Braun, 2013). Figure 3.3 illustrates the thematic analysis procedure utilised in this study.

Step 1	• Familiarising with the data: The Researcher immersed himself in, and became intimately familiar with the qualitative data collected. Process involved listening to audio-recordings at least twice, transcription, reading and re-reading the transcribed data, and noted any initial analytic observations.
Step 2	• Coding: This involved generating pithy labels for important features of the data of relevance to the study question. The Researcher endeavored to code every relevant data item. Codes generated that captured both semantic and conceptual aspects of the data were collated and extracted.
Step 3	• Search for themes: Second order coding was done to actively construct coherent and meaningful patterns in the data relevant to the research question. The Researcher collated all relevant codes to each derived theme and sub-theme.
Step 4	• Review of themes: Involved checking that the themes derived were in relation to both the coded extracts and the full dataset. Researcher cross-checked that the themes reflected a convincing and compelling story about the data, and began to define the nature and relationships of individual themes, including merging related themes and sub-themes.
Step 5	• Defining themes: The Researcher conducted a detailed analysis of each theme to determine what answers it provided with regards to the study question. This was done in order to construct a concise and informative theme.
Step 6	• Writing up: This was the integral part of the analytic process. Step involved weaving together the analytic narrative and data extracts to inform a coherent and persuasive evidence from the data, and contextualising it in relation to existing literature.

Figure 3.3. Braun & Clarke's six-phase framework for thematic analysis (adapted and modified from Braun & Clarke, 2013)

A top-down deductive (theoretical) analytical approach was preferred as it was primarily driven by the research question as compared to the bottom-up (inductive) approach that tends to be driven more by the nature of the data (Maguire and Delahunt, 2017). All audio recorded FGD sessions were double-checked and transcribed verbatim onto interview

transcripts. Data cleaning and reduction was done by extracting out irrelevant recordings and noise in the data before proceeding to the analysis. In this context, noise referred to any information captured but not related to the communication of the message. Raw data was then organised to generate explanatory sort codes categorised into emerging sub-themes. Second-order coding enabled sub-themes to be grouped and categorised into main themes. The organisation, sorting and coding of qualitative data were done using Nvivo 11 software (*QSR Int., Australia*). The software helped ensure that codes generated were valid, mutually exclusive and exhaustive.

As a first step, open coding was applied where all statements relating to the interview questions were identified and each assigned a code and category. Open coding involved identifying, categorising and naming expressions, breaking down patterns into discrete parts and closely examining them for similarities and differences in relation to the phenomenon reflected in them (Strauss and Corbin, 2008). Using Nvivo software, related expressions and narratives from participants' responses were clustered, highlighted using a unique colour code, named and stored as an emerging theme depending on its focus. The researcher ensured the name given to each emerging theme cluster was most logically related to the data it represented.

Axial coding followed open coding where the data was re-read three times by the researcher to identify linkages between emerging themes, searched for further codes and statements fitting into any of the identified categories. Related or duplicating themes were merged into clusters with the highlighted different participant's narratives that were similar or connected to the theme. Similarly, diverging themes, trends and narratives were noted from the data and clustered as earlier described. The coding of data, including organisation of expressions, narrative statements or sentence extracts was done using methods previously described (Maguire and Delahunt, 2017).

3.3.2.9. Credibility, dependability and trustworthiness of qualitative data

In this phase of the study, three main approaches were utilised to assure credibility of the qualitative research process. Firstly, appropriate data collection methods befitting the study design established credibility. FGDs, similar to one-on-one interviews, enjoy wide use to obtain rich qualitative data. During data collection, the researcher applied meticulous record-keeping of discussion sessions, decision trails, and transparency of interpretations in the data. This was an evidence-based strategy of maintaining internal validity and credibility of data (Long and Johnson, 2000). Secondly, peer debriefing was done between the researcher and the research supervisors who reviewed the process and methods data was collected, including reviewing the transcripts and the data coding process that was used. Lastly, an expert qualitative analyst was consulted to cross-check the data coding framework and consistency of derived themes from the analysis. The research supervisors also cross-checked the findings to further ensure credibility. This method of establishing and maintaining the internal consistency of qualitative data has been previously described (Pitney and Parker, 2009). This strategy also ensured analysis biases were eliminated, ensured there were sufficient depth and relevance of data collection and analysis (Sandelowski, 1993), including controlling for and accounting for any other possible biases with potential to influence findings reported (Morse *et al.*, 2002).

Transferability was assured two-fold. Firstly, within Zambia, the curriculum design and model of training pharmacists were not very different between the public and private universities offering pharmacy education programmes. This is because the B.Pharm. curriculum developed by UNZA has been replicated and adapted at other local private universities offering the same programme (Kalungia *et al.*, 2019). Transferability was therefore feasible to some extent as the possibility exists for students' experiences with the methods of teaching and learning having similar features across institutional settings. Secondly and

importantly, transferability to settings outside Zambia was made possible by detailing each step of the qualitative data collection, management and steps of analysis undertaken in this phase.

Respondent validation was done by inviting two selected participants from each focus group to preview the interview transcripts generated from the discussion sessions held with them as being a true reflection of the data collected. This was done by providing them with rich verbatim descriptions of participant's accounts and context to validate the data. This method is advocated by scholars (Noble and Smith, 2015). Data validation was further enhanced by comparing and appraising the study findings with the current literature (Kuper *et al.*, 2008). Similarly, respondent validation was also used to ascertain dependability, which determined consistency in research findings of the same participants and context (Bitsch, 2005). Dependability of the findings was also enhanced by using separate comparative coding of the qualitative data done by the investigator and then verified by an expert qualitative consultant. Emergent themes derived from the related codes as extracted from the data were then cross-checked and verified. Lastly, this being a component of a mixed-methods study, findings from the qualitative phase of the study were triangulated at the analysis stage with those from the quantitative components undertaken. This ensured confirmation and completeness of the apparent findings and their interpretations. Triangulation in research refers to the use of multiple techniques for gathering and handling data within a single study (Adami and Kiger, 2005).

3.3.2.10. Presentation of qualitative findings

The results of phase 2 of this study were presented using a traditional approach previously described (Burnard, 2004, Burnard *et al.*, 2008). The Researcher set the scenario being discussed in the FGD, extracted appropriate direct quotes from participants' verbatim narratives to illustrate and confirm the findings, and then commented on the key findings under each main theme and subthemes accordingly. This was then accompanied by linking findings

to related discussion points with which the findings were contextualised within the existing body of literature (Burnard *et al.*, 2008). To ensure conformity with prescribed reporting formats for qualitative studies, every effort was made to adhere to the Consolidated Criteria for Reporting Qualitative research (COREQ) guidelines promoting explicit and comprehensive reporting of qualitative studies involving interviews and focus groups (Tong *et al.*, 2007). Results of this phase were presented in Chapter 4 of this thesis.

3.3.3. Phase 3

3.3.3.1. Objective

To assess the effect of a metacognitive educational intervention (a 5-day OADLSS elective module) on ATL and academic performance among preclinical pharmacy students.

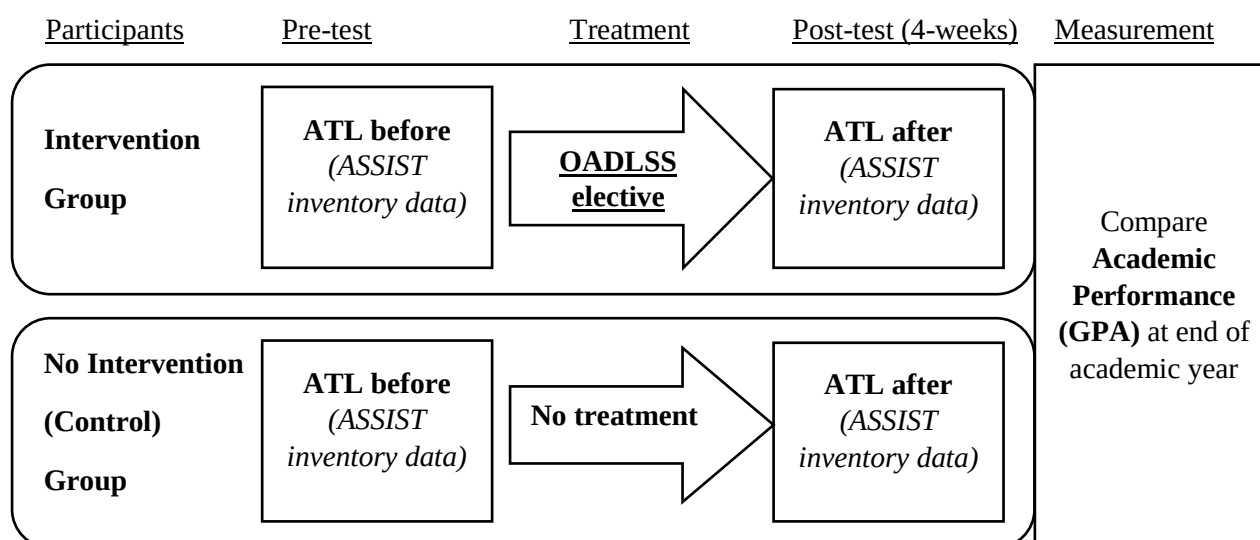
The specific objective for this phase of the study was informed by the conceptual framework (Figure 2.2) interrogating the following overarching question: 'Does raising metacognitive awareness of deep learning and studying influence students' approaches to learning and academic outcomes?' This question formed the basis of developing and experimenting a novel and innovative educational intervention in a population of preclinical undergraduate pharmacy students at UNZA. Moreover, existing local evidence suggests that pharmacy students at UNZA lacked adequate study skills (Ezeala and Siyanga, 2015). The development of the innovative elective module as an educational intervention was informed by this gap.

The objective of this study achieved aspects of the 'Population', 'Intervention', 'Comparison', 'Outcomes' (PICO) and the 'Participants', 'Educational aspects', and 'Outcomes' (PEO) in accordance to frameworks for evidence-based medical education research enquiry (Masoomi, 2012). The population or participants (P) were the preclinical

undergraduate pharmacy students to gain a better understanding of how within the local educational environment and context they learn. The intervention (I) was designed by the researcher as a 5-day elective module dubbed ‘Orientation and Approaches to Deep Learning and Study Skills (OADLSS)’ – a novel, innovative learning and studying skills capacity-building module that exposed participants to educational aspects (E) considered relevant to enhance deep learning and studying strategies. A comparison (C) of key outcome variables of interest (ATL and academic performance) was made between participants exposed to the educational intervention (experimental intervention group) and those not exposed (non-intervention control group). The outcome (O) of interest included: students adopting a deep learning approach, and academic performance in summative assessments.

3.3.3.2. Study design

This was a quasi-experimental study adopting a pretest-posttest design using two non-overlapping groups (Figure 3.4). A quasi-experiment, as described by Maciejewski (2018), is an observational study that is similar to a randomised controlled trial in many respects, with the primary exception being that participants self-select into an intervention instead of being randomly assigned for the purpose of comparing the real-world effectiveness of the intervention (Maciejewski, 2018). In a quasi-experiment, there is manipulation of the independent variable, except participants are not randomly assigned to conditions (Cook and Campbell, 1979). Even in the absence of randomisation, this study design was eligible to examine participants’ ATL both before and after exposure to the OADLSS module and compared to a control (non-intervention) group.



ATL: Approach to Learning, OADLSS: Orientation & Approaches to Deep Learning & Study Skills elective module, QUAN: Quantitative

Figure 3.4. Pretest-posttest design to examine the effect of an educational intervention on students' learning approaches.

Participants were assigned to the experimental intervention (OADLSS) group on the basis of self-selection to participate based on their individual perceived need or merit of the intervention (Shadish and Galindo, 2010). In this study, participant self-selection to either group (intervention or no intervention group) was used in order to avoid ethical concerns associated with researcher-led assignment to groups. According to White and Sabarwal (2014), by using self-selected groups such as individuals who are already participating in a programme (in this case, the B.Pharm. programme at UNZA), the method avoids the ethical concerns that are associated with random assignment – for example, the withholding or delaying of a potentially effective intervention for one group of study participants (White and Sabarwal, 2014). Moreover, quasi-experimental designs identify a comparison group that is as similar as possible to the treatment group in terms of baseline (pre-intervention) characteristics (White and Sabarwal, 2014). In this study, the treatment intervention group shared similar baseline characteristics with the comparison (no intervention) group. The two groups all undertook

similar formal learning and assessment activities during the academic year and only differed by intervention exposure status.

A regression discontinuity design was considered for matching similarity of observable characteristics between the experimental intervention and comparison groups by means of threshold criteria. Regression discontinuity design deals with non-observable characteristics more convincingly than other methods of quasi-experimental matching such as propensity score matching and sample selection models (White and Sabarwal, 2014). In this study, the score for ‘deep’ learning scale (as measured via the adapted ASSIST questionnaire using methods described in section 3.3.1.8) was the outcome of interest used to determine the regression threshold. Deep learning scale on the adapted short-version of the ASSIST questionnaire (Entwistle *et al.*, 2013b) comprised six items whose scores were numerically rated on a 5-point Likert scale previously described. Therefore, the aggregated score for the ‘deep’ learning scale permitted a maximum score of 30 and a minimum score of 6 from each of the contributing items. A pre-intervention (pre-test) threshold score greater than 15 was assigned as criteria for selection to each group (intervention and control group, respectively).

3.3.3.3. Hypotheses

Null hypothesis (H₀)

The null hypotheses of this study were stated as follows:

“There is no difference in the ATL and academic outcomes of pharmacy students exposed to the OADLSS elective module compared to those not exposed to the intervention”.

Alternate hypothesis (H₁)

“Pharmacy students exposed to the OADLSS elective module adopt deep learning and attain better academic outcomes compared to those not exposed to the intervention”.

The strength of evidence generated was used to test the hypotheses. Outcomes of the hypothesis test were described in Chapter 4.

3.3.3.4. Study site

The study site was UNZA, School of Health Sciences situated at the Ridgeway Campus in Lusaka, Zambia.

3.3.3.5. Study population

The population of interest were the preclinical (Year 1 and 2) undergraduate pharmacy students undertaking full-time study during the 2017 to 2018 academic year. The basis of targeting this sub-population of undergraduate pharmacy students was, as revealed in Chapter 1 of this thesis (Figure 1.1), the higher fail rates occurring as compared to their clinical level counterparts (B.Pharm. Year 3 and 4), respectively. Moreover, this subpopulation was considered acclimatizing to their exposure to pharmacy education at bachelor degree level and therefore would be an ideal target for educational interventions aimed at improving their approach to learning approach and study skills.

3.3.3.6. Sample size

The sample size for a two-sided two-sample means assumed a non-intervention (control) group mean score for deep learning of 16 based on findings from phase 1 study, a mean difference of ± 4 with the intervention (experimental) group, at a significance level of 5% and desired power of 80%, and assuming both groups had a standard deviation of ± 5 . The computed sample size was 52 participants (with N per group = 26 participants, respectively).

Sample size computations were done using Stata 13 software (*Stata Corp, College Station, TX, USA*).

To recruit participants, the OADLSS elective was advertised to preclinical undergraduate pharmacy students through class emailing lists and posters placed on class notice boards during the first and second week of the first term of 2017 academic year. Based on individual perceived need for the intervention, students interested in the OADLSS elective module advertised individually signed up to participate. Convenience sampling was used to attain the target sample size for the experimental group ($n = 26$). A matched control group of participants was recruited using methods described in section 3.3.3.2.

3.3.3.7. Inclusion and exclusion criteria

To maintain a homogenous sample, only preclinical (Year 1 and 2) undergraduate pharmacy students at UNZA were included on account that this was the population evidenced to be experiencing relatively high attrition rates (Figure 1.1). It was, therefore, envisaged that this particular sub-population of pharmacy students would benefit from any potential positive effects of the educational intervention. Students at the clinical level (Year 3 and 4) of B.Pharm. programme, as well as students on other HPE training programmes at UNZA, were excluded.

3.3.3.8. The educational intervention

The educational intervention was a novel adjunct elective module named ‘Orientation and Approaches to Deep Learning & Study Skills’ (OADLSS). The module outline and syllabus are shown in Appendix 3. This elective module was conceptualised locally and developed by the research team (that is, the principal investigator, principle supervisor, and co-supervisor) using principles of instructional design posited by Rowntree in 1981, and by Gagne and Briggs in 1974 (Gagne and Briggs, 1974, Rowntree, 1981). The module syllabus was modelled from published literature derived from Entwistle & Ramsden’s Understanding

Student Learning, Chapter 4 – 6 (Entwistle and Ramsden, 2015) and Pritchard's Studying and Learning at University: Vital skills for success in your degree, p.5 – 174 (Pritchard, 2008).

The rationale underpinning the design of this particular novel educational intervention was based on existing evidence that undergraduate pharmacy students at UNZA lacked adequate study skills (Ezeala and Siyanga, 2015) and that metacognitive practices in the educational setting have potential to influence students to learn better (Zohar and David, 2009, Weimer, 2012). The OADLSS, though adjunct and elective in nature, was intended for the local setting to address learning gaps identified. Moreover, the current B.Pharm. curriculum does not offer any elective courses that aim to help students learn effectively.

3.3.3.8.1. Design and development of the OADLSS module

The OADLSS module design, its educational objectives, content and face validity were iteratively examined, peer-reviewed and validated through a two-round Delphi technique involving four local technical experts in Medical Education based at UNZA. The Delphi technique, as a method of collecting expert opinion on a particular enquiry, subject matter or research question, was based on the premise that pooled intelligence enhances individual judgement and captures the collective opinion of a group of experts without being physically assembled (de Villiers *et al.*, 2005).

The first Delphi round involved sending via email the draft outline of the module. The outline consisted of the proposed module title, its aims and objectives, suggested content, instructional methods, contact hours and educational resources used. The outline was individually sent to the four identified experts. Comments were solicited from experts on the suitability, clarity or ambiguity of the module objectives, content, instructional methods and cognitive level aimed to be attained by participants. Respective expert comments were collected and collated from the first round and suggested refinements incorporated in the

subsequent draft module. Alongside, existing literature and published resources were iteratively consulted from which relevant content of the module was updated accordingly.

In the second Delphi round, the revised draft module was re-sent for experts' valid opinions and comments for improvement. All four experts independently gave positive comments and consensus attained on the suggested design aspects of the module. At this point, the researcher proceeded to finalise the design of the OADLSS elective module.

3.3.3.8.2. Experimentation and evaluation of the OADLSS elective module

To the best knowledge of the researcher, this was the first of the kind educational intervention targeting raising metacognitive awareness of deep learning and studying strategies for undergraduate students on a health professions programme using an elective approach at UNZA. The OADLSS was novel and was tried for the first time on undergraduate pharmacy students. Specifically, the aim of the OADLSS elective module was to orient participants to principles of deep learning and studying skills useful for health sciences. In the OADLSS module, participants were exposed to concepts and attributes of deep learning as espoused by leading scholars and theorists (Marton & Saljo, 1997, Entwistle *et al.* 1998), how to utilise deep learning and studying strategies to their everyday learning tasks, and employ study skills that enabled them understand and apply what they learnt. At the end of the module, the participants were expected to: be oriented to deep learning and studying approaches; reflect on their learning and develop, adopt or adapt strategies of deep learning and studying; manage and organize their learning and study time; demonstrate critical thinking during learning and assessment tasks, and better utilize educational resources that support deep learning and studying of their courses.

The OADLSS elective module was adjunct and non-compulsory in nature. The module content was delivered using expository, exploratory and participatory methods of facilitating

learning via a seminar approach. The instructional philosophy was sitting within a blend of cognitivist and constructivist approaches to facilitating learning (von Glasersfeld, 2012). Instructional contact time per module session was two-hour duration per day. On Day 1, participants were introduced to learning orientations, transitions and concepts of effective learning (Entwistle and Ramsden, 1983, Pritchard, 2008). On Day 2, participants were taught the attributes of deep learners (Marton and Saljo, 1997, Entwistle *et al.*, 2002), explored their individual learning styles, including how to develop and effectively utilize different learning styles (Kolb *et al.*, 2000). On Day 3, participants discussed strategies and skills for deep learning, studying and critical thinking. On Day 4, participants discussed methods of effectively utilising educational resources that promote deep learning, including organising their studying (Wong, 2009, Ellis, 2011). On the last day (Day 5), participants wrapped up by reviewing key concepts covered and also evaluated the module.

A self-administered evaluation form (Appendix 4) was administered to participants exposed to the OADLSS to evaluate the module. Aspects of the evaluation adapted from Stufflebeam's content, input, process, product (CIPP) model (Stufflebeam, 2007). This model was preferred for its systematic approach and attention to context, inputs and available resources, processes and outcomes. These elements of the evaluation could help developers categorize priority needs and also to serve available resources to the best type of activity with continuous improvement and monitoring of the intervention. Stufflebeam's CIPP model has demonstrated value for evaluating medical science courses in educational settings (Mohebbi *et al.*, 2011). The following aspects were evaluated: module addressing contextual learning needs, quality of delivery, participation, modification of behaviour (that is, approaches to learning and study skills), and educational benefits to participants.

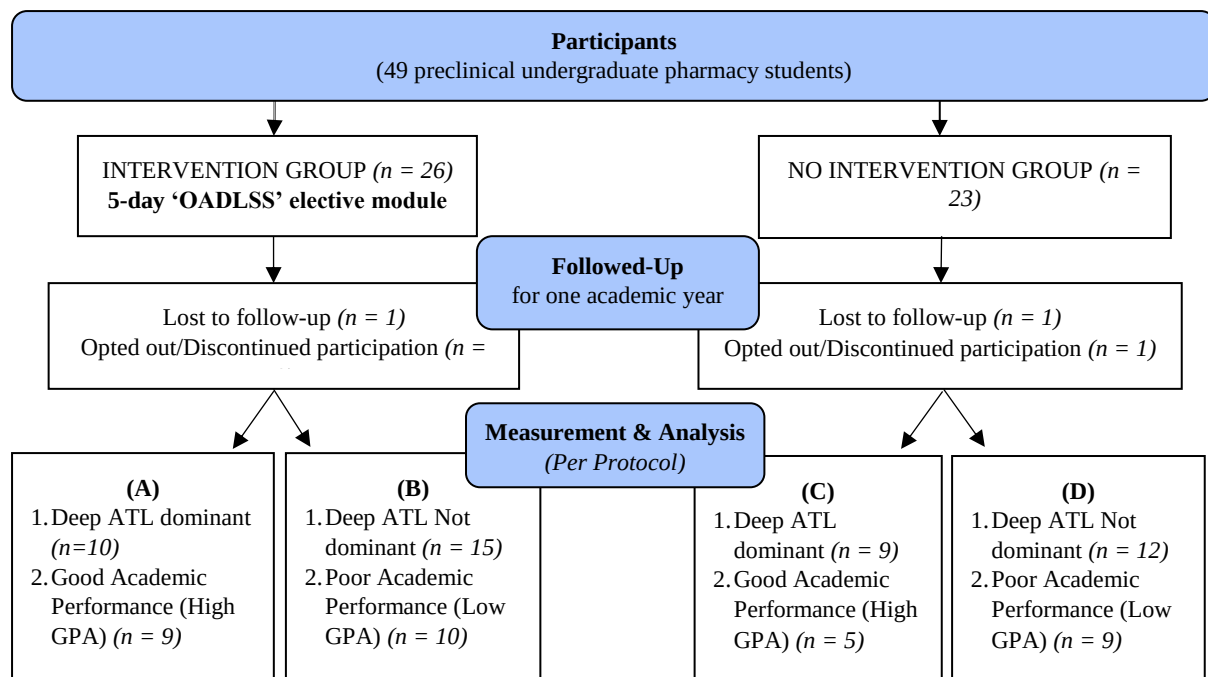
The OADLSS module sessions were scheduled and conducted during the first-term break when students were off their formal academic class activities. All undergraduate

programmes at UNZA's Ridgeway campus follow a 28 to 32-week academic calendar divided into four terms with 7 to 8 weeks each. At the end of each term, students are given 1-week end-of-term breaks as activity review periods.

The OADLSS module was purely experimental and was designed with no formal assessment components tied in. A module evaluation component was incorporated for purpose of formative measurement of impact among participants exposed to the OADLSS. Module policy and participant requirements included regular attendance, completion of scheduled sessions, and completion of the pre- and post-measurement inventories required.

3.3.3.9. Group allocation and experiment process

Figure 3.5 illustrates the quasi-experiment flow chart of the experiment process undertaken. Existing evidence suggests assignment to quasi-experiment conditions (that is, treatment versus control or comparison group) can be by means of self-selection – a process by which participants choose treatment for themselves or through administrator selection (that is, by the researcher, project managers, teachers, and so on) or through both of these routes (Shadish *et al.*, 2002, White and Sabarwal, 2014). In this study, enrolled participants self-selected to be assigned to either the intervention (OADLSS, based on their perceived need and desire for the intervention) or the control (no intervention) group, respectively. No randomised allocation of participants to groups was done.



OADLSS: Orientation & Approaches to Deep Learning & Study Skills elective module. ATL: Approach to Learning; GPA: Grade Point Average

Figure 3.5. Quasi-experiment flow chart for the Phase 3 study

3.3.3.10. Measurements and variables of interest

The measurements of interest (dependent and independent variables), their indicators and points were measured during the study are shown in Table 3.4.

Table 3.4. Variables and measurements for Phase 3 study

Dependent (Outcome) Variable	Variable type	Indicators	When measured:
Approach to learning	Categorical	Deep, Surface, Strategic	Baseline (pre-test) and after 4-weeks (post-test)
Academic performance	Continuous	GPA scores attained in formal examinations	End-point
Academic outcome	Dichotomous	Pass, Fail	End-point
Independent (Predictor) variables			
Sex	Dichotomous	Male, Female	Baseline
Prior learning/academic attainment		A-level Natural Sciences, Diploma in Pharmacy	
Level/Year of study		Year 1 B.Pharm. Year 2 B.Pharm.	
Mode of admission		Regular, Parallel	
Age	Continuous	Age in years	
IQ	Ordinal categorical	WAIS-IV test score category: Superior (>120), Normal (111 – 119), Average (91 – 110), Inferior (<90)	
Other non-academic activities (e.g. formal work, etc.)	Dichotomous	Yes, No	
Study time	Continuous	Average hours spent studying per week	
Level of self-motivation	Ordinal categorical	Low, Moderate, High	Baseline and End-point
Self-perception and rating of academic capacity	Ordinal categorical	Low, Average, High	
Academic course load	Nominal categorical	Number of courses taken in the academic year	Baseline

3.3.3.11. Data collection tools

The ASSIST short-version questionnaire (Appendix 2B) as amended by Noel Entwistle (2006) was adapted for use to measure participants' ATL before and 4-weeks after the OADLSS treatment. The basis of measuring ATL at baseline and 4-weeks post-intervention was informed by evidence by Spollen and colleagues (2010) (Spollen *et al.*, 2010). Only minor components such as additional demographic questions were added to the original ASSIST tool in order to capture additional demographic data about participants. The phrasing of some statements in the original questionnaire was revised to contextualise local pharmacy education experiences. Aside from the minor adaptations made, the tool maintained its original constructs as intended by the developers. The ASSIST short-version questionnaire consisted of 18 items asking participants their relative agreement or disagreement with statements that best described their ATL. Prior to self-administering the ASSIST questionnaire, participants in both groups initially completed a self-administered baseline demographic questionnaire (Appendix 2D) used to collect baseline covariate data.

In addition to other baseline covariate data collected, participants' cognitive ability was measured using the Wechsler Adult Intelligence Scale, version 4 (WAIS-IV). To do this, participants independently undertook a timed quick online test version of the WAIS-IV consisting of 25 general questions attempted in 10 minutes duration (available at www.wechsleriqtest.com). Recent evidence suggests that the WAIS-IV version provided superior measurement, scoring, and structural models to measure perceptual reasoning, working memory and processing speed attributes of IQ (Taub and Benson, 2013). It should be noted that the WAIS test scores automatically generated for each participant by the online platform upon completion of the test were used only as a preliminary unverified indicator of the level of cognitive ability only for purposes of this study.

An Assessment Performance Tracking (APT) form (Appendix 2E) developed for the purpose of this study was used to track and record Participants' course-specific and overall composite scores and grade points attained in their continuous assessments and final examinations conducted during the 2017 to 2018 academic year, including assessment outcomes (pass or fail) were recorded on the APT form. Assessment grades and outcomes attained were extracted from the official published UNZA Senate examinations report for the academic year. Grade point average (GPA) score was calculated by dividing the total grade points attained in the courses assessed with the total credit units of the courses taken in the academic year (where credit unit for weighting a full course range from 3.0 to 5.0, and that of a half-course range from 1.0 to 2.9, respectively). At UNZA, grade point values in the health science courses are allocated as follows: Distinction: A+ = 5, A = 4; Meritorious: B+ = 3.5; Credit: B = 3, C+ = 2.37; Pass: C = 1.5; Fail: D+ or D = 0, respectively (UNZA, 2016). Academic performance data captured using the APT form was entered onto a Microsoft Excel spreadsheet and exported to Stata and GraphPad Prism software, respectively, for further analysis.

3.3.3.12. Data analysis

Statistical methods were used to analyse quantitative data. Pre- and post-test scores from the ASSIST questionnaire were summed and aggregated as described in section 3.3.1.9. Normality of continuous data was confirmed using the Shapiro-Wilk's test with $p > 0.05$ and complemented by visually inspecting Normal Q – Q plots generated.

Outcomes of interest included ATL scores measured at baseline (pre-test) and 4-weeks after the OADLSS intervention (post-test). The post-test reliability of the adapted ASSIST short-version questionnaire was determined using Cronbach's alpha. Coefficients of the construct scales were as follows: deep approach = 0.73, strategic approach = 0.45, and surface approach = 0.69, respectively. The overall alpha coefficient was 0.72 which was acceptable

reliability. Although the alpha coefficient of the strategic and surface approaches did not quite reach above 0.7, given the low number of test observations ($n = 46$) and items per scale (6), the reliabilities were still considered satisfactory based on Tavakol and Dennick's (2011) argument that a low alpha value could be due to a low number of items per construct, poor inter-relatedness between items, or a heterogeneous construct. Increasing the number of items per construct usually tends to increase returns on the Cronbach's alpha value (Tavakol and Dennick, 2011). Furthermore, Schmitt (1996) earlier argued that there was no absolute level of acceptance, and even relatively low levels of Cronbach's alpha values (e.g., 0.50) of criterion reliability do not seriously attenuate validity coefficients and can indeed still be useful (Schmitt, 1996).

Other outcomes of interest measured were academic performance in assessments (GPA scores) attained and assessment outcomes (pass or fail rates) between groups. For ease of comparison, ATL and GPA scores for both the intervention and non-intervention (control) groups were described using Mean $\pm$ Standard Deviation (SD) as data were normally distributed. A paired t-test was used to compare changes in ATL scores within each group whereas an unpaired t-test was used to compare ATL scores between the intervention and control group both at pre-test and post-test, respectively. Similarly, an unpaired t-test was used to compare GPA scores attained by participants exposed to the OADLSS intervention versus controls. A one-way independent between-groups Analysis of Variance (ANOVA) followed by Dunn's post-hoc test was used to measure ATL differences between participants with low and high GPA categories. Pearson's correlation coefficient was used to determine the relationship between ATL scores, GPA scores and other continuous variables of interest. To predict effects of independent variables on the outcomes of interest (ATL, GPA and academic outcome), a logistic regression model was constructed. However, due to the limited number of participants, it was inadequate to fit the model (regression model chi-square > 0.05).

Alternatively, a predictive margins plot with a 95% confidence interval was used to determine the magnitude of the effect of the OADLSS intervention using different exposure variables of interest.

For statistical inference, a two-tailed p-value < 0.05 was accepted as statistically significant. Statistical analyses were done using Stata 13 (*StataCorp LLC, College Station, USA*) and GraphPad Prism 5 (*GraphPad Software, La Jolla, USA*) software, respectively. Results of the analysis were described in Chapter 4.

3.3.4. Measures taken to mitigate potential threats to validity and reliability of methods

This study adopted a widely utilised and pre-validated tool to measure ATL. In the phase 1 study, reliability of the ASSIST tool was confirmed at Cronbach's alpha = 0.71, 0.73 and 0.68 to detect deep, strategic and surface learning, respectively. This was quite similar to what other scholars that have utilised the ASSIST reported in other studies (Byrne *et al.*, 2004). Both the original and short version of the ASSIST inventory were utilised in this research. As stated in earlier sections, only minor components of the original ASSIST were modified and re-worded to fit the context. Prior permission to adapt the ASSIST was obtained from the developers of the tool (Appendix 6). The tool maintained its original constructs as intended by the developers.

In alignment with the research paradigm, sequential multi-method design and methodology were employed. Triangulation of findings from the quantitative and qualitative phases of this study was merged at the analysis stage. Phase 3 of this study examined, for the first time in Zambia's HPE sector, the effect of a metacognitive educational intervention dubbed 'OADLSS' – a novel, needs-based and locally designed elective module aimed at promoting deep learning strategies among undergraduate pharmacy students at UNZA. The

educational content of the experimental module developed was validated through expert peer-review prior to being experimented as an educational intervention.

Group interaction effects were kept to an absolute minimum by ensuring the OADLSS elective module utilised closed group sessions, guided instruction, ordered and sequenced information delivered naturalistically using self-reflective techniques. Moreover, by measuring post-intervention ATL 4-weeks later, maturation effects were avoided. The study did not modify the education environment in any way.

3.4. Ethical considerations

3.4.1. Considerations relating to participants

Adequate participant information (as shown in Appendix 5) was provided and written informed consent obtained from each participant prior to enrolment into any of the outlined phases of the study. Since all participants were literate, written informed consent was obtained by allowing each participant enough time to study the Participant Information Sheet provided (Appendix 5) and to clarify any concerns before signing the consent form. Participation in the study was purely voluntary and no coercion was used at any time. As shown in Appendix 5, the Participant Information Sheet clarified potential issues of power perceptions, risks and mitigation strategies available should they arise in the course of participation in the study. Moreover, participants were also availed protection and resources available to them to report any possible ethical breaches or power differentials (whether coercive, reward, legitimate, referent, or expert power) they felt were infringed upon by the researcher.

Participants were at liberty to decline or withdraw participation at any time without any consequences whatsoever. All principles relating to the responsible and ethical conduct of research, and the protection of human participants, including respect of participant autonomy, justice, beneficence, and non-maleficence, were strictly adhered to during the conduct of this

study. Every effort was taken to ensure that participants were not identified by name as only student numbers, anonymised codes and unique group identifiers were assigned. Access to raw data and datasets generated was restricted to the principal investigator and supervisors only. This study had no known physical or psychological risk to participants except for their time spent participating in the respective phases of the study. There was no remuneration or other related incentive given for participation in the study. For academic benefit, the researcher ensured that after successful completion of the experimental phase of this study, participants in the control group were to be offered the opportunity to experience the educational intervention should it demonstrate beneficial outcomes.

3.4.2. Considerations relating to the academic institution (study site)

This study did not interfere with the formal academic setting or learning activities undertaken on the programme therein. Participants were requested, as guided by the information sheet provided, to utilise only their free time to participate in this study. No student was taken away from their scheduled academic sessions. Whereas the phase 1 study utilized a self-administered questionnaire to collect primary data, the focus group discussions (phase 2 study), and the ‘OADLSS’ educational intervention (phase 3 study) were undertaken during the end of term break when students were away from their academic class activities. Moreover, all data collected during this research was protected, confidentially maintained, and used within the jurisdiction of the approved study protocol. Relevant permission from UNZA management was granted (Appendix 6), including access to official published examination results of students on the B.Pharm. programme.

3.4.3. Considerations relating to the research process

The researcher, being a faculty member at UNZA, was officially recused from academic teaching and assessment duties during the entire period of field research and data collection. This was in order to eliminate any potential power differentials that could have arisen in an

academic environment setup. Participants were in their natural and social settings where they were undertaking their normal academic activities and programmes as scheduled. The research process was sequential and phased to ensure the study participants were not put under any undue stress or pressure of research. The research protocol was approved by the University of Zambia Biomedical Research Ethics Committee (IRB00001131 of IORG0000774). The approval reference is 008-06-17 (shown in Appendix 2).

3.5. Limitations and delimitations of the study

This study was not without limitations. The monocentric nature of the study done at one public university and in one population of interest (undergraduate pharmacy students) may have limited the generalizability of the findings. Nonetheless, ecological validity was still demonstrated. Moreover, the overall thrust of the study was not to generalize but to endeavour to find solutions to a contextually relevant phenomenon of interest and concern so as to enhance learning outcomes.

Despite the cross-sectional survey conducted in the first phase of this study being inherently unable to establish temporality and causal relationships of ATL as an outcome of interest, the findings provided a useful baseline upon which a prospective intervention to improve quality of student learning was and can still be further developed. The quasi-experiment (phase 3) utilised per protocol (as treated) analysis. The outcomes of statistical analysis were however, not very different even when cross-checked with intention-to-treat analysis.

Lastly, the OADLSS elective module (educational intervention) was novel, innovative, and locally developed for purposes of this study. The elective module had never been previously tried or piloted anywhere before this study. Similarly, in the local environment, there was no other quite similar module that was used as a comparative standard. Consequently,

no standard comparison group was used. A concern may have arisen that since the OADLSS module was elective in nature and delivered using 2-hour contact sessions for five consecutive days that did not account or contribute to any course credits, may have affected the level of uptake and utilisation of concepts by the participants. The present study focussed on assessing the immediate impact of the OADLSS intervention on ATL and academic performance in assessments as outcomes of interest in this phase. Future studies can, however, consider more sophisticated methods of evaluating long-term impact of educational interventions such as the OADLSS module using for instance the Kirkpatrick's model of evaluation (Kirkpatrick, 2009) and how the intervention would transfer to sustain academic performance and future professional practice of the graduate. These long-term effects of the intervention were beyond the scope of this study. This researcher looks forward to conducting further research in this area.

CHAPTER 4 : RESULTS

4.1. Introduction

This chapter presents the results of the study. The findings are presented in accordance with the phases of the study undertaken in line with the set specific objectives that guided the study as follows: Firstly, results for phase 1 study are presented, then followed by phase 2 study, and lastly phase 3 study, respectively. Quantitative results utilised contingency tables for frequency distributions, histograms, box-plots for medians and interquartile ranges, and scatter plots for means and their standard deviations. Qualitative results were discussed as emergent themes, subthemes and participants' narratives as captured from the data. The cross-talk between qualitative and quantitative results were also described in this chapter.

4.2. Results of phase 1 study

The phase 1 study investigated the following sub-questions:

- i. What approach to learning is predominant among the undergraduate pharmacy students?
- ii. Which teaching style is predominantly preferred by undergraduate pharmacy students at the university?

4.2.1. Demographic characteristics of participants in phase 1

A total of 160 ASSIST questionnaires were distributed with 150 returned (90% response rate). Incomplete questionnaires (n = 3) were omitted from the analysis. Therefore only 147 questionnaires that were completed in full were used in the analysis. Table 4.1 shows the demographic characteristics of the participants in the phase 1 study.

Table 4.1. Phase 1 study participants' demographic characteristics

Variable	Categories	Proportion (n, %)
Sex	Male	74 (50.3)
	Female	73 (49.7)
Age	≤25 years	93 (66.9)
	>25 years	46 (33.1)
Year of Study	Year 1	32 (21.8)
	Year 2	43 (29.3)
	Year 3	40 (27.2)
	Year 4	32 (21.8)
Mode of Admission	Regular intake	111 (75.5)
	Parallel intake	36 (24.5)
Prior Learning	A-level Natural Sciences	103 (70.1)
	Diploma in Pharmacy Technology	44 (29.9)

4.2.2. Reliability of ASSIST scales and subscales

Table 4.2 shows the internal consistency of the ASSIST construct scales and subscales as measured using Cronbach alpha for all three ATL scales (deep, strategic and surface).

Table 4.2. Cronbach alpha coefficients of ASSIST scales and subscales to detect learning approaches (n = 147)

Approach to Learning and Studying	No. of Items	Median Score (IQR)	Cronbach alpha coefficient
- Seeking meaning	4	17 (8 – 20)	0.60
- Relating ideas	4	15 (4 – 20)	0.71
- Use of evidence	4	17 (7 – 20)	0.62
- Interest in ideas	4	17 (9 – 20)	0.65
- Monitoring effectiveness	4	18 (11 – 20)	0.71
Deep Approach	20	16.25 (9.25 – 19.5)	0.71
- Organized studying	4	16 (7 – 20)	0.64
- Time management	4	18 (7 – 20)	0.60
- Achieving high scores	4	18 (8 – 20)	0.67
- Alertness to assessment demands	4	18 (9 – 20)	0.74
Strategic Approach	16	17.25 (9.75 – 20)	0.73
- Lack of purpose	4	7 (3 – 18)	0.69
- Unrelated memorising	4	12 (5 – 19)	0.56
- Fear of failure	4	16 (5 – 20)	0.55
- Syllabus-boundness	4	14 (7 – 20)	0.66
Surface Approach	16	12.25 (6.5 – 16.75)	0.68

IQR: interquartile range

Cronbach alpha coefficients for the construct scales and ATL categories were not less than 0.7 except for ‘Surface’ approach (0.68). Overall, the ASSIST questionnaire items were internally consistent and reliably detected student’s learning approaches.

There was a statistically significant difference between the median score for strategic learning (M = 17.25, IQR: 9.75 – 20) and deep learning approach (M = 16.25, IQR: 9.25 – 19.5, $p < 0.0001$). Similarly, strategic learning (M = 17.25, IQR: 9.75 – 20) and surface learning

approach ($M = 12.25$, $IQR = 6.5 - 16.75$) median scores were significantly different ($p < 0.001$).

4.2.3. The predominant approach to learning among undergraduate pharmacy students

A strategic approach to learning was predominant among the majority (67%) of the undergraduate pharmacy students that participated in the study. Only 25% were found to adopt deep learning approach. Few students (7%) were surface learners (Figure 4.1).

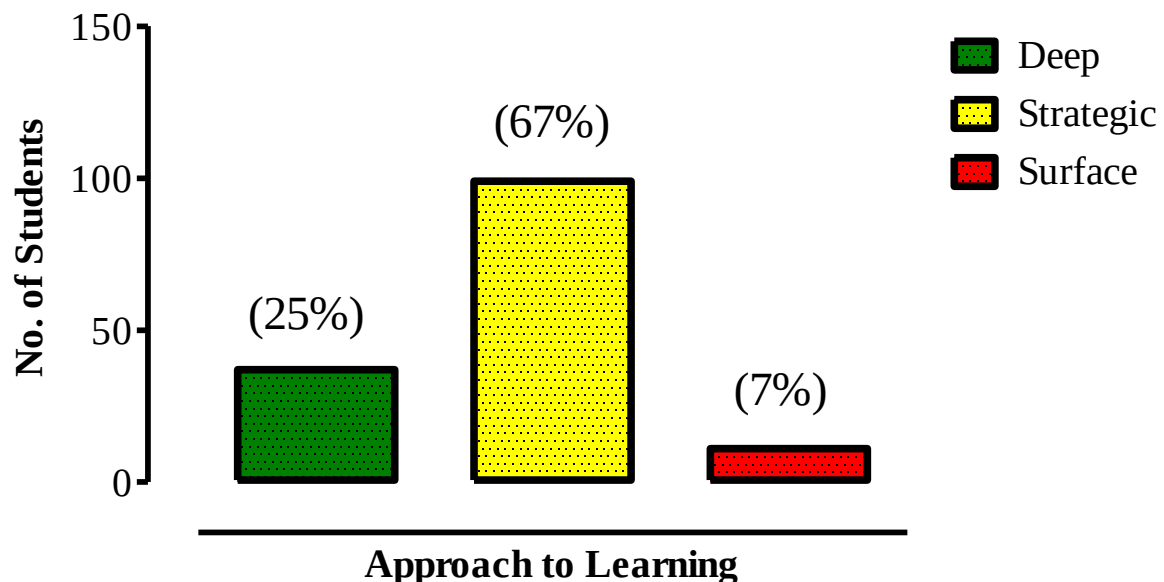


Figure 4.1. Approaches to learning among undergraduate pharmacy students at UNZA

4.2.4. ASSIST scale and sub-scale analysis of approaches to learning constructs

An analysis was done to compare scale and sub-scale scores for each of the main ATL constructs (that is; deep, strategic, and surface), respectively. Subscale analysis results are shown in the Figures 4.2, 4.3 and 4.4, respectively.

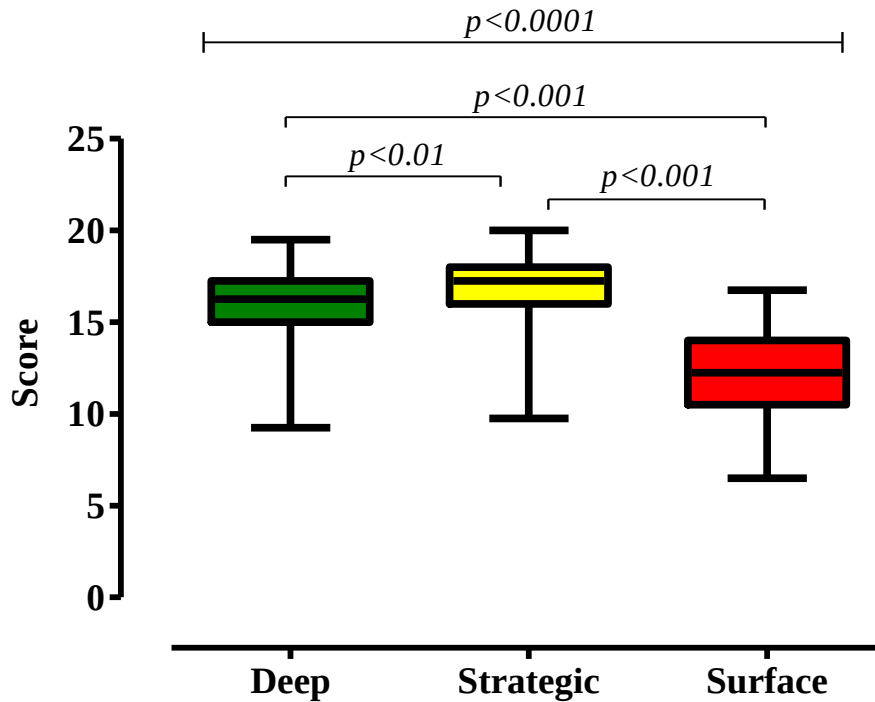


Figure 4.2. Comparison of median scores for the tripartite ATL categories

Outputs from the Kruskal-Wallis test revealed that the median scores for deep, strategic and surface ATL scales varied significantly ($t = 216.3$, $p < 0.0001$). Dunn's multiple comparison test revealed that the difference in the rank sum of deep versus strategic ATL median scores was statistically significant ($p < 0.01$). Similarly, the difference in rank-sum for deep versus surface ATL median score was 160.6, and strategic versus surface ATL median score was 208.7 which were also statistically significant ($p < 0.001$).

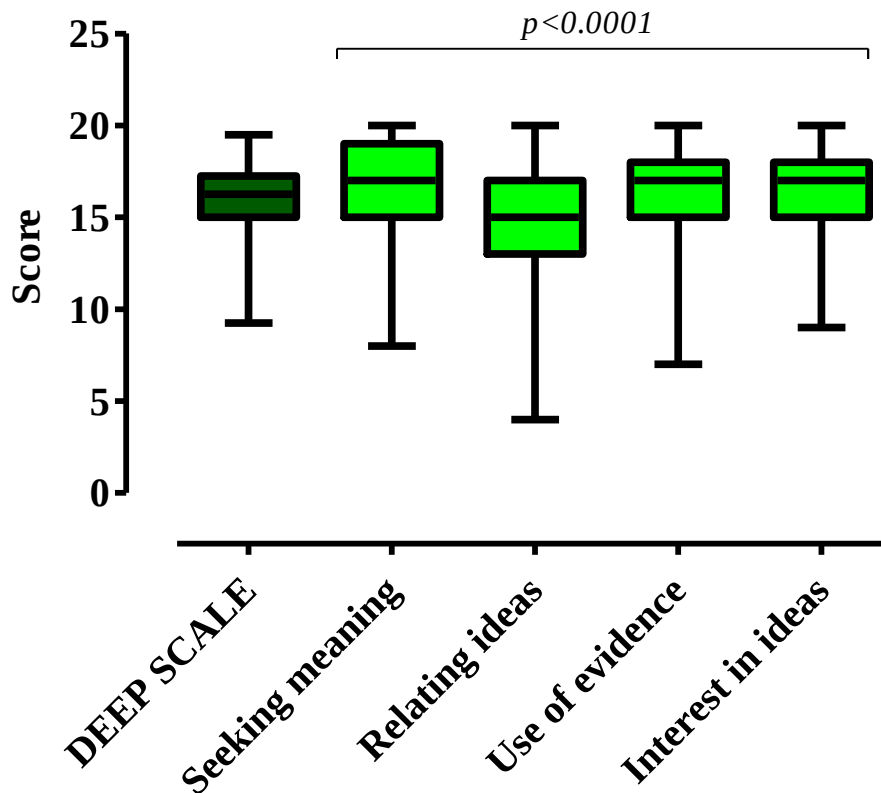


Figure 4.3. ASSIST scale and sub-scale scores for Deep learning construct among undergraduate pharmacy students at UNZA.

The Kruskal-Wallis test revealed a statistically significant difference between the median scores in the four sub-scales of deep learning construct ($t = 34.24$, $p < 0.0001$). Post-hoc results of Dunn's multiple comparison test are shown in Table 4.3.

Table 4.3. Multiple comparison test for difference in rank sums of Deep ATL subscale scores

Dunn's multiple comparisons	Rank sum difference	Significance level
Seeking meaning vs. Relating ideas	99.04	$p < 0.001$
Seeking meaning vs. Use of evidence	3.789	$p > 0.05$
Seeking meaning vs. Interest in ideas	13.53	$p > 0.05$
Relating ideas vs. Use of Evidence	-95.26	$p < 0.001$
Relating ideas vs. Interest in ideas	-85.51	$p < 0.001$
Use of evidence vs. Interest in ideas	9.745	$p > 0.05$

The difference in rank sums of median scores for ‘relating ideas’ vs. ‘use of ideas’, ‘relating ideas’ vs. ‘use of evidence’, and ‘seeking meaning’ versus ‘relating ideas’ were all statistically significant (Table 4.3).

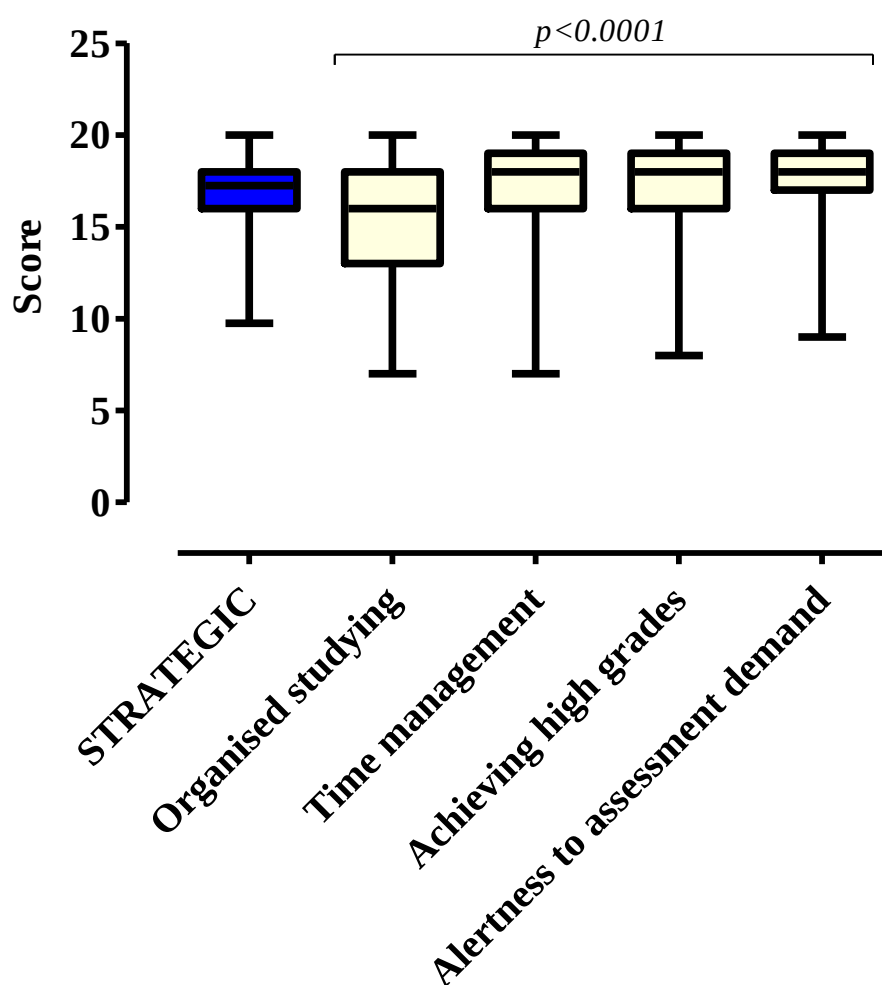


Figure 4.4. ASSIST scale and sub-scale scores for Strategic learning construct among undergraduate pharmacy students at UNZA

Among subscales of strategic ATL scale, median scores were highest for ‘alertness to assessment demands’ (M = 18, IQR: 9 - 20), ‘achieving high scores’ (M = 18, IQR: 8 – 20) and ‘time management’ (M = 18, IQR: 7 – 20) items of the strategic learning construct (Figure 4.4). Similarly, a Kruskal-Wallis test revealed a statistically significant difference between the

median scores in the four subscales of the strategic learning construct ($t = 74.33$, $p < 0.0001$).

Dunn's post-hoc multiple comparison tests showed significant differences in rank sums of subscales scores (Table 4.4).

Table 4.4. Multiple comparison test for difference in rank sums of Strategic ATL subscale scores

Dunn's multiple comparisons	Rank sum difference	Significance level
Organised studying vs. Time management	-109.3	$p < 0.001$
Organised studying vs. Achieving high grades	-114.0	$p < 0.001$
Organised studying vs. Alertness to assessments demands	-163.8	$p < 0.001$
Time management vs. Achieving high grades	-4.759	$p > 0.05$
Time management vs. Alertness to assessment demands	-54.58	$p < 0.001$
Achieving high grades vs. Alertness to assessment demands	-49.82	$p > 0.05$

When compared, differences in median scores for the following subscales: 'organised studying' vs. 'time management', 'organised studying' vs. 'achieving high grades', 'organised studying' vs. 'alertness to assessments demands', 'time management' vs. 'alertness to assessment demands' were all statistically significant (Table 4.4).

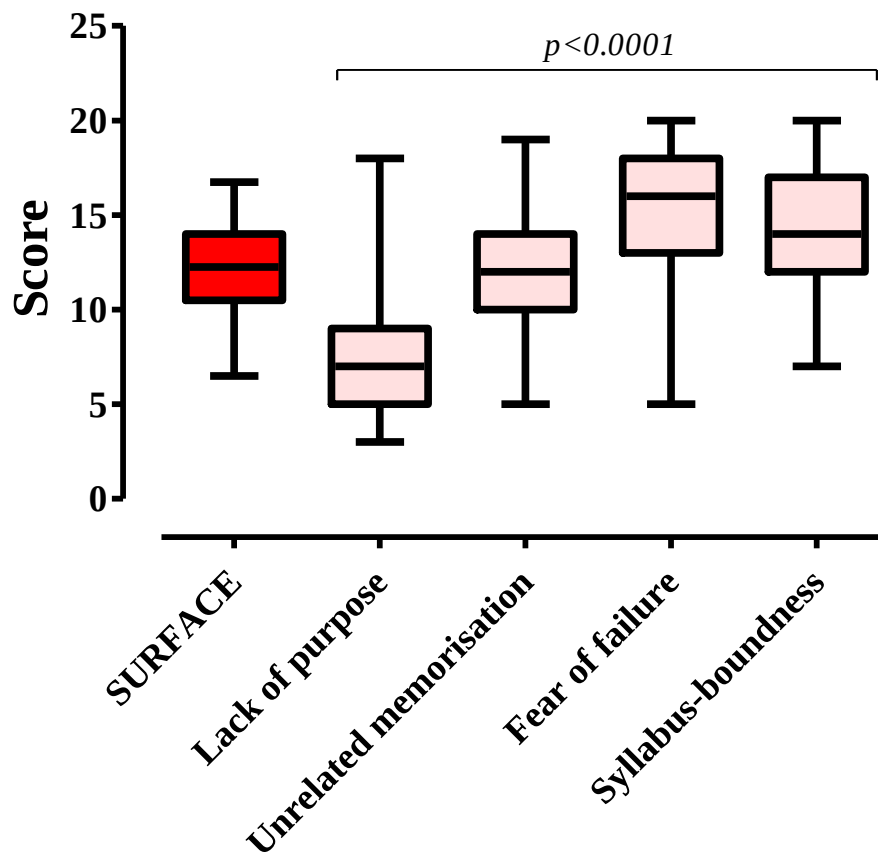


Figure 4.5. ASSIST inventory scale and sub-scale scores for Surface learning construct among undergraduate pharmacy students at UNZA

Despite surface learning being the least preferred approach among participants, the median score for ‘fear of failure’ ($M = 16$, IQR: 5 – 20) subscale was highest followed by syllabus-boundness ($M = 14$, IQR: 7 – 20) among the subscales of surface ATL construct (Figure 4.5). Similarly, median scores of each subscale of the surface ATL construct were significantly different ($t = 275.1$, $p < 0.0001$). Outcomes of multiple comparisons of the difference in rank sums of the median scores using Dunn’s post-hoc test are shown in Table 4.5.

Table 4.5. Multiple comparison test for difference in rank sums of Surface ATL subscale scores

Dunn's multiple comparisons	Rank sum difference	Significance level
Lack of purpose vs. Unrelated memorisation	-162.0	$p < 0.001$
Lack of purpose vs. Fear of failure	-307.1	$p < 0.001$
Lack of purpose vs. Syllabus-boundness	-250.0	$p < 0.001$
Unrelated memorisation vs. Fear of failure	-145.1	$p < 0.001$
Unrelated memorisation vs. Syllabus-boundness	-88.02	$p < 0.001$
Fear of failure vs. Syllabus-boundness	57.07	$p < 0.05$

4.2.5. Teaching style preference among undergraduate pharmacy students

Figure 4.6 shows that the majority of pharmacy students (67%, $n = 98$) preferred teaching that involved transmitting information.

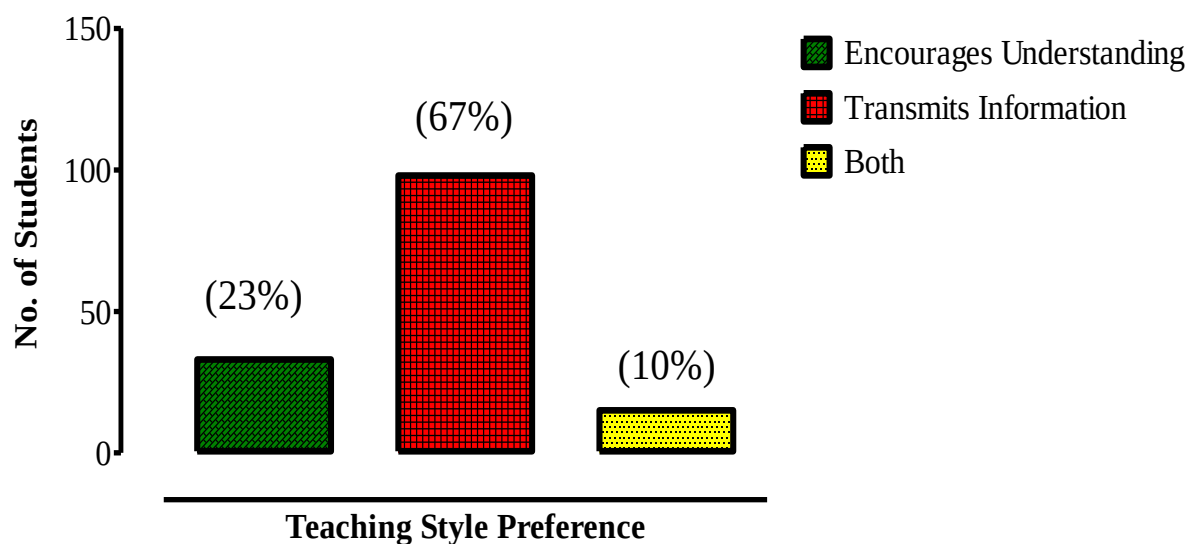


Figure 4.6. Teaching style preference among undergraduate pharmacy students at UNZA

Among the ASSIST subscales for teaching style preference, median scores were higher for ‘transmitting information’ subscale ($M = 19$, IQR: 9 - 20) than ‘encouraging and supporting understanding’ subscale ($M = 17$, IQR: 9 - 20). Only 23% ($n = 33$) preferred teaching styles that encouraged and supported understanding.

4.2.6. Association between the approach to learning, teaching style preference and demographic variables

Table 4.6 shows frequency distributions of ATL and teaching style preference by the different demographic variables of participants. The nature and strength of the association between dependent and independent variables were confirmed using Fisher’s exact test.

Approach to learning was statistically significantly associated with course load ($p = 0.028$) and programme stage ($p = 0.010$). For instance, among strategic learners ($n = 99$), the majority (84%) were taking more than five courses in the academic year and 60% were in the preclinical stage (that is; year 1 and 2) of the B.Pharm. programme. A Mann-Whitney test revealed a statistically significant difference between the underlying distribution of strategic ATL median scores of students taking not more than five courses compared to those taking more than five courses in the academic year ($p = 0.0186$). Similarly, among deep learners ($n = 37$), 65% were in the clinical stage (that is, year 3 and 4) of the B.Pharm. programme. Among the 11 surface learners, 8 were in the clinical stage of the programme (Table 4.6).

Although the relationship was not statistically significant ($\rho = 0.102$, $p = 0.221$), the majority (69%) of participants who were strategic learners ($n = 98$) preferred teaching styles that involved lecturers transmitting information. Similarly, among female students aged below 25 years, including those taking more than five academic courses in the academic year, the

majority also preferred teaching styles that involved transmitting information (Table 4.6). Mann-Whitney's test revealed a statistically significant difference between the median score for 'transmitting information' subscale among female and male students ($p = 0.039$) and between pharmacy students enrolled via the regular admission mode versus students admitted via the parallel mode ($p = 0.030$). Interestingly, there was no statistically significant association between students' teaching style preference and their approach to learning ($p = 0.085$).

Table 4.6. Association between learning approaches, teaching style preferences and demographic variables

Dependent Variable	Independent Variables											
	Sex (n, %)		Age (n, %)		Programme Stage (n, %)		Mode of Admission (n, %)		Prior Learning (n, %)		Course Load (n, %)	
	Male	Female	<25 years	>25 years	Preclinical	Clinical	Regular	Parallel	A-level NS	Dip.Pharm	≤5 courses	>5 courses
Approach to Learning												
1. Deep	24 (64.9)	13 (35.1)	23 (63.9)	13 (36.1)	13 (35.1)	24 (64.9)	27 (73.0)	10 (27.0)	26 (70.3)	11 (29.7)	11 (29.7)	26 (70.3)
2. Strategic	47 (47.5)	52 (52.5)	61 (65.6)	32 (34.4)	59 (59.6)	40 (40.4)	73 (73.7)	26 (26.3)	67 (67.7)	32 (32.3)	16 (16.2)	83 (83.8)
3. Surface	3 (27.3)	8 (72.7)	9 (90.0)	1 (10.0)	3 (27.3)	8 (72.7)	11 (100)	0 (0)	10 (90.9)	1 (9.1)	5 (45.5)	6 (54.6)
	<i>p</i> = 0.060		<i>p</i> = 0.294		<i>p</i> = 0.010*		<i>p</i> = 0.131		<i>p</i> = 0.323		<i>p</i> = 0.028*	
Teaching Style Preference												
1. Encourages understanding	22 (66.7)	11 (33.3)	20 (66.7)	10 (33.3)	17 (51.5)	16 (48.5)	22 (66.7)	11 (33.3)	22 (66.7)	11 (33.3)	7 (21.2)	26 (78.8)
2. Transmits information	43 (43.9)	55 (56.1)	64 (68.8)	29 (31.2)	50 (51.0)	48 (49.0)	76 (77.6)	22 (22.5)	71 (72.5)	27 (27.6)	24 (24.5)	74 (75.5)
3. Both 1 and 2	9 (60.0)	6 (40.0)	9 (60.0)	6 (40.0)	8 (53.3)	7 (46.7)	13 (86.7)	2 (13.3)	10 (66.7)	5 (33.3)	1 (6.7)	14 (93.3)
	<i>p</i> = 0.063		<i>p</i> = 0.753		<i>p</i> = 1.000		<i>p</i> = 0.308		<i>p</i> = 0.722		<i>p</i> = 0.331	

*Statistically significant Fisher's exact test. Dip.Pharm: Diploma in Pharmacy Technology, NS: Natural Sciences

4.2.7. Predictors of students' approaches to learning on the pharmacy programme

Table 4.7 shows the results of a multinomial logistic regression model predicting students' ATL relationship with independent variables.

Table 4.7. Multinomial logistic regression model predicting students' learning approach relationship with demographic variables (N = 139) where Surface ATL was used as the base outcome

Variable	Deep ATL (AOR, 95% CI)	p-value	Strategic ATL (AOR, 95% CI)	p-value
Age				
≤25 years	1		1	
>25 years	6.8 (0.05 – 922)	0.444	6.9 (0.1 – 858.5)	0.432
Sex				
Female	1		1	
Male	8.3 (1.4 – 49.8)	0.021*	5.2 (0.9 – 29.9)	0.062
Prior Learning				
A-level NS	1		1	
Dip. Pharm.	1.1 (0.01 – 147.7)	0.979	1.9 (0.02 – 233.8)	0.795
Year of Study				
Year 1 (2 nd year)	1		1	
Year 2 (3 rd year)	1.7 (0.1 – 37.0)	0.740	1.6 (0.1 – 30.5)	0.740
Year 3 (4 th year)	0.7 (0.1 – 8.9)	0.762	0.2 (0.02 – 2.6)	0.239
Year 4 (5 th year)	0.3 (0.02 – 3.1)	0.289	0.1 (0.01 – 0.7)	0.023*

AOR: Adjusted Odds Ratio, CI: Confidence Interval, * statistically significant. ATL:

Approach to Learning, NS: Natural Sciences, Dip.Pharm: Diploma in Pharmacy Technology.

Male students were eight-times more likely to adopt a deep approach to learning than female students (AOR = 8.3, 95% CI: 1.4 – 49.8, $p = 0.021$) after controlling for age, year of study, and previous study. Though not statistically significant (AOR = 5.2, 95% CI: 0.9 – 29.9, $p = 0.062$), strategic learning was five-times more likely among male students than female students. Similarly, despite not being statistically significant, relatively older students (>25 years old) were about seven-time more likely to adopt a deep ATL (AOR = 6.8, 95% CI: 0.05 – 922, $p = 0.444$) and strategic ATL (AOR = 6.9, 95% CI: 0.1 – 859, $p = 0.432$), respectively. After controlling for age, sex and previous study, pharmacy students in the final year (year 4)

of B.Pharm. training showed 90% less likelihood of adopting a strategic ATL (AOR = 0.1, 95% CI: 0.01 – 0.7, $p = 0.023$).

4.3. Summary of phase 1 results

This phase of the study set out to utilise the ASSIST inventory to explore the predominant ATL and teaching style preferred among undergraduate pharmacy students at UNZA. Findings revealed that strategic learning was the dominant approach adopted by the majority of pharmacy students at UNZA. By implication, pharmacy students were more inclined towards rote learning for purposes of achieving and merely ‘to pass’ summative assessments in order to advance on the programme rather than focussing on understanding taught material. Subscale analysis revealed high scores for ‘achieving high grades’, ‘alertness to assessment demands’ and ‘fear of failure’ as drivers of students’ ATL on the B.Pharm. programme. Course load and programme stage statistically significantly influenced students’ ATL. Consequently, it was not surprising that the majority of the pharmacy students preferred lecturers whose teaching style involved transmitting information as compared to encouraging understanding. The preferred teaching style was related to the surface and strategic approach (Entwistle *et al.*, 2013b).

4.4. Results of phase 2 study

The second phase of this study investigated the following specific question: What contextual factors impact the learning efficacy of undergraduate pharmacy students on the B.Pharm. programme at UNZA?

4.4.1. Emerging themes

Inductive thematic analysis of qualitative data yielded 4 themes, 8 subthemes and 22 categories. The four themes that emerged from the qualitative data were as follows:

- i) Student-related factors
- ii) Educational programme-related factors
- iii) The learning environment, and
- iv) Assessment-related factors.

The derived themes, their subthemes and clustered categories were illustrated in Figure 4.7 and described in detail below. Within each of the themes and sub-themes, relevant selected participants' narratives were illustrated using direct quotations extracted from the focus group discussions. Since some themes were not mutually exclusive, it was not surprising that some narratives were in certain instances a description of more than one theme or contents of another related subtheme or cluster category from within the data.

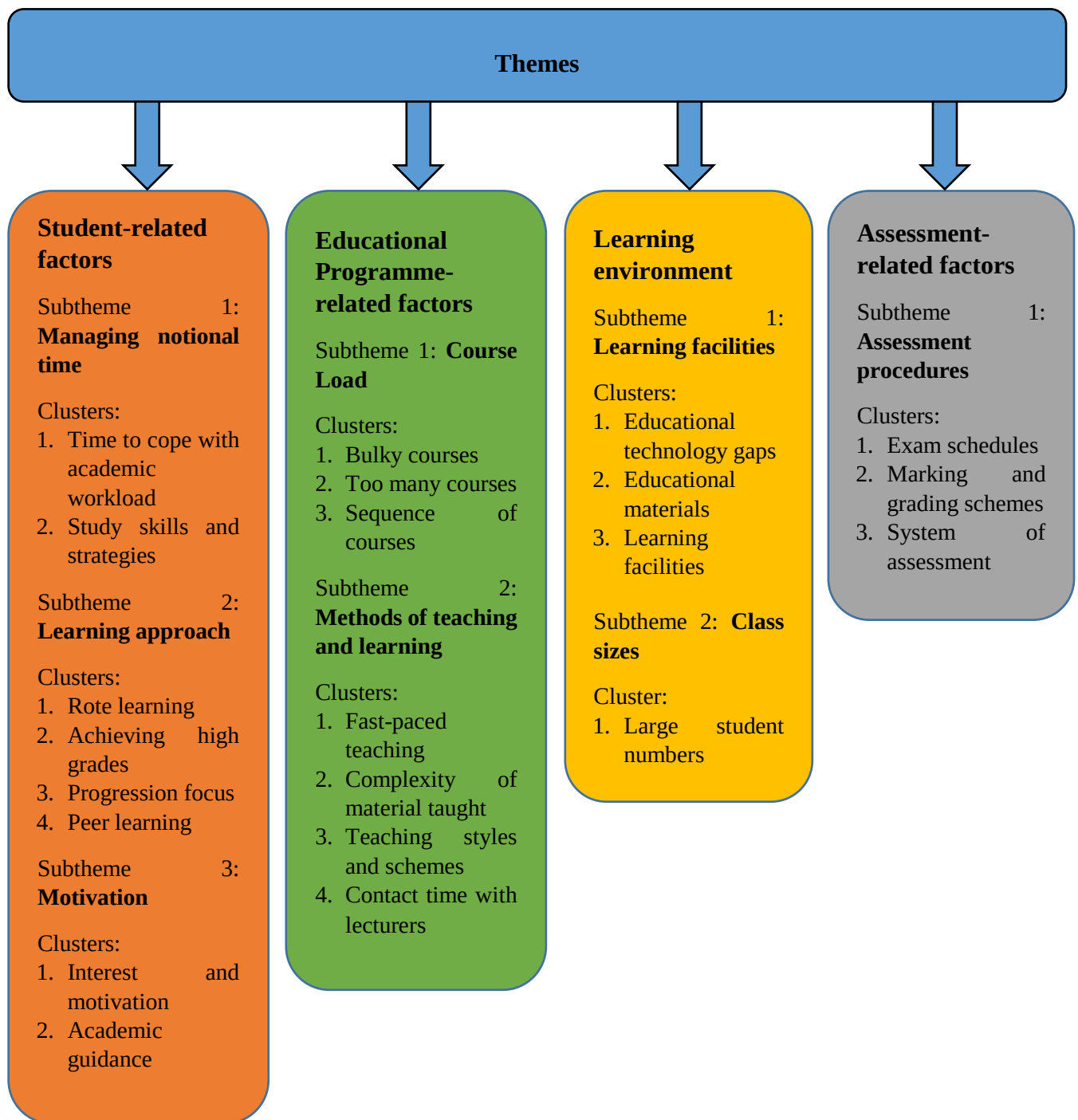


Figure 4.7. Emerging themes and subthemes from the focus group discussions

4.4.1.1. Theme 1: Student-related factors

Subtheme 1: Managing notional time

The participants, in particular, those in the Year 2 B.Pharm. class expressed concerns that identified notional time management as a factor affecting how they learn and perform academically. In the context of medical education, time management is described as clusters of behavioural skill sets that are important in the organization of study/course load (Sansgiry *et al.*, 2006). Time management skills include activities performed by students such as planning in advance, prioritizing work, test preparation, and following schedules. In this study, participants expressed concerns regarding challenges with managing the notional time required to cope with the academic workload and tasks meted out on the respective courses they were taking during the academic year. Below are some excerpts from participants that felt notional time demands overwhelmed their ability to cope with the academic workload and study time demands:

“[...] then if at all you did not understand in class, for you to just go and grasp everything covered in two or three hours is something. And when you are back in class, either there is an assignment or there is a test, so it is just overwhelmingly bulky” – EM, Year 2 B.Pharm. student (FG1-27-11-17).

“I think this can be very much attributed to time and how much information that is being required of you to learn because it just doesn’t end at the slides delivered in the lecture but it requires you to go and find the details to the information that is being delivered to you in just within a short time” – IM, Year 2 B.Pharm. student (FG1-27-11-17).

“I also think looking at the number of courses that we have, you spend time trying to dig deeper in one course you’ll find that you still do not have enough time for other courses especially that most of the time you have lectures so you don’t have enough time to study” – ST, Year 1 B.Pharm. student (FG3-09-12-17).

By description, notional learning hours are the estimated time taken by an ‘average’ student to achieve the specified learning outcomes of the course, unit of subject matter or programme of

study. Notional time includes teaching contact time (that is; lectures, seminars, tutorials, laboratory practicum, workshops, fieldwork, and so on), time spent studying, preparing and carrying out assignments and examinations, whether in term-time or during the vacations (UNISA, 2017). Although not a precise measure, notional hours provide students and educators with an indication of the amount of study and level of commitment expected to achieve the desired learning outcomes.

Some participants felt challenged with time management by virtue of having too many other competing needs apart from academics that demand for their time. This concern was mostly expressed by participants drawn from the direct-entry mode of admission (that is; students that had prior formal employment experience and/or social commitments). Excerpts extracted were as follows:

“For me I think it is mostly time, making time to handle things and balance time for everything. Yeah, there are a lot of things coming our way besides academia” – KM, Year 2 B.Pharm. student (FG2-27-11-17).

“I think also what makes time management a factor is that as a student its not only academic life that consumes time, there are other activities that are there. Some of the parents who are here they even have families that they are supposed to take care of and other things that are supposed to be done at home apart from studying” – CM, Year 2 B.Pharm. student (FG1-27-11-17).

Clearly, pharmacy students that combined formal employment engagements, social responsibilities with full-time academic schooling often faced addition conflict to manage notional time for learning.

Study skills and strategies emerged as another factor that some participants felt they were not good at and contributed to how they ineffectively managed their learning. Participants like CP - a Year 2 student and CM - a Year 1 pharmacy student alluded to this when they said:

“[...]it is the study skills from what I have observed not only from myself but also the study skills of how to study the topics and everything because you can study something like the knowledge which you acquired in 2nd year and if you can really remember and

apply, if you can recall right now you can see that you are failing to recall [...].” – CP, Year 2 B.Pharm. student (FG2-27-11-17).

“What usually happens to me is that with these courses that are bulky that I need to study, I find it hard to study them because just after a certain point I think I become saturated as compared to courses that involve solving problems, so I don’t know how I can develop the study skills....” – CM, Year 1 B.Pharm. student (FG3-09-12-17).

The feeling of inadequacy expressed by CP and CM may be a generally cross-cutting feature among a number of pharmacy students at the university. This finding also collaborated previous evidence by Ezeala and Siyanga (2015) who showed that undergraduate pharmacy students at UNZA lacked adequate study skills (Ezeala and Siyanga, 2015).

Subtheme 2: Learning approach

Achieving and progressing to the next stages of the B.Pharm. programme were apparent motives among the majority of participants. Characteristic features of strategic learning were evident from their expressions. The following were excerpts from participant’s discussions that pointed to this finding:

“You find that you have to strategise to make sure you pass. You don’t study to understand and know what you are studying but just formulate a manner that will let you gain the information into the test and just thereafter all the information is even gone. That is the same experience even here, you are just studying just to prepare for a test, prepare for an examination, you move to the next year you even totally forget what you learnt in Anatomy and Physiology in the past year and so on. That is the challenge that we are facing” – IM, Year 2 B.Pharm. student (FG1-27-11-17).

“Then again as students what we are interested in most of the time is progressing no matter what assessment method you are assessed with [...] it’s about going forward” – CM, Year 2 B.Pharm. student (FG1-27-11-17).

“[...] and when you are back in class, either there is an assignment or there is a test, so it’s just too overwhelmingly bulky. So, at times you just study not to get to understand but you study to memorise for an exam” – EM, Year 2 B.Pharm. student (FG1-27-11-17).

Participants like CM were clearly driven by a focus on achieving high grades in tests and examinations as their benchmark for academic success, and not necessarily understanding what

they learnt in the subjects or courses. The dominance of an achievement focus was very evident even from CP's perception below:

From assessments is where you know how well your perceived course, the things that they (examiners) brought, the way you have studied, that is where you gauge yourself well [...]. For me, it is the grades that are important [...], if you have good grades meaning your understanding is good as well as your application. So now if the grades are not good that is where you even get demoralised” – CP, Year 2 B.Pharm. student (FG2-27-11-17).

Another participant expressed aspects of focussing their learning on second-guessing what they perceived lecturers wanted or expected them to learn:

“[...] it's more like not having the right material and because we have different lecturers and knowing exactly what the lecturer wants or expects you to do” – NC, Year 2 B.Pharm. student (FG2-27-11-17).

Other participants like CM felt the very nature of voluminous information being transmitted to them by lecturers and were expected to learn drove their tendency for strategic learning;

“The thing is there is too much information, it needs strategy. We tend to ‘gun’ the information” – CM, Year 1 B.Pharm. student (FG3-09-12-17).

Even when learning for understanding and application may be their desirable state, IM explained his opinion why this state was a challenge to attain in the context of pharmacy education at UNZA:

“If it goes to deep learning, it requires that at least you have enough ample time to try and assimilate the information and relate ideas broadly. Now looking at the time in the university that we are given today, somehow to a certain extent I feel it is also a hindrance to how I learn which makes people mostly become strategic learners” – IM, Year 2 B.Pharm. student (FG1-27-11-17).

Arguably, the dominance of a strategic ATL associated with rote learning outcomes was considered by most students as a coping mechanism required to ‘survive’ on the B.Pharm. programme and at the university in general. Remarkably, some participants like ZP argued that theirs was a different approach to learning:

I think for me, am able to apply what I learn. For me, it does not sit well if I get A+ in a test but after two weeks am unable to apply what I learnt” – ZP, Year 2 B.Pharm. student (FG2-27-11-17).

Participant ZP's point, closely related to a deep approach, was in contrast to the previous discussants on the issue raised. To participants like ZP, assessment grades attained did not seem to matter much. Her motivation was to learn and apply what she learnt even when average grades were attained in tests and examinations. ZP further went on to explain her approach to utilising peer learning as a strategy towards enhancing learning efficacy;

“There are challenges but I think it is also self-discipline as well by also learning how to apply what you have been taught. Let me go back to 2nd year, we started learning for example polymer linkage; you have no idea if what you are learning is connected to pharmacy but at least I was able to talk to my seniors and they explained that it helps me to understand medicinal chemistry later” - ZP, Year 2 B.Pharm. student (FG2-27-11-17)

From ZP's explanation, elements of peer learning emerged and were also alluded to by other participants like MM, and to a great extent also advocated by JW when they individually said:

“[...] Yeah, you also get counselling from those who are ahead or in more years than us [...].” – MM, Year 2 B.Pharm. student (FG2-27-11-17).

“[...] if you are going to work together at the end of the day I may know something which somebody might not know and through working together we'll be able to share that. But due to isolation, it was also affecting many of us students” – JW, Year 1 B.Pharm. student (FG4-16-12-17).

Peer learning seemed to provide a strategy for students to learn from each other. Boud (2001) described peer learning as students learning with and from each other as fellow learners without any implied authority to any individual (Boud, 2001). Using this strategy, students learn a great deal by explaining their ideas to others and participating in activities in which they can learn from their peers. It was not uncommon at UNZA to find students using peer learning in small study groups they constitute based on shared learning needs and objectives. From the participants' views, it became apparent that peer learning on the B.Pharm. programme was entirely an individual student's initiative and not an aspect deliberately incorporated in the curriculum's educational strategies. Scholars have argued that well designed peer learning can be optimised when incorporated as an integral component of a curriculum, paying special

attention to creating conducive educational environments where students build mutual respect for and trust and confidence in one another, so that they feel free to express opinions, test ideas, and ask for, or offer help when it is needed (Smith, 1983, Gwee, 2003). That way students who engage in collaborative learning and group study tend to perform better academically, persist longer, feel better about the educational experience and have enhanced self-esteem, and are individually and collectively accountable for optimising their own learning and achievement of the expected outcomes of the learning (Gwee, 2003, Landis, 2013).

Subtheme 3: Motivation

Throughout the participants' views, it became apparent that pharmacy students placed a high value on aspects of mentorship motivation for their learning and expected educational outcomes. For new students in Year 1 of B.Pharm. training, misconceptions, poor motivation and lack of academic guidance featured prominently in their discussion and seemed to affect their learning to a great extent;

"It can be a motivator, it provokes us somehow when we hear someone talk to us and the way we go about learning properly. Honestly speaking some of us when we were coming (to do pharmacy) we were kind of worried. I thought it was a very good career, 'kanshi' it's not all what it's about" – NB, Year 1 B.Pharm. student (FG4-16-12-17).

"You hear people say no, your job will just be to be standing on the (dispensing) window, counting medicine and some other stuff like that. So why are we saying all this, it is because, in the first place, we did not have an orientor to come and tell us what pharmacy is all about" - NB, Year 1 B.Pharm. student (FG4-16-12-17).

"[...] there are people that can do without motivation and there are those that are saved by it [...]. Some people you find that it is due to that they get energised. I think it is not much here" – ST, Year 1 B.Pharm. student (FG3-09-12-17).

"Even some friends, in the first week here they said why don't you change, why don't you change (programme)? So those are some of the things that are confusing us" – LG, Year 1 B.Pharm. student (FG4-16-12-17).

The influence of poor motivation and lack of academic guidance cannot be understated. Existing evidence shows that motivation has a positive influence on study strategy, academic performance, adjustment and well-being among students, and that positive motivation positively correlates with academic performance through deep strategy towards studying and higher study effort (Kusurkar *et al.*, 2011, Kusurkar *et al.*, 2013).

4.4.1.2. Theme 2: Educational programme-related factors

Subtheme 1: Course load

The majority of participants expressed concerns about high course load and bulkiness of the subjects they were taking in the academic year. Participants bemoaned the voluminous nature of content and information load transmitted to them during expository lecture sessions delivered in the respective courses. This theme emerged as a major factor affecting the quality of learning among the majority of participants. The participants shared similar experiences with this factor and had quite a lot to say about this;

“For me, I think coming from Evelyn Hone (college) and comparing it to here, where the lectures are too bulky, we are learning 100 to 70 slides at a time [...]” – EM, Year 2 B.Pharm. student (FG1-27-11-17).

Other participants overwhelmingly concurred with EM on this point and expressed themselves on the matter saying;

“Just to add on from what she said, because I have the same background from Evelyn Hone to here [...] there is so much to do. Like at Evelyn Hone quite alright things were like compressed so to say but in this place, they are so bulky, nothing is left out. And in that bulkiness, you are expected to know every little part of it [...].” – AM, Year 2 B.Pharm. student (FG1-27-11-17).

“Just to add on, because of the bulkiness of what you supposed to do and also what you are required to know, again what is happening is we tend to panic because you want to know those things [...] you also need to study all those things [...].” – CM, Year 2 B.Pharm. student (FG1-27-11-17).

“[...] now coming just to understanding the processes of how and what you are learning, what you need to do, it's quite tricky with the bulkiness of it” – SW, Year 2 B.Pharm. student (FG1-27-11-17).

On this point, other participants also felt the high course load was further compounded by the large class sizes (enrolled student numbers) which make the educational environment challenging to cope;

“Too many courses [...], we have a lot of courses and there are a lot of us [...].” – IM, Year 2 B.Pharm. student (FG1-27-11-17).

“Worse now it is very involving [...] with seven or so courses and subjects like pharmaceuticals [...] we are somehow disturbed with what this is” – KD, Year 1 B.Pharm. student (FG4-16-12-17).

Other participants like NB, CM and HP felt the high course load was further complicated by having quite a number of combined courses addressing different subject areas, the complex nature the of course content, and the manner in which lecturers delivered the courses. Seemingly, having too many courses with multidisciplinary teaching was a cause of concern for some participants. This was what they expressed:

“You will find that in one course, there are more like two of them in one, like Comparative Anatomy and Physiology, Computer Sciences and Social Sciences, Molecular Cell Biology and Microbiology [...] they are two in one and each of these components have their own lecturer to teach the stuff, so when you look at Physiology its quite involving and when you look at Anatomy its quite involving just getting them in a combined one, for you to balance Anatomy to Physiology its somehow different if you're studying it as course on its own, it will even give you some kind of [...]. I would prefer if they were separate courses like they were at first” – NB, Year 1 B.Pharm. student (FG4-16-12-17).

“Despite the fact that these courses are many, there is a danger part again because everything that happens there is some advantages and disadvantages. So now the main disadvantage here is that the courses are many, its bulky” – CM, Year 1 B.Pharm. student (FG4-16-12-17).

“For me what I can talk about are the courses that are too bulky and quite challenging, maybe we have, I give an example of Pathology wherein it we have Microbiology, we have Parasitology, we have Immunology, it's a bulky programme and today we have this lecturer maybe talking about cell injury, and another one talking about cell

adaptation and so on yet it is the same course. Then at the end of it all, we are going to be examined on everything by different lecturers. I think on that one they can look into it whereby if it is immunology, it can be one person lecturing it so that you are able to understand the course itself and how to go about answering questions” – HP, Year 2 B.Pharm. student (FG2-27-11-17).

One participant, MM further attributed challenges to adopting deep learning to the high course load;

“Also, some components are just too bulky and with scopes that are too large [...] I think the most cardinal point to not achieving deep learning may be the course loads are a serious problem because they do not really work well with the learning environment” – MM, Year 2 B.Pharm. student (FG2-27-11-17).

High course load was a resounding factor that was affecting the quality of learning among pharmacy students at UNZA. On the recently revised 2017 B.Pharm. curriculum, preclinical Year 1 students undertake five full-courses (each with 5.0 credit units), and one half-course with 2.5 credit units. In Year 2, students take six full-courses (each with 5.0 credit units) in the academic year. The recommended course load for programmes at UNZA is not more than four to five full courses in the academic year.

Subtheme 2: Methods of teaching and learning

When asked about ways teaching and learning was facilitated by lecturers, the pedagogical skills and methods of facilitating learning by lecturers on the programme were also a concern among participants. Some participants expressed concern over lecturer’s organisation, time management, commitment to teaching duty, and ability to help students learn. This is what KC expressed:

“Some of us who are coming from NS, we have seen that as a lecturer, let me just say lecturers, most of the time don’t have time, now (they) just rush through everything, we don’t even understand. There was not even time for us to ask questions. This lecturer will just come and give you things which you do not even understand just to make sure that there is learning” – KC, Year 1 B.Pharm. student (FG4-16-12-17).

[In a disappointed tone] “I took a book and started studying but when I went to a lecturer (for help), he sent me away. I was affected personally” – KC, Year 1 B.Pharm. student (FG4-16-12-17).

Another participant, NM angrily castigated some lecturer’s commitment to teaching students saying:

“By this time, 4 to 5 months have passed since we started learning but other lecturers have not even met them, we don’t know if they are still preparing or not coming we don’t know, maybe it’s the material, maybe it’s the new curriculum” – NM, Year 1 B.Pharm. student (FG4-16-12-17).

“The problem with UNZA lecturers is they are involved in so many issues and opportunities, they might be at UNZA and other places, working somewhere, appointments, they are busy people sometimes they even forget they have a lecture, by the time they realise they just call saying gentlemen I cannot make it, let’s meet the other coming week, not knowing again they’ll have another appointment” – NM, Year 1 B.Pharm. student (FG4-16-12-17).

These concerns indicated that students had a high expectation of their lecturers to show commitment and dedication to their teaching roles. Participants felt that the ways lecturers’ approached teaching roles had a reciprocal effect to influence how students approached their learning.

Other participants expressed concerns about the fast-paced way teaching sessions were conducted by lecturers. The participants observed that some lecturers tended to congest content and sessions towards the end of the academic year as the examinations drew close and when there was the realisation that insufficient content had been covered to warrant a valid summative assessment. A number of participants expressed their worry about this tendency;

“When we open next term they (lecturers) will be cruising for them to catch up and it will be too late for us [...] we won't even understand anything at the end of the day” – LM, Year 1 B.Pharm. student (FG4-16-12-17).

“[...]and the way I know these people, honestly speaking, when it comes to cruising through lectures they don’t spare, it will now be up to you to cope up with them” – KC, Year 1 B.Pharm. student (FG4-16-12-17).

“Looking at the pace at which we are doing the school work, I think it is too fast for me to keep up with the pace of some courses” – ST, Year 1 B.Pharm. student (FG3-09-12-17).

“That is exactly how I feel but for things like pharmacognosy, you’ll find that they are always referring to biochem like that, so you’ll find that you’re having challenges with catching up with the lecturer who is at a different pace than you” – HP, Year 2 B.Pharm. student (FG2-27-11-17).

Other participants similarly expressed concern about insufficient learning interaction with lecturers as a factor affecting them academically;

“We lack a one-to-one interaction with our knowledge-givers like our lecturers. There is no platform where you can ask something where you personally have been left out other than in class” – SH, Year 1 B.Pharm. student (FG3-09-12-17).

“Just to add on, looking at the subjects or what we are studying, there some lecturers or [...] their guidelines or outlines of the topics we are supposed to cover, some of the topics are not given properly and are told to go and read on our own” – EM, Year 2 B.Pharm. student (FG1-27-11-17).

A participant made sharp contrasts to the methods of teaching and learning they were previously exposed to during their prior learning on other programmes with the current methods being experienced on the B.Pharm. programme:

“[...] when it came to Mathematics and Chemistry, we were given tutorial sheets of questions we have to answer and when you go to the tutorial, there is a tutor to take you through and you can even ask questions. All that taught us that there is a way student can learn by being supported” – KD, Year 1 B.Pharm. student (FG4-16-12-17).

Clearly, KD’s comment drew out marked benefits of employing problem-based learning (PBL) methods for certain subjects or content areas involving problem-solving. It would be interesting to evaluate the extent to which teaching and learning through the use of small-group tutorial sessions were utilised on the B.Pharm. programme. If not adequately utilised, as argued by KD, perhaps there remains an opportunity to mainstream the use of PBL that maximise problem-solving skills. The participants’ concerns they raised also pointed to the urgent need to re-model ways teaching and learning are conducted on the B.Pharm. programme and make them

more responsive to the deep learning needs and competency requirements of the contemporary professional practice of pharmacists.

4.4.1.3. Theme 3: Learning environment

Subtheme 1: Learning facilities

It was valuable to assess not only student perceptions of their educational outcomes but also their perceptions about the manner in which pharmacy education was provided at the university. Since the educational process consists of the rich combination of experiences that occur both inside and outside of the classroom which helps determine educational outcomes, a more comprehensive view of the quality of pharmacy education at UNZA was obtained from student opinions of that process along with perceptions of how it influences their assessments of educational quality. Participants in this study expressed their concerns about the learning facilities and derived aspects such as educational media technology gaps, educational materials and infrastructure facilities as factors affecting the quality of learning. The following were selected excerpts from the data:

“[...] the system here in Zambia is just not okay, the level of technological advancement and all those, that kills our zeal so we are affected by that” – AS, Year 2 B.Pharm. student (FG2-27-11-17).

“Another aspect that affects our learning negatively is lack of exposure [...] we are supposed to be exposed to such things in order for us to learn because we are living in a dynamic world, we are not just Zambians but we are Zambians who are also supposed to be engaged internationally. Now if we are not exposed to such things, suppose I want to do my course outside Zambia, I’ll face problem certainly when I find some advanced machinery there which I don’t know or have no idea how it operates” – KC, Year 1 B.Pharm. student (FG4-16-12-17).

These views by AS and KS perhaps pointed to existing inadequacies of educational facilities used for experiential and simulated learning of the pharmaceutical sciences. Another

participant JM sounded more disappointed than surprised with this inadequacy to facilitate and provide simulated learning exposures in the subjects they were taking;

“It is somehow surprising in the sense that 100% of what we do is theory, you see that practical part is what we lack, especially when we put it this way, as a professional, as pharmacists and they say we are scientists by nature, we are people who are supposed to acquire knowledge of how to synthesise drugs but if we try to look around, such opportunities are not there” – JM, Year 1 B.Pharm. student (FG4-16-12-17).

He went on further to say;

“What we end up doing is something contrary to what we are being trained for. You are being trained to go out there to be in the pharmaceutical industry, operating machines, measuring quantities of different types of medicines so that we produce out there to the public to solve the problems that they are going through but we are not seeing such kind of stuff. So, in short, another thing that I can say is lacking is adequate facilities that will enhance our learning skills” – JM, Year 1 B.Pharm. student (FG4-16-12-17).

These were genuine concerns that participants felt were lacking in their educational environment to effectively enhance their learning efficacy towards becoming well-trained pharmacists. There is, therefore, need to leverage on the pharmacy programme at UNZA, a sufficient mix of educational exposures and educational infrastructure to support practical aspects of training pharmacists. Apart from that, other participants like SH, CP and MM felt there were inadequate study materials and educational resources to support their learning;

“I think what can affect my academic performance is lack of adequate study materials. You’ll find that you have to do this but you are limited to some educational resources and you find that you are doing something that is irrelevant, but that’s the only thing you have, so due to inadequate access to some study materials, the study skills get affected” – SH, Year 1 B.Pharm. student (FG3-09-12-17).

“Yes, very much. Sometimes books; some books are not available” – CP, Year 2 B.Pharm. student (FG2-27-11-17).

“Sometimes there is no internet [...]” – MM, Year 2 B.Pharm. student (FG2-27-11-17).

The university, through the library service, remains duty-bound to provide and make available adequate educational resources in the form of prescribed and recommended books, including

uninterrupted internet access for students to use for their learning. Where students perceive these services (which they pay for in tuition fees) as being inadequate, effects on quality of their learning become apparent to a great extent.

Subtheme 2: Class size

Participants expressed concerns about large class sizes and student enrolment numbers as a factor affecting the quality of learning. The researcher observed that despite participants being largely inexpressive about this issue, a few like MM expressed themselves in no uncertain terms that large class sizes in their cohort affected the quality of their learning;

“The enrolment numbers also matter, like if we are too many how you will be taught will be different to those who are 25 because of the number [...] but with the 107 of us they (lecturers) cannot manage us all [...]” - MM, Year 2 B.Pharm. student (FG2-27-11-17).

At UNZA, the paradox of economics of scale driving increases in enrolment size versus pedagogically desirable and manageable class sizes, including limited physical infrastructure to house the large student numbers on full-time study programmes has resulted in some complex and sometimes contentious programme design and delivery issues that may be negatively impacting the educational environment.

4.4.1.4. Theme 4: Assessment-related factors

Subtheme 1: Assessment processes

In all the four focus groups, participants expressed their discomfort and difficulties experienced with assessment modalities on the B.Pharm. programme. Concerns ranged from the way examinations were scheduled to how they were conducted and graded;

“For me, am not comfortable with the way they are preparing the exam timetable, you’ll find the examination timetable does not have breathing space. You are writing today, tomorrow you are writing, the other day you’re writing, in one week you’ll find all the six subjects you are done” – IM, Year 2 B.Pharm. student (FG1-27-11-17).

“At least maybe a day in between or two days so that we prepare adequately for the course exam. You’ll find that today you are writing biochemistry, tomorrow you are writing something, the other day again so I think that type of timetable is very bad for me” - IM, Year 2 B.Pharm. student (FG1-27-11-17).

Other participants, KM and RM also added their concerns about the way final examinations were scheduled and how this affected their academic performance;

“On the same issue of time table, they should come up with a way where they consult students when making the exam timetable” – KM, Year 2 B.Pharm. student (FG1-27-11-17).

“Sometimes I feel like the timetable can determine whether some students will do well or not. How you set the (examination) timetable will determine if students fail or not. Sometimes when the courses are too closely timed, you won't have to revise and there are certain people who can't read in one day” – RM, Year 2 B.Pharm. student (FG1-27-11-17).

The way summative assessments were scheduled was a driver of strategic learning among the pharmacy students at UNZA. This assertion was amplified by KM’s point that was also echoed by IM;

“You’ll find that towards the exams, that’s when we’re given a lot of work [...] again the time table is tight, I think that [...] the timetable will determine how well you perform in exams” - KM, Year 2 B.Pharm. student (FG1-27-11-17).

“There are even instances, you know the information but the essence of you having enough time to revise is for you to gain the confidence that now I can go and face the exams. Now look at the situation where, like in first year, where you begin to write one exam at 10 (hours) and the other course at 14 (hours), you are forced to come back and sit down from one exam to prepare for another exam no matter how frustrating the other (course) exam was, you even frustrate and confuse yourself more because of the schedule. So, I think I agree that the time table also can affect someone” – IM, Year 2 B.Pharm. student (FG1-27-11-17).

Here, participants raised very genuine concerns driven in part, by the assessment modalities students were made to go through on the B.Pharm. programme. Similarly, students tended to become so familiar with the system of assessment that they narrowed their focus to study only those taught materials they felt were sufficient content to memorise for purposes of passing the examinations;

“I think it is the system of assessment because just like he said, there are just certain materials that you need to pass, so if you maybe go beyond that to read other things maybe even try the critical thinking, you won't get there” – MM, Year 2 B.Pharm. student (FG2-27-11-17).

“In addition to what my brother said, it is just the system, how the system is because in 2nd year we had some other subjects where when you just needed to go through some specific materials for you to pass, when you use other materials it feels like there is nothing you are doing” – MM, Year 2 B.Pharm. student (FG2-27-11-17).

Participants confirmed that some examiners had become so predictable due to the tendency of recycling assessment questions that students were able to second-guess what content they liked examining on and what to memorise in order to pass their assessment in the course;

“There are some (lecturers) like over a decade they've just been using the same materials of assessment, so if you do not familiarise yourself with those materials then you fail and if you use others then you get to be asking to say what is this. So again, it is about the system of assessment” – MM, Year 2 B.Pharm. student (FG2-27-11-17).

Evidently, assessment modalities and methods used by educators on the B.Pharm. programme was promoting surface and strategic approaches to learning that often can be associated with rote learning outcomes. Characteristic features of surface ATL, such as unrelated memorisation, syllabus-boundness, and fear of failure, were very evident from some participants like NC and IM who similarly expressed their concerns about assessment types and grading systems they felt were disadvantaging their academic performance;

“I feel the way they grade the exam, so I feel like that we are bombarded that it is very difficult for me to grasp from page 1 to the last page. So, if I touched only 50% of what I learnt and then 50% doesn't come then am done. So how we can be helped is those things that are brought in a CA test should not be examined in the exam” – NC, Year 2 B.Pharm. student (FG2-27-11-17).

“Then another thing is this so-called negative type of marking for multiple choice. From the little that you've gotten correctly, they are deducting again [...] what is the significance of that?” – IM, Year 2 B.Pharm. student (FG1-27-11-17).

From the foregoing findings concerning participants' experiences with the practice of assessments and how this influences their learning efficacy, there was, therefore, a case to be made about how educators on the B. Pharm. programme approach the assessment of learning.

There exists a very close cross-talk between the quality of assessment practice by educators and quality of student learning.

4.4.2. Summary of phase 2 study results

From the findings of the qualitative phase of this study, contextual factors impacting pharmacy students' learning efficacy on the B.Pharm. programme at UNZA were categorised into four main themes as follows: (i) student-related factors, (ii) educational programme-related factors, (iii) the learning environment, and (iii) assessment-related factors. The results showed that diagnostic factors may depend on current learning experiences within the academic courses students are taking (Entwistle *et al.*, 2002), the quality of teaching (Ellis, 2018), and on the nature of the assessment procedures (Rowntree, 2015). The qualitative results presented not only elucidated contextual factors affecting pharmacy students' learning efficacy but to a great extent also helped explain the results of the quantitative phase 1 and 3, respectively. This cross-talk of the results from the three phases of this study was further discussed in Chapter 5 of this thesis.

4.5. Results of phase 3 study

The phase 3 study investigated this sub-question: Is there a difference in ATL and academic outcomes of preclinical pharmacy students exposed to a metacognitive educational intervention (a 5-day adjunct elective module dubbed ‘Orientation and Approaches to Deep Learning and Study Skills’) compared to those not exposed?

4.5.1. Participants’ demographic characteristics

Only 46 out of the 49 participants enrolled in this phase of the study successfully completed the pre- and post-test evaluations throughout the follow-up period were analysed per protocol. There were 31 (67%) male and 15 (32%) female participants. Table 4.8 shows the demographic characteristics of participants in the phase 3 study. There was no statistically significant difference in baseline characteristics between the two groups.

Table 4.8. Baseline characteristics of the preclinical pharmacy students that participated in Phase 3 study

Characteristic	OADLSS group (N=25)	Control group (N=21)	p-value*
Sex (M: F)*	17:8	14:7	0.923
Age	23 (21 – 24)	22 (21 – 24)	0.680
Year of Study*			
• Year 1 B.Pharm.	9	10	
• Year 2 B.Pharm.	16	11	0.425
Mode of admission*			
• Regular	20	19	
• Parallel	5	2	0.324
Prior learning*			
• A-level NS	19	17	
• Dip.Pharm.	6	4	0.685
Study time per week	20 (18 – 28)	24 (15 – 30)	0.820
WAIS-IV category			
• Borderline	25	21	-

*Chi-square test. For continuous variables median (interquartile range) are shown. M: male; F: female; NS: natural sciences; Dip.Pharm.: diploma in pharmacy technology; WAIS: Wechsler Adult Intelligence Scale

4.5.2. Participant's evaluation of the educational intervention

Table 4.9 shows that the majority of participants positively rated the context, inputs, processes and outcomes of the OADLSS elective module. All participants exposed to the intervention indicated the OADLSS elective module was relevant in relation to their learning and study needs, and that it was beneficial for enhancing their learning. The majority found the content, knowledge and skills learnt on the OADLSS module very useful. Despite the largely positive ratings, a few participants found the time allocated for the elective module to be inadequate (Table 4.9). Regarding aspects of the OADLSS module that exposed participants perceived they learnt well on the module, the majority appreciated the lesson about critical thinking skills ($n = 13$), managing study time ($n = 11$), and the session on deep learning strategies ($n = 9$). Table 4.10 shows the rating and evaluation of the OADLSS by participants that undertook the module ($n = 25$), including their experiences on the module sessions.

Table 4.9. Participants' rating and evaluation of the OADLSS elective module

1. Context		Participants' Rating (n, %)				
	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1.1. Relevance	The Seminar Series on Approaches to Deep Learning & Study Skills was relevant in relation to my learning and study needs?	25 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
1.2. Time Allocated	The time allocated for the OADLSS Seminar Series was adequate	20 (80%)	0 (0%)	1 (4%)	4 (16%)	0 (0%)
1.3. Academic Benefit	I benefitted academically from attending the OADLSS Seminar Series	25 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
1.4. Need	The OADLSS is needed for Pharmacy Students. I would recommend it to other students	24 (96%)	0 (0%)	1 (4%)	0 (0%)	0 (0%)
2. Inputs and Processes		Very Good	Good	Average	Poor	Very Poor
2.1. Content and Materials	How would you rate the content and material covered in the Seminar Sessions?	21 (84%)	3 (12%)	1 (4%)	0 (0%)	0 (0%)
2.2. Quality of Delivery	How would you rate the quality to delivery of the Seminar Sessions?	19 (76%)	6 (24%)	0 (0%)	0 (0%)	0 (0%)
2.3. Module Organisation	How would you rate the overall organization of the OADLSS module?	19 (76%)	6 (24%)	0 (0%)	0 (0%)	0 (0%)
3. Product (Outcomes)		Very Useful	Useful	Unsure	Not Useful	Irrelevant
3.1. Knowledge and skills learnt	How did you find the content, knowledge and skills learnt on the OADLSS module?	24 (96%)	1 (4%)	0 (0%)	0 (0%)	0 (0%)
3.2. Usefulness and Application	Overall, how would you rate the usefulness and application of the knowledge and skills acquired from the OADLSS module?	21 (84%)	4 (16%)	0 (0%)	0 (0%)	0 (0%)

Table 4.10. Feedback from participants exposed to the OADLSS elective module

Aspect Evaluated	Key aspects derived from participants' grouped responses to open-ended questions	Selected quotes from participant written responses to open-ended questions
Aspects of the OADLSS module that went well for participants	<ol style="list-style-type: none"> 1. Critical thinking skills ($n = 13$) 2. Time management session ($n = 11$) 3. Deep learning strategies ($n = 8$) 4. Study strategies ($n = 7$) 5. Dealing with distractions ($n = 5$) 6. Learning styles ($n = 4$) 7. Approaches to learning ($n = 3$) 8. Note-taking methods ($n = 2$) 	<p><i>"Critical thinking session seems to have improved the (way) I use logic and understanding in learning skills"</i></p> <p><i>"The segment on critical thinking really helped me realise am not thinking as am supposed to [...], I also learnt that managing my time is important"</i></p> <p><i>"Time management session went well for me"</i></p> <p><i>"Session 2 (Overview of Approaches to Deep Learning & Studying) went well for me because I realised that deep learning is the most efficient"</i></p> <p><i>"how to develop strategies of deep learning and skills needed for critical thinking was good for me [...]"</i></p>
Aspects of the OADLSS module did not go so well for participants	<ol style="list-style-type: none"> 1. Session time insufficient ($n = 6$) 2. Teaching styles not covered ($n = 2$) 3. Content coverage ($n = 2$) 	<p><i>"I think we needed more time than we had for the seminar"</i></p> <p><i>"[...] I felt we needed to have more time - probably 2 weeks for the seminar [...]"</i></p> <p><i>"The duration of the seminar was short, I think more time would have been much (better) [...]"</i></p> <p><i>"[...] style of teaching and lecturing (was not covered) [...]"</i></p> <p><i>"[...] what or how much effort lecturers put in in their teaching styles (was not covered) [...]."</i></p>
Key things learnt from the OADLSS module that participants wish to apply in their own learning and studying	<ol style="list-style-type: none"> 1. Managing study time ($n = 13$) 2. Deep Learning ($n = 9$) 3. Applying critical thinking ($n = 6$) 4. Applying learning styles ($n = 4$) 5. Studying strategies ($n = 4$) 	<p><i>"I learnt how to become a good learner, allocate time for studies".</i></p> <p><i>"[...] time management, critical thinking and broadening my learning style".</i></p> <p><i>"I have learnt that I have to analyse the must know, good to know and nice to know [...]"</i></p> <p><i>"I have learnt the need for me to use other study and learning skills and also how to handle time for studies [...]"</i></p> <p><i>"[...] mainly on how to practice critical thinking [...]"</i></p> <p><i>"[...] a lot which includes deep learning skills, critical thinking [...] and how to study."</i></p>

4.5.3. Approaches to learning before and after the intervention

Figure 4.8 (a, c, and e) shows results of comparisons of the pre-test mean scores for deep, strategic and surface ATL within and between participants in the intervention and non-intervention groups at baseline (before the OADLSS module), respectively. A two-tailed unpaired t-test result revealed that pre-test mean scores for deep ATL between the intervention group (23.68 ± 3.26 , 95% CI: 22.23 – 25.03) and non-intervention group (23.62 ± 3.17 , 95% CI: 22.18 – 25.06) were not significantly different before the OADLSS ($t = 0.064$, $p = 0.949$). Similarly, the mean scores for surface ATL were not significantly different (15.88 ± 4.33 , 95% CI: 14.09 – 17.67 versus 17.57 ± 4.00 , 95% CI: 15.75 – 19.40; $t = 1.364$, $p = 0.179$) before the intervention. However, the mean scores for strategic ATL were statistically different between the two groups (27.20 ± 1.94 , 95% CI: 26.40 – 28.00 versus 25.05 ± 4.38 , 95% CI: 23.06 – 27.04; $t = 2.218$, $p = 0.0318$) before the intervention. Before the OADLSS intervention, a strategic ATL was predominant among participants in both groups.

When measured 4-weeks after the OADLSS intervention, mean scores for deep learning minimally increased (from 23.68 ± 3.26 , 95% CI: 22.23 – 25.03 to 24.08 ± 3.64 , 95% CI: 22.58 – 25.58) among participants exposed to the OADLSS elective module. However, this increase was not statistically significant ($t = 0.5426$, $p = 0.5924$). Mean scores for deep learning remained relatively unchanged in the non-intervention (control) group (Figure 4.9). Interestingly, there was a statistically significant decrease in the mean scores for strategic learning among participants exposed to the OADLSS intervention (from 27.20 ± 1.94 , 95% CI: 26.40 – 28.00 to 26.00 ± 3.1 , 95% CI: 24.72 – 27.28; $t = 2.400$, $p = 0.0245$) compared to controls (25.05 ± 4.38 ; 95% CI: 23.06 – 27.04 to 24.38 ± 3.28 ; 95% CI: 22.89 – 25.87, $p = 0.5079$). Though both groups recorded a decrease in mean scores for surface learning, the margins of the mean difference were not statistically significant (Table 4.11). Overall, scores

of strategic learning remained relatively higher than deep and surface learning, respectively, in both groups when measured 4-weeks later. This suggested that a strategic learning approach still remained predominantly preferred among participants in both groups irrespective of intervention exposure status.

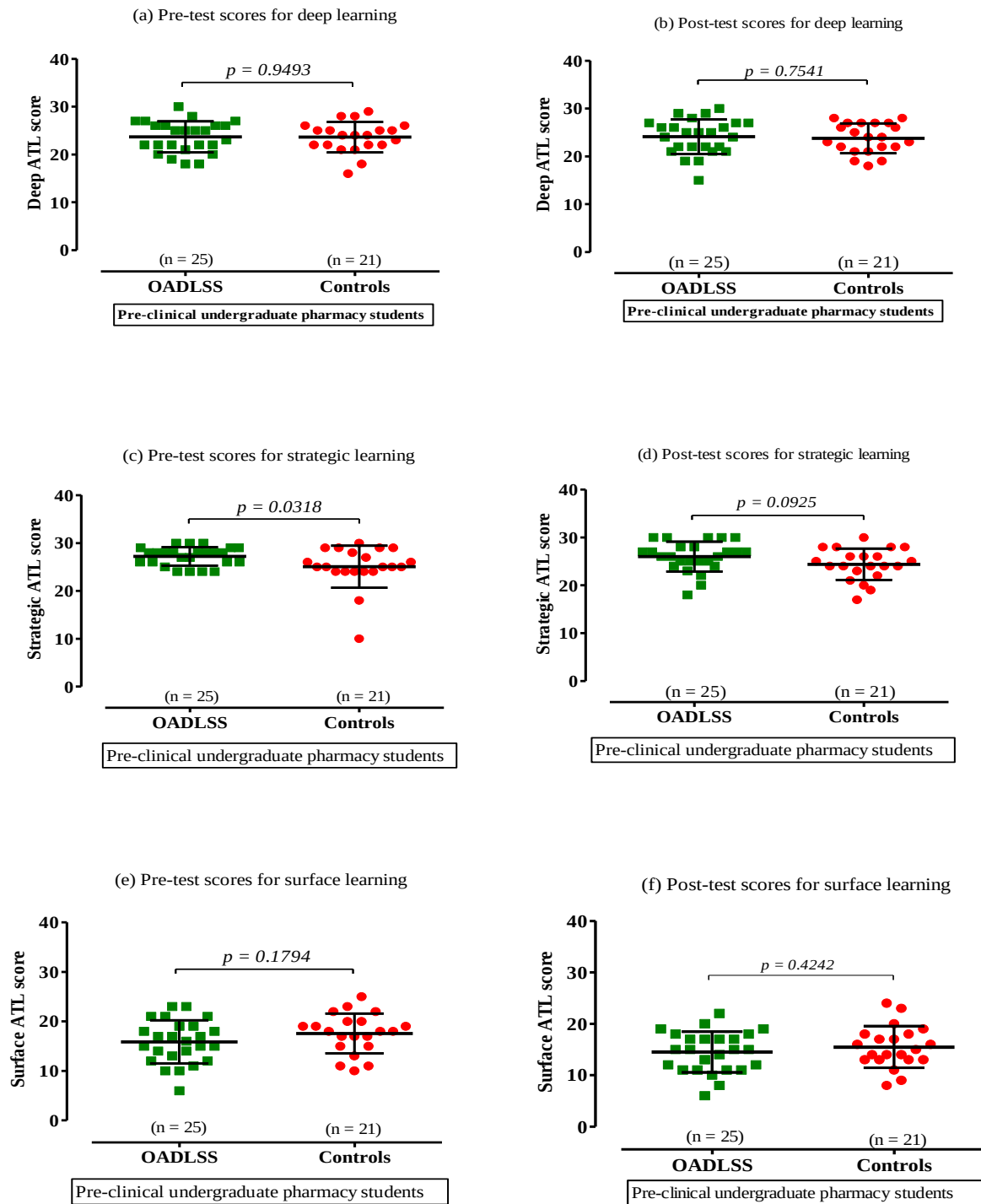


Figure 4.8. Comparison of pre- and post-test scores for deep, strategic and surface learning between participants in the OADLSS and non-intervention group, respectively.

Figure 4.9 shows paired t-test results for within-group comparisons of pre- and post-test mean scores for learning approaches before and 4-weeks after the intervention.

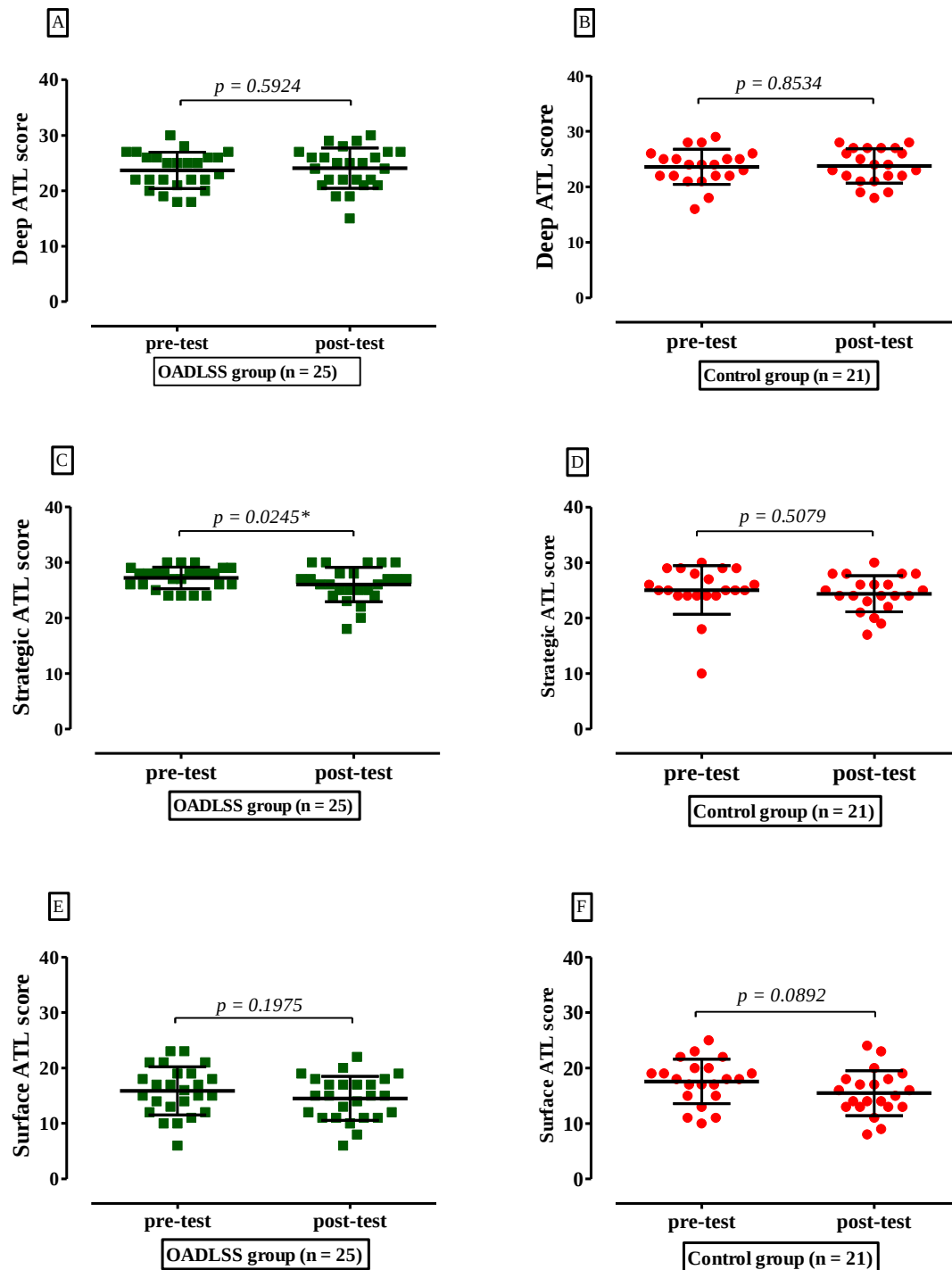


Figure 4.9. Pre- and post-test scores for deep, strategic and surface learning to detect changes within the groups

Table 4.11. Comparison of pre- and post-test ATL scores across and within groups

Variable		OADLSS group (n = 25)	Control group (n = 21)	Mean difference	95% CI	t (p-value)
		Mean ± SD	Mean ± SD			
Deep learning	Pre-test	23.68 ± 3.26	23.62 ± 3.17	0.06 ± 0.95	-1.86 to 1.98	0.064 (0.949)
	Post-test	24.08 ± 3.64	23.76 ± 3.11	0.32 ± 1.01	-1.72 to 2.35	0.315 (0.7541)
	Mean Difference	0.40	0.14			
	95% CI	-1.92 to 1.12	-1.74 to 1.45			
	t (p-value)	0.543 (0.5924)	0.187 (0.8534)			
Strategic learning	Pre-test	27.20 ± 1.94	25.05 ± 4.38	2.15 ± 0.97	0.19 to 4.11	2.218 (0.0318)*
	Post-test	26.00 ± 3.09	24.38 ± 3.28	-1.62 ± 0.94	-3.52 to 0.28	1.720 (0.0925)
	Mean Difference	-1.20	-0.67			
	95% CI	0.17 to 2.23	-1.39 to 2.73			
	t (p-value)	2.400 (0.0245)*	0.674 (0.5079)			
Surface learning	Pre-test	15.88 ± 4.33	17.57 ± 4.01	-1.69 ± 1.24	-4.19 to 0.81	1.364 (0.179)
	Post-test	14.52 ± 3.96	15.48 ± 4.06	-0.96 ± 1.19	-3.35 to 1.43	0.807 (0.4242)
	Mean Difference	-1.36	-2.09			
	95% CI	-0.76 to 3.48	-0.35 to 4.54			
	t (p-value)	1.325 (0.1975)	1.786 (0.0892)			

*Statistically significant; t = test statistic

Table 4.11 summarises the comparative measurement of participants' ATL, including the margins of mean difference within and across the groups in each ATL category as measured using the ASSIST inventory.

4.5.4. Comparison of academic performance in summative assessments

Figure 4.10 shows the comparison of GPA scores among participants in the intervention (OADLSS) and non-intervention groups, respectively.

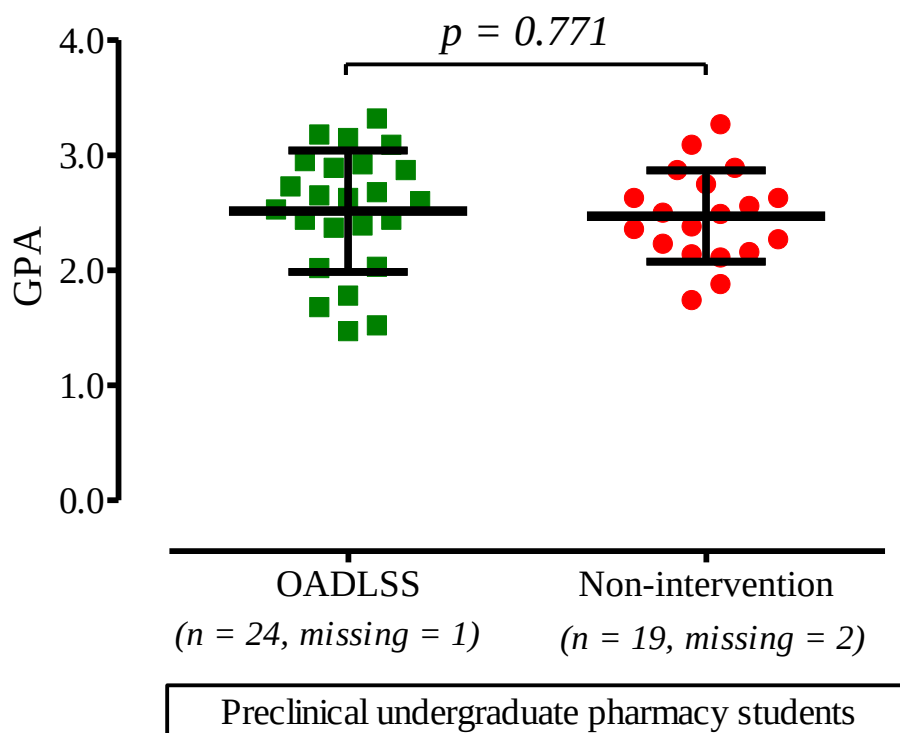


Figure 4.10. Comparison of GPA scores of participants exposed to the OADLSS intervention versus the non-intervention group

The grading system at UNZA considers a GPA greater than 2.5 as above-average academic performance in the medical and health science fields (UNZA, 2016). The academic standard for undergraduate level programmes varies from country to country and institutional policy, for instance in the USA, a minimum GPA of 3.0 is required to graduate at most colleges and universities (Ren *et al.*, 2012). Although the mean GPA score attained by participants exposed to the OADLSS was slightly higher (2.51 ± 0.53 , 95% CI: 2.29 – 2.74) than those in the non-intervention group (2.47 ± 0.39 , 95% CI: 2.28 – 2.66), the mean difference was not statistically significant ($p = 0.771$).

A correlation matrix of GPA score, ATL scores in the respective categories, and age was explored. This revealed not only patterns observable in the data but also whether the amount of correlations suggest that the linear regression estimates would be reliable or unreliable. Interestingly, whereas there was a negative correlation between GPA score and age, there were positive correlations between deep, strategic and surface learning scores, respectively, with GPA score. However, these correlations were not statistically significant. The positive correlation between deep learning and strategic learning scores was statistically significant (Table 4.12).

Table 4.12. Correlation matrix showing relationships among variables in preclinical pharmacy students

	Age	Deep learning	Strategic learning	Surface learning	GPA
Age	1.0000				
Deep learning	0.0339	1.0000			
Strategic learning	0.1874	0.2990*	1.0000		
Surface learning	-0.2124	0.2054	-0.0638	1.0000	
GPA	-0.2193	0.2582	0.2007	0.1197	1.0000

*GPA: grade point average; *p-value < 0.05.*

When assessment outcomes were compared between the two groups, there was a slightly higher pass rate (83%) in the intervention group compared to 79% in the non-intervention group (Table 4.13). Similarly, the fail rate was slightly lower (17%) in the intervention group compared to 21% in the non-intervention group, respectively. However, the differences were not statistically significant (95% CI: 0.286 – 6.216, $p = 1.0000$).

Table 4.13. Comparison of outcomes in summative assessments in the academic year

Assessment Outcome	OADLSS group (<i>n</i> = 24, <i>missing</i> = 1)	Control group (<i>n</i> = 19, <i>missing</i> = 1)	p-value*
	<i>n</i> (%)	<i>n</i> (%)	
Pass	20 (83%)	15 (79%)	1.000
Fail	4 (17%)	4 (21%)	

*Fisher's exact test

4.5.5. Hypothesis testing

The null hypothesis (H_0) of this study as stated in Chapter 3 was as follows: 'There is no difference in approach to deep learning and academic outcomes among participants exposed to a 5-day OADLSS elective module versus those not exposed'. Table 4.14 shows the statistical outputs of the hypothesis tests.

Table 4.14. Hypothesis test statistics

		OADLSS group	Control group	Mean difference	t (<i>p</i> -value)
		Mean $\pm$ SD	Mean $\pm$ SD		
Deep learning score	Pre-test	23.68 $\pm$ 3.26	23.62 $\pm$ 3.17	0.06	0.064 (0.949)
	Post-test	24.08 $\pm$ 3.64	23.76 $\pm$ 3.11	0.32	0.315 (0.754)
	Mean difference	0.40	0.14		
	t (<i>p</i> -value)	0.543 (0.592)	0.187 (0.853)		
GPA	Mean	2.51 $\pm$ 0.53	2.47 $\pm$ 0.39	0.04	0.293 (0.771)
	95%CI		2.28 – 2.66		
		2.29 – 2.74			

CI: confidence interval, SD: standard deviation, t: test statistic

Outputs of the unpaired t-test comparing deep learning scores for participants exposed to the 5-day OADLSS elective (intervention group) versus those not exposed showed that the mean difference in deep learning scores between the two groups was minimal and returned a two-tailed p-value of 0.754 far greater than the minimum acceptable level of 0.05. This indicated that despite exposure to the OADLSS elective module, there was no statistically

significant difference in deep learning scores between the two groups (Table 4.14). Similarly, the academic performance (GPA scores) were not significantly different and a returned two-tailed p-value of 0.771 far greater than the minimum acceptable level of 0.05. Based on the strength of evidence, the null hypothesis was not rejected. A possible reason the null hypothesis was not rejected was, in part, attributable to the adjunct nature and duration of the OADLSS intervention to influence immediate changes in deep ATL and GPA.

4.5.6. Predictive margins of the educational intervention

After constructing a logistic regression model, average marginal effects were used to determine and predict the probability of attaining a higher GPA score if exposed to the OADLSS intervention. The result showed that, holding all other variables constant, the probability of participants passing their formal academic assessments with a GPA score ≥ 2.5 reduced by 2.2 percentage points (95% CI: -7.6 – 3.2) when taking a deep ATL after exposure to the OADLSS module, whereas a strategic ATL increased the probability of passing with a GPA score of ≥ 2.5 by 1.6% (95% CI: -5.11 – 8.38) and a surface ATL reduced the probability of passing by 2.7% (95% CI: -7.61 – 2.26) after exposure to the OADLSS. All changes were however not statistically significant (Table 4.15).

Table 4.15. The magnitude of change in learning approaches after exposure to OADLSS elective module

Intervention	Percentage change	95% CI	p-value
Deep learning	-2.2%	-7.60 – 3.20	0.42
Strategic learning	1.6%	-5.11 – 8.38	0.63
Surface learning	-2.7%	-7.61 – 2.26	0.28

CI: confidence interval

When the predictive margins were analysed and plotted, findings showed that there was a positive predictive relationship between strategic learning and academic performance. As scores for strategic learning increased, the probability of predicting a higher GPA also increased, irrespective of exposure to the OADLSS module. Though it was deep ATL that the OADLSS module was aiming to promote using a metacognitive educational strategy, results revealed a positive predictive relationship between strategic learning and attaining a high GPA. There was an inverse predictive relationship between deep ATL and attaining a high GPA score. This implied that whether a participant was exposed to the OADLSS module or not, as deep learning score increased, the probability of predicting a higher GPA reduced, holding all other covariates constant (Figure 4.11). This inverse relationship was true of age and GPA score. Increasing age shows a higher predictive probability of lower GPA.

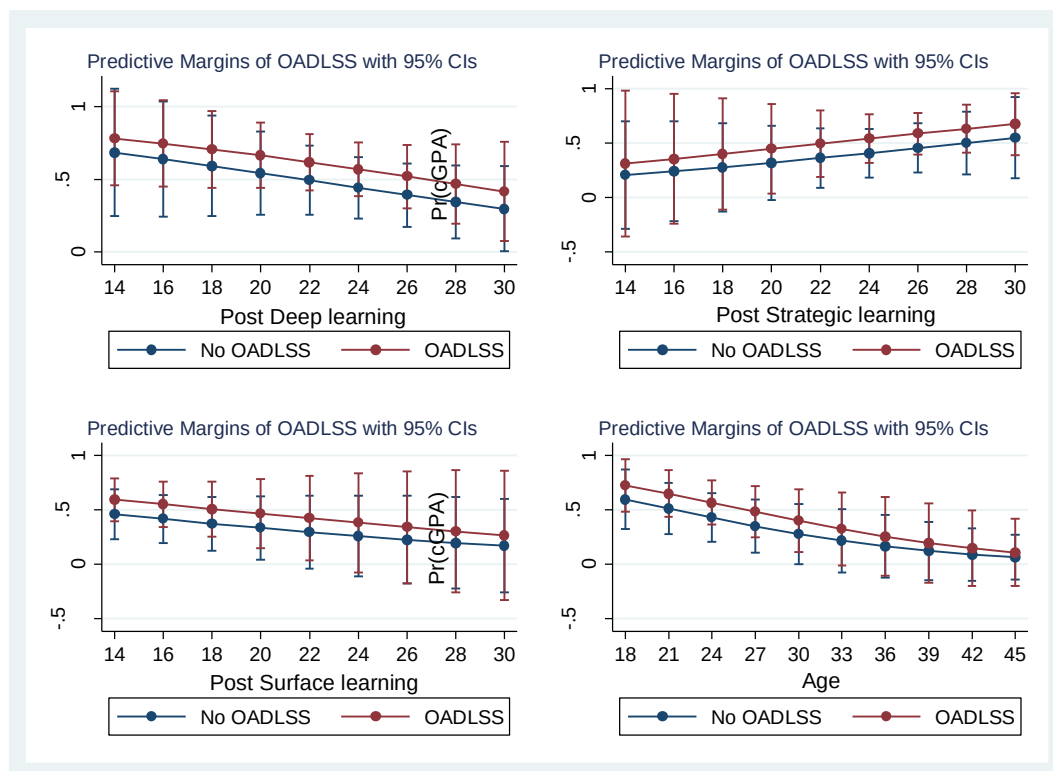


Figure 4.11. Predictive margins of the OADLSS intervention on approaches to learning and academic performance in assessments.

4.6. Summary of phase 3 results

Results from this phase of the study showed that despite participants' positively rating the OADLSS elective module to be relevant and useful in terms of improving their own learning, there were minimal immediate changes to the ATL of the participants exposed to the educational intervention compared to those not exposed. Similarly, academic performance (as measured using GPA scores attained in official summative assessments) were not significantly different between participants exposed to the OADLSS compared to those not exposed. It can be argued that the adjunct nature of the OADLSS module introduced as a quick-fix intervention the midst of a learning environment characterised by high course load (as shown by the results of phase 1 and 2), may well provide tentative explanations for the minimal immediate changes to deep ATL after exposure to the OADLSS elective module. Alternative explanations could also be inherent within the module design aspects (for example, time and duration).

In this phase of the study, strategic learning focussed on achieving remained the predominant ATL among participants despite the intervention. Further studies will be required to continue monitoring the impact of this ATL on the educational outcomes in future. In order to promote attainment of meaningful learning outcomes, it will be prudent for the system of educating pharmacists in Zambia to consider educational strategies that scaffold deep learning approaches that have been evidenced to produce learning outcomes that positively impact the future professional practise of pharmaceutical care.

CHAPTER 5 : DISCUSSION

5.1. Overview of the study

This study was necessitated by contextually relevant need to address the quality of learning outcomes among undergraduate pharmacy students at UNZA. Diagnostic indicators of the problem pointed to, among other things, issues to do with how pharmacy students, individually or collectively, learn and take to studying. Prior to this study, it was known how undergraduate pharmacy students approached their learning, the contextual factors impacting their learning efficacy.

This study investigated, using an exploratory sequential mixed-method design, the predominant ATL; the contextual factors affecting undergraduate pharmacy students' learning efficacy; and assessed the potential effect a locally designed elective module dubbed 'Orientation and Approaches to Deep Learning and Study Skills (OADLSS)' on preclinical pharmacy students' ATL and academic performance. The instructional design of the intervention was based on the metacognition and constructivism theories, respectively.

This study was conducted in an undergraduate population of pharmacy students enrolled in 2017 to 2018 academic year at UNZA. As an initial step, the predominant ATL among undergraduate pharmacy students was determined using a pre-validated tool. This was followed by qualitative exploration of contextual factors influencing the learning efficacy of preclinical pharmacy students, and lastly, the study assessed the immediate effect of the OADLSS as an educational intervention among the preclinical pharmacy students at UNZA.

The worthiness and logic of this study was founded on the following thesis statement: Although some scholars argue against their scientific validity, approaches to learning in contemporary health professions education programmes are key diagnostic and modifiable

attributes of learners that have potential to enhance or undermine their educational outcomes. Moderating ATL using metacognitive educational interventions becomes important because what the learner does and becomes finds importance in defining the quality of future healthcare practice. In the local setting, there is contextual need to routinely diagnose students' ATL and how this impact on quality of learning outcomes achieved in a health profession.

5.2. The predominant approach to learning among undergraduate pharmacy students

Results from the phase 1 study revealed that strategic learning was the more dominant approach adopted by the majority of the undergraduate pharmacy students at UNZA. Fox and colleagues (2019) who also showed that pharmacy students generally tend to be achievement-focussed (Fox *et al.*, 2019). The dominance of a strategic ATL implied pharmacy students were more inclined towards achieving and merely 'passing' summative assessments in order to progress on the study programme than focussing on understanding the material taught. Rote learning is a feature outcome this approach relates to. Rote learning – an outcome of learning characterised by memorisation of information based on repetition or recall of facts, tends to promote a propensity referred to in education as 'cramming' – a practice of working intensively to absorb large volumes of information in short amounts of time (Lal, 2016). This study found that a deep ATL was not as predominant among pharmacy students at UNZA. Smith and colleagues (2007) also found little evidence of a preference for deep learning among Australian undergraduate pharmacy students (Smith *et al.*, 2007). In related disciplines, strategic learning was the predominant approach amongst the majority of undergraduate medical students in Singapore (Chonkar *et al.*, 2018) and Colombo (Samarakoon *et al.*, 2013). In Australia, Brown and colleagues (2015) also found higher mean scores for the strategic learning approach in male compared to female students on an introductory chemistry course (Brown *et al.*, 2015). Arguably, in the health professions training programmes in Zambia which have been largely male dominated over the years, it is not surprising that male students are perhaps more

motivated and achievement focussed to perform better academically than their female counterparts.

Results from the qualitative phase of this study further suggest that the dominant learning approach students adopt may be influenced more by the particular learning environment, pedagogical methods employed by educators, the types of assessment regimens administered, as well as the individual student's motivation for engaging the learning task rather than the subject matter content within a particular discipline. Entwistle and colleagues (2002) described strategic learners as those with the tendency of second-guessing what examiners or markers look for when assessing students; and who concentrate on or allocate effort to studying just those bits of information sufficient to 'pass' examinations or assessments (Entwistle *et al.*, 2002). Though not adequately investigated in this study, the results may also reflect an important consideration promulgated by Walker and colleagues (2010) that students' ATL can vary depending on the learning tasks encountered and the learning environment (Walker *et al.*, 2010). In this study, results did show that likelihood of a strategic ATL was significantly less among students in clinical than the preclinical stages of the B.Pharm. programme (Table 4.7).

It was plausible that several complex factors may be at play in influencing the dominance of strategic learning approach among pharmacy students at UNZA. Moreover, the finding that more pharmacy students preferred teaching styles that largely involved transmitting information implied that more students preferred passive learning. This is where lecturers tell them exactly what is important to note down, the topics they should focus to read and where information can be memorised easily. Passive learning is also characterised by assessment regimens which only need reproducing material provided in the lecture notes. The implication of sustaining passive learning through teaching styles that largely involved transmitting information was that these would promulgate a surface learning approach

(Entwistle *et al.*, 2002). With regards the influence of teaching methods on students' ATL, recent evidence has shown that student-centred teaching and learning using exploratory and simulated (constructivist) approaches works better than expository (passive) lecture approaches (Frame *et al.*, 2015, Quintanilha *et al.*, 2018). From the results of this study, it can be argued therefore that the primary focus of pharmacy education in Zambia, including other health professions education programmes in general, should be about how students can attain meaningful learning outcomes instead of merely focussing on the teaching or what they are taught.

It was a cause of concern that only a low proportion (25%) of pharmacy students in the sample were deep learners and only 23% preferred teaching styles that encouraged and supported understanding of material learnt. The proportion of students adopting deep learning approach was relatively lower compared to findings of other studies in settings involving undergraduate pharmacy (Smith *et al.*, 2010, Phanudulkitti *et al.*, 2018), medical (Subasinghe and Wanniarachchi, 2009, Chonkar *et al.*, 2018) and other health science students (Walker *et al.*, 2010, Mosca *et al.*, 2015). This finding could further suggest that few pharmacy students approached their learning and studying with the intention to understand for oneself or critically relate their knowledge to develop an understanding of pharmaceutical concepts they were learning. Additionally, Figure 4.6 revealed that few pharmacy students at UNZA preferred lecturers who encouraged them to critically think for themselves, assessments which allowed them to show how they thought about the material learnt, and courses where they were encouraged to read around the subject by themselves – all such attributes related to deep learning were relatively low. Interestingly, whereas other studies (Halawi *et al.*, 2009, Phanudulkitti *et al.*, 2018) found that female pharmacy students had a higher likelihood of adopting a deep ATL, this study found that male students had statistically significant higher

odds of adopting a deep learning approach than female students (*AOR: 8.3, 95% CI: 1.4 – 49.8, $p = 0.021$*).

The results of the phase 1 cross-sectional survey of ATL across the entire population of undergraduate pharmacy students (both clinical and preclinical stages) at UNZA revealed that students in higher academic years than in lower years on the B.Pharm. programme were statistically significantly more likely to adopt a deep approach to learning (Table 4.7). This was consistent with other studies (Phanudulkitti *et al.*, 2018, Smith *et al.*, 2010). Mosca and colleagues (2015) in their study argued that academic workload and transition from high school to university education in South Africa were possible contributors to students' lack of preparedness to adopt a deep approach to learning in the early years of study on a medical programme (Mosca *et al.*, 2015). Whether this argument may similarly hold true in the Zambian setting was subject to further research building on findings of this study.

Results of the present study (Table 4.6) showed a statistically significant association between pharmacy students' learning approach and course load ($p = 0.028$). This result agrees with the growing body of evidence that the course workload and learning task demands on students influence their approach to learning. Other published evidence linked the importance of clear, well-structured and tailored instruction and learning activities to the attainment of deep learning among pharmacy students (Phanudulkitti *et al.*, 2018, Wang *et al.*, 2015). Varunki and colleagues (2017) found that pharmacy students who considered their course workload as appropriate and manageable tended to adopt a deep approach to their learning (Varunki *et al.*, 2017). In pharmacy curriculum design and educational delivery, it was therefore imperative that student course workload and learning tasks were manageable, instructional content clear and well organized to promote deep learning and understanding of information taught.

5.3. Contextual factors impacting learning efficacy among pharmacy students

The second phase of this study investigated, from the perspectives of students, the contextual factors impacting the learning efficacy, processes and outcomes among pharmacy students, including ways this can be improved at the university. It emerged that, apart from internal (student-related) factors, pharmacy students' tendency to adopt a predominantly strategic ATL at UNZA was largely influenced by the educational programme-related factors (that is; the high course load, bulkiness of content coverage, and the teaching methods and styles used by educators), the learning environment (characterised by large class sizes and inadequate educational facilities), and the modalities of assessments. These factors converged to influence how students managed their learning time and adopted coping strategies in order to 'survive' the academic workload and educational demands of the B.Pharm. programme (Figure 4.7).

An important result from the qualitative data was that many preclinical undergraduate pharmacy students at UNZA may be struggling to meet the notional time demands to invest in understanding material taught on the already credit-heavy full courses they were taking in the academic year. This demonstrated contextual evidence that many pharmacy students may be struggling to cope with the academic workload. This further highlighted the strongly negative influence high course load, voluminous information transmission during lectures, and learning assignments each student is expected to undertake to comprehend the content of each course in the curriculum have on the quality of learning undertaken. This result also raised concerns that where the notional time requirements are not duly considered or regarded during curriculum or course development and allocation of credits, it is therefore not surprising to find that the students consequently feel challenged to meet the notional time demands of the respective courses in the curriculum. From an educational standpoint, subject matter experts

should not be oblivious to this important consideration when designing academic courses and curriculum.

Evidence from other published studies also showed that the sheer volume of cognitive information expected to be learnt by students was identified as a driver of rote learning outcomes (Lal, 2016). As described by Haylock (2007), rote learning is a style of learning in which the student seeks only to retain and later to recall some information, result or process, without necessarily making cognitive connections between the new learning and their existing network of understanding (Haylock, 2007). In most instances, although the benefits of such a style may seem beneficial to the student in the short-term, there may be long-term disadvantages with regards to the outcomes of learning which have potential to affect how they will apply concepts in future practice as a health professional. It could be further argued that the strategic ATL being preferred among the majority of pharmacy students at UNZA was perhaps an indirect response to the inadvertent educational demands, teaching strategies, and the educational environment within which they were learning. The findings from this study further contribute to the growing body of evidence (Sansgiry *et al.*, 2004, Sansgiry *et al.*, 2006, Lal, 2016) that high course load may tend to drive rote learning outcomes in pharmacy education.

As expressed by participants, a number of courses on the current B.Pharm. curriculum are multi-component subjects, each with different lecturers teaching the respective components. Participants felt this made the content coverage and comprehension level quite difficult, and required the investment of more notional time for them to study the material. Other studies showed that students' perception of course load was associated with test anxiety, fear of failure and inability to effectively manage time for course work (Sansgiry and Sail, 2006). Test anxiety and fear of failure were both characteristic features of a surface learning approach.

As demonstrated by the qualitative findings of this study, the ways educators (lecturers) go about teaching may have a direct influence on students' adopting a strategic ATL and preference for teaching styles that largely involved transmitting information. When this putative influence is not diagnosed early enough, the student's tendency to adopt a strategic or surface approach perpetuates further and proceeds to affect their overall learning outcomes. Pashler and colleagues (2008) who also showed that preference for different modes of most effective teaching differs for individual students. They argued that effective teaching can only be undertaken if the learners' approach to learning is diagnosed early enough and the teaching methods tailored accordingly (Pashler *et al.*, 2008). Harb and El-Shaarawi (2006) also demonstrated that a good match between students' approach to learning and the educator's teaching style has positive effects on students' academic performance and learning outcomes (Harb and El-Shaarawi, 2006). In his book, Omrod (2008) argued that in a class where only one teaching method (for instance, expository lecture method) was employed throughout, there was a strong possibility that a number of students often find the learning environment less optimal hence affecting their academic performance (Omrod, 2008). In contemporary pharmacy education practice, this evidence, therefore, underscores the need for training programmes to encourage effective but diverse teaching methods and styles as scaffolds of a deep learning approach that aims to develop understanding and application of concepts by the learners.

In this study, participants highlighted some gaps in the pedagogical approaches of the educators, how the lecturers organised teaching and learning activities, motivated students, managed and committed their time to the process of facilitating learning. For instance;

“lecturers most of the time don't have time, they just rush through everything, we don't even understand [...]”—Year 1 B.Pharm. student (FG4-16-12-17).

These perceptions potentially affected the learning efficacy among the undergraduate pharmacy students at UNZA. This finding agreed with evidence by Newman-Ford and colleagues (2009) who also found that poor delivery and timing of lectures and assessment pressures affected student's learning and academic performance at the University of South Wales (Newman-Ford *et al.*, 2009). With the multimodal nature of learning styles that may be present in any population of students (Fleming, 2016), variation in terms of teaching style preferences exist among students. This calls for prudent understanding of the types of learners in any given population of students, hence the need to select appropriate educational strategies to employ to facilitate learning of different components of the respective courses. For lecturers, as facilitators of learning and implementers of curricula, the qualitative results in phase 2 of this study suggest that there is an expectation that facilitating learning must be a well-thought-out process, grounded on evidence, and contextualised to the needs of learners. Heinesen (2010) affirms this argument that pedagogical effectiveness and teaching styles of educators may prove significant in improving students' educational outcomes (Heinesen, 2010). Future studies can explore this aspect further.

In phase 2 of this study, it emerged as a theme that among factors affecting pharmacy students' learning efficacy at UNZA were the methods and pace of teaching by the lecturers. In consonant with Engin-Dermir's (2009) argument, in health professions education contexts, an educator's academic qualification or specialist knowledge in the discipline, enthusiasm for teaching, and interaction with students are not enough to assure quality of teaching (Engin-Demir, 2009). It requires combination of these qualities with additional competence in pedagogy (Heinesen, 2010).

It was somewhat clear from the open-ended expressions and emergent themes of the contextual factors what aspects promulgated the predominance of a strategic ATL among the undergraduate pharmacy students at UNZA. The findings reflected feedback from learners on

the current way pharmacists were being training at the university. Debatably, it was quite unlikely that the qualitative findings were going to differ significantly even if the study was done longitudinally. As argued by Taylor and Harding (2007), the initial perception of pharmacy students and exposure to pharmacy education was less to do with undergoing training for a professional role and more to do with acquiring the bare minimum scientific knowledge base required to progress on the study programme to attain an academic qualification in pharmacy, but divorced from professional practice competency and orientation (Taylor and Harding, 2007). Whether this was the motivation among the majority of pharmacy students in Zambia remains to be empirically determined by subsequent future research.

This study promulgates an argument that for any HPE programme where surface or strategic learning were prominent or promoted, it may be the indirect consequence of such an influenced ATL that professional acculturation of core competencies, values, ethos, and practice requirements are held secondary by students whose focus of learning was how to merely ‘pass’ the health science courses and progress to graduate from the programme. The ultimate effects of such approaches to learning on the quality of future healthcare practice will be interesting to monitor in future. Pharmacy education should not be about just teaching for expedience and producing graduates in huge numbers such that the essential process of a student discovering oneself as a nascent professional in the training process is deferred by the influence of the unfavourable educational environment driving an achieving-focus and rote learning outcome. Rather, pharmacy education should be about the process of one acquiring professional identity and attaining meaningful learning outcomes that translate into the quality professional practice of healthcare, innovation and development. Evidence from this study provides a sound rationale for educational policymakers involved in pharmacy education in Zambia, curriculum developers, and educators to plan and implement pharmacy training programmes with clear educational outcomes in mind (that is; meaningful learning rather than

rote learning outcomes) so that the educational processes (teaching and learning as inputs) are designed to contribute towards attaining the set goals. It is generally expected by the consumers of pharmacists' services that, as medicine experts they are purportedly trained to be; they are supposed to have developed during the course of their training, a broad understanding and application of pharmaceutical sciences to relate professionally to both the patients and other healthcare professionals (Taylor and Harding, 2007). The impact of poorly designed curricula, educational strategies, and assessment components as vanguards of quality assurance are far-reaching to not only the quality of graduates being produced by the university but to the quality of healthcare practice and patient care in the long term.

In the context of pharmacy education in Zambia, both the quantitative and qualitative evidence from this study find utility in escalating the call to undertake corrective measures to improve the quality of learning outcomes of pharmacy students, especially in public-funded institutions. As earlier argued by Mlambo (2011), the throughput of health professionals from public-funded institutions was constantly under scrutiny especially because of demands to improve efficiency where public resources were allocated and utilised in facilitating the professional training processes against a backdrop of other competing economic needs of the country (Mlambo, 2011). For public universities such as UNZA where a larger proportion of students were supported by government scholarships and student loans mobilised from public funds, including huge capital investments made by the state to run and fund the training programmes, high attrition rates resulting from indirect consequences of poorly structured educational strategies in the context of the learning needs and the learning environments cannot go without correction. This study contributes contextually relevant evidence required to inform such corrective action at the university.

The qualitative findings of this study also collaborated earlier evidence by Ezeala (2016) who also found that despite undergraduate pharmacy, medical and physiotherapy

students' rating of their educational environment as being more positive than negative at UNZA, they perceived inadequacy of support for stressed students, teaching that over-emphasised factual versus practical learning, lecturers being authoritarian, unpleasant student accommodation, and educational stress as key issues that needed to be addressed to improve the quality of learning (Ezeala, 2016). The present study further highlighted the important role that a conducive educational environment that supports quality learning plays in sustaining students' attainment of meaningful learning outcomes. As earlier alluded to by Elliot and Church (1997), the ideal educational environment is not about the quality of teaching alone but a complement of all other processes that make learning meaningful and motivating for the learner (Elliot and Church, 1997). The ground was therefore fertile to not only diagnose the factors but to also develop educational interventions aimed at further promote the adoption of a deep approach to learning.

On the B.Pharm. programme at UNZA, participants also identified inadequacy of the learning facilities, including large class sizes as some of the key factors in the educational environment that affected the quality of learning. Interestingly, pharmacy education programmes offered at both public and private training institutions in Zambia were generally having large enrolment sizes despite the recognized advantages associated with small class sizes. Arguably in Zambia, pharmacy education programmes have been indirectly driven into having large classes because of the economics of scale owing to the growing demand for pharmacy education in the country. At the time of the study, the Year 1 B.Pharm. class at UNZA had 107 pharmacy students enrolled against a recommended class size of 50 students per intake (based on the recommended student-to-lecturer ratio and capacity of classroom infrastructure). Clearly, the enrolment size for this class had been exceeded by over 100% despite limited or no changes to the learning infrastructure and resource envelope. The effects of large class sizes on student's quality of learning was indeed a cause for concern. As earlier

argued by Heinesen's (2010) and also reinforced by Mlambo (2011), class size is one of the key factors with a general negative relationship and impact on academic performance (Heinesen, 2010, Mlambo, 2011). Studies have shown that large class size negatively influences the following: assessment modalities on the course (Persky and Pollack, 2010), student accountability and motivation (Hassel and Lourey, 2005), academic performance (Jepsen and Rivkin, 2009), and types of learning outcomes that can be achieved (Lopez, 2004). Johnson (2010) suggested that further trimming enrolment to smaller manageable classes than reducing class size overall could attain a larger impact on student performance (Johnson, 2010).

The learning environment at UNZA emerged as a factor affecting the students' learning efficacy, specifically the state of the learning infrastructure and class sizes were highlighted as a concern by participants (Figure 4.7). Whereas aspects such as purpose-built infrastructure to house modern learning facilities and teaching areas for pharmacy education do require adequate fiscal capital to invest in for contemporary training of pharmacists, it remains a challenge for public universities in many low-middle income countries (LMICs). In the absence of new medical schools or expansion of existing infrastructure to accommodate the increasing class sizes, Norcini and colleagues (2007) argued that despite small group learning structures being adopted in preclinical courses at a number of universities, they are quite labour-intensive and many clinical clerkship sites were already saturated with learners converging from the different training institutions. They further argued that the task for educators in future will be to accommodate this bolus of students without compromising on educational quality (Norcini *et al.*, 2007).

It is not a secret that similar to many other LMICs, Zambia continues to experience challenges to delivering quality pharmacy education owing to the limited infrastructure, funding challenges leading to an inadequate academic workforce, limited access to teaching resources, and low research capacity (International Pharmaceutical Federation, 2013, Anderson

et al., 2014, Kalungia *et al.*, 2019). These were relatively similar challenges reportedly being faced with pharmacy education in other LMICs as well (Bamiro and Olugbenga, 2010). Going forward, these will need to be addressed for quality improvement in pharmacy education systems.

Regarding the learning environment, results from phase 2 of this study agreed with Harb and El-Shaarawi's (2006) conclusions that students in higher education may end up performing poorly not because they do not know how to learn but in part because the training institution fails to create a conducive environment that mainstreams best educational practices effective enough for their professional learning and educational needs (Harb and El-Shaarawi, 2006). Similarly, Lizzio and colleagues (2002) also demonstrated that students' perceptions of good teaching influenced them towards deep approaches to learning and studying whereas perceptions of heavy workload and inappropriate assessments influenced them towards a surface approach. Therefore, students' perceptions of their current learning environment were a stronger predictor of learning outcomes at university (Lizzio *et al.*, 2002).

As vanguards of quality assurance, assessments are expected to be fair in the context of need and purpose, valid, reliable, and conducted in an objective manner (Norcini *et al.*, 2013). Assessments, when properly planned and implemented, have a powerful positive steering effect on learning and the curriculum (Amin *et al.*, 2006). In this study, the way summative assessments for undergraduate pharmacy students were allegedly being conducted on the B.Pharm. programme at UNZA emerged as a factor affecting students' learning efficacy and academic performance. For instance, a participant said:

"[...] the way they (examiners) are preparing the exam timetable, you'll find the examination timetable does not have breathing space [...]" – Year 2 B.Pharm. student (FG1-27-11-17).

The concerns expressed seemed to suggest that the practice of assessment and modalities assessment regimes were administered was currently problematic for students. These concerns also highlighted the urgent need for faculty involved in teaching and assessing pharmacy students to be aware of the profound influence that assessment practice had on the quality of education outcomes of the graduates they produced.

As posited by Amin and colleagues (2006), educators must move away from viewing assessment as a mere 'necessary evil' - an act that must be carried out because it is there in the curriculum but as an opportunity to effectively determine whether meaningful learning has taken place in the learners. They further argued that it is not the grades the assessors give the students that should matter but the choice of assessment methods, implementation, monitoring, and effort educators put into the process of effectively measuring attainment of meaningful learning that truly determine the outcome of the education system (Amin *et al.*, 2006). It is, therefore, the duty of faculty, assessors and administrators of assessment processes that are involved in the planning and conduct summative examinations to be fully cognizant of the strengths and weaknesses inherent in their choice of assessment practice, as informed by the competence outcomes envisaged by the curriculum, discipline or profession. This is important so that appropriate assessment types and instruments are utilised to reliably measure attainment of learning by the students.

It is generally accepted, based on earlier evidence from qualitative studies conducted by other scholars, that a plethora of other variables (such as personal and social factors; sponsorship, motivation, age, work-study, family and social demands, coping ability and students' personal circumstances, etc.) also have potential to influence academic performance and outcomes (Park and Kerr, 1990, Abbasi and Mir, 2012). This study identified influence of the learning environment and the educational strategies of the curriculum (e.g. course load) and

lecturers (method of teaching), to be much more pronounced in the context of pharmacy education at UNZA. These will need to be addressed to improve students' learning efficacy.

5.4. The immediate effects a metacognitive educational intervention

Literature suggest that development of metacognitive skills is one method to increase self-awareness of pharmacy students (Fox *et al.*, 2019). The third objective of this study assessed whether a novel structured educational intervention aimed at raising metacognitive awareness of deep learning and studying strategies would help gravitate preclinical pharmacy students to adopt a deep approach to their learning. A growing body of evidence suggests that metacognitive practices in an educational setting help students become aware of their strengths and weaknesses as learners, enable them to gain a level of awareness above the subject matter, including thinking about tasks and contexts in different learning situations and themselves as learners in those different contexts (Zohar and David, 2009, Weimer, 2012).

In terms of fidelity and validity of the quasi-experiment, even in the absence of randomisation, the similarities in the baseline characteristics of the participants that were in the experimental (OADLSS intervention) and those in the non-intervention (control) groups suggested the groups were equally matched and comparable. That strategic learning remained the predominant ATL among the participants exposed to the OADLSS intervention and those in the control group was not surprising. This was considering, as informed by the phase 2 results, the putative influence that the current learning environment, methods and pace of teaching by lecturers (educational delivery), and the assessment modalities utilised on the current B.Pharm. programme at UNZA had on the way students undertook academic tasks. The results of this study were similar to other settings where repeated post-test prediction evidence showed that pharmacy students generally tend towards being high achieving (Fox *et al.*, 2019). This may perhaps explain the predominance of the strategic ATL. At baseline (before the

OADLSS intervention), the dominance of strategic learning among the participants in both the intervention and control group respectively, was demonstrated by the relatively higher pre-test scores attained for the strategic learning construct compared to the deep and surface approaches, respectively, as measured using the adapted short-version ASSIST tool (Table 4.11). Among participants exposed to the OADLSS intervention, the majority felt the elective module was relevant to their learning and studying needs, and enhanced their generic critical thinking and time management skills (Table 4.10). These findings collaborated with Kridoitis and Swart (2017) in South Africa who also found that students that participated in a Lifelong Learning Skills (LLLS) module added to first-year medical students' curriculum at the University of the Free State's School of Health Sciences in Bloemfontein, believed that the LLLS module enhanced their generic skills and that it was beneficial to them (Kridiotis and Swart, 2017). Similarly, in their study, aspects such as motivation, time management, and critical thinking skills improved. Kridoitis and Swart's study, however, did not measure the impact of the LLLS intervention on subsequent academic performance of the participants.

In contrast to findings of the present study, a quasi-experimental study conducted by Guyatte (2008) that explored using an educational intervention, the value of incorporating an online instructional design model to promote deep learning of information system concepts and problem-solving skills for accounting students showed that the experimental groups exposed to the educational intervention had a statistically significant positive increase in deep ATL along with an equally significant decrease in surface approach (Guyatte, 2008). Although the educational principles underpinning Guyatte's intervention were quite similar to this study, the mode of delivering the educational intervention was rather different. This study utilised a contact-based seminar series format of delivery. Results from this study did not show a statistically significant positive increase in deep learning approach scores but showed a statistically significant decrease in strategic learning approach scores among participants in the

experimental OADLSS group when measured 4-weeks after the intervention. Arguably, this important outcome was perhaps partly attributable to the intervention and not a result of maturation effects, regression to the mean, spontaneous remission, or perhaps confounding by other variables unknown. This was, however, subject to further confirmation by future studies.

The results from the quasi-experimental study were further aligned to the earlier criticism by Tait and Entwistle (1996) that study skills training courses become largely ineffective when offered as an adjunct to a course and students have difficulty in transferring the advice given to them into their own learning context (Tait & Entwistle, 1996). This argument is where the theory of metacognition finds challenges to translate effects into educational practice. Because it is the student to make an independent decision to apply the principles taught from the study skills courses, such decision may be negatively or positively influenced by the learning environment, educational strategies of the lecturers, and assessment modalities utilised to measure learning. In consonant with this argument, for a deep learning and study skills intervention to have maximum impact in pharmacy education, it may require to be presented as an essential component of a course or academic programme and application of principles taught therein evident in the programme design. This is potentially where the future of educational interventions such as the OADLSS lies in order for the students to realise significant and sustained benefits for their learning going forward.

Though the evidence of immediate positive change in deep ATL scores after the OADLSS intervention was relatively weak in this study, the educational intervention proposed was appreciated by learners exposed to it. Arguably, the positive rating and appreciation shown by participants may have been either realised by aspects of the OADLSS intervention or due to many other factors beyond the intervention. The participants' rating and feedback (Table 4.9) about the OADLSS intervention was inconsonant with current evidence that suggests that

instructional design based on metacognition and cognitive constructivism theories can influence attainment of meaningful learning, critical thinking, and problem-solving skills among students (Cisneros et al., 2002, Kang et al., 2010, Entwistle, 2013). The result that participants' scores for deep ATL scale did not statistically significantly increase, despite being exposed to the OADLSS intervention, may not necessarily imply they were not metacognitively self-aware and capable of adopting a deep ATL. To the contrary, this somewhat agreed with Fox and colleagues' (2019) recent argument that such a contrasting result finding may reflect that additional time and attention, including appropriate learning methods on the programme overall, should be allocated for explicit application of deep learning skills in pharmacy education to be demonstrated. In the absence of both, it continues to remain rather difficult to demonstrate immediate effects of improved metacognitive processes since much of this self-regulation happens internally (Fox et al., 2019). The researcher also contends that future research can further modify these design aspects of the OADLSS module, in addition to mainstreaming deep learning in the educational environment where pharmacy students learn.

Overall, this study showed that the adjunct OADLSS elective module did statistically significantly reduce strategic ATL scores, the immediate significant influence on adoption of a deep ATL among participants exposed to the intervention was not observed. This was evidenced by results that the mean difference between pre- and post-test scores for the ATL categories were not significantly different except for strategic learning scores that showed a significant decrease among participants exposed to the OADLSS module (Table 4.11). Although the context of the educational intervention tried in this present study may differ from those of other studies earlier reviewed, there exists commonalities in the intention of the intervention (that is, to foster behavioural change in learning approaches), exposure time, and points of evaluation (pre- and post-intervention measure of impact). Similar to Spollen and colleagues (2010) who also showed modest improvements (though not statistically significant

when Bonferroni-corrected) in the observed areas of interest measured 4-weeks post-intervention in a group of Year 2 medical students, the relatively narrow scope of follow-up evaluation (4-weeks) was acknowledged as focussing on short-term changes in variables of interest (Spollen *et al.*, 2010).

Tentative explanations to the low preference of a deep ATL in spite of a targeted educational intervention to enhance this could be provided by results from the qualitative study (phase 2) that brought out a myriad of factors affecting pharmacy students' learning efficacy on the B.Pharm. programme at UNZA. As noted by Novak and colleagues (2006) who found that pharmacy students' learning style changed before and after a problem-based learning intervention at the University of Texas in the USA, students' learning preferences may be modified according to how learning activities are structured, demands that the lecturer places on the learning tasks, and the nature of assignments or assessments administered (Novak *et al.*, 2006). Similarly, from the findings of the quasi-experiment conducted in this study, it was still possible that the way the formal learning activities were structured on the B.Pharm. programme, the educational demands of pharmacy lecturers, the nature of learning tasks, assignments, including assessment regimes administered on the programme may have had a putative influence on the participants' dominant preference for a strategic ATL. There could be various reasons for this observation. Newble and Cannon (2002) earlier argued that though there seems little doubt that good learning and study skills have potential to contribute to improved academic performance, in themselves, they are not a guarantee of success. Equally, possessing learning skills is now seen as having a lifelong relevance and not just limited to good grades attained at an end of year examination (Newble & Cannon, 2002).

In the absence of changing or modifying the learning environment (Walker *et al.*, 2010), the OADLSS module being an adjunct educational intervention showed a marginal efficacy to

modify the approaches to learning and academic performance (Figure 4.11). Hall and colleagues (2004) were able to demonstrate the positive impact of changing the learning environment to promote deep learning in their study conducted in a population of accountancy students. Their study showed that students exhibited a small but statistically significant increase in their deep ATL scores and a small but statistically significant reduction in their surface learning approach scores when the learning environment centred on group-based problem-solving activities (Hall *et al.*, 2004). Similar evidence was also experimentally demonstrated by Guyatte in 2008 in a study of accountancy students.

Other existing evidence also agrees with findings that excessive course workload, the structure of lectures, educators' lack of enthusiasm, and absence of feedback or guidance to students were crucial elements of the learning environment that maintained student's preference towards a particular approach to learning (Sharma, 1997) such that in the absence of that approach they would not cope with the educational demands of the particular learning activity. In future studies, it will be interesting to evaluate the influence of modifying the educational strategies and learning environment from the current predominantly expository teaching and learning methods used by pharmacy educators in Zambia to a more integrated, exploratory and problem-solving methods of teaching and learning on pharmacy students' ATL. This is potentially future work.

When academic performance (as measured by GPA scores attained in the formal assessments conducted in the academic year) were compared between the OADLSS exposed and non-exposed (control) groups respectively, this study did not find a significant difference between the mean GPA scores of the two groups (Figure 4.10). Although it could be argued that exposure to the OADLSS elective module did not immediately influence participants' academic performance, it was very plausible that other contextual factors may explain

academic performance in summative assessments. For instance, Sansgiry and colleagues (2006) found that at the University of Houston in the USA, test competence was an important factor that distinguished pharmacy students with low versus high GPA scores as a measure of academic performance (Sansgiry *et al.*, 2006). Equally, other factors such as test anxiety, assessment types, and time management during assessments can affect academic performance (Sansgiry *et al.*, 2006). In the present phase 3 study, it was also plausible that such factors as described by Sansgiry and colleagues (2006) were present since participants in the two groups shared similar characteristics and the majority were predominantly strategic learners (Table 4.11) irrespective of intervention exposure status. There was also the possibility of them demonstrating similar test competence – a factor which refers to one’s ability to manage the amount of study material for an examination and in preparing for them (Sansgiry *et al.*, 2006).

That mean scores for strategic learning construct were positively correlating with GPA scores agreed with evidence by Sansgiry and colleagues (2006) who also found that strategic studying techniques may help pharmacy students achieve a high GPA (Sansgiry *et al.*, 2006). These findings were consistent with Marton and Saljo’s (1997) theory of achieving as a motivation for students’ learning (Marton and Saljo, 1997). In the present study, student’s age was also a predictor of academic performance. With increasing age, the probability of predicting a higher GPA score reduced whether a student was exposed to the OADLSS module or not (Figure 4.11).

On whether a student’s ATL could predict academic performance, the study findings showed that adopting a deep ATL was predicting a lower probability of attaining a higher GPA in assessments. Predictive margins of the intervention indicated that whether a student was exposed to OADLSS module or not, with increasing deep learning scores, the probability of predicting a higher GPA score reduced. In contrast, as the strategic learning score increased,

the probability of predicting a higher GPA increased (Figure 4.11). This finding was consistent with Entwistle's (2000) earlier argument that where the assessment regimes do not emphasize and reward personal understanding of concepts, surface or strategic learning approaches may well dominate and prove adaptive (Entwistle, 2000).

It should be re-emphasised here that the OADLSS elective module, as an adjunct educational intervention, was neither intended to increase test competence nor moderate academic performance in assessments but rather intended to promote a deep approach to learning and studying via a metacognitive educational strategy. The OADLSS served to enable students consider adopting and utilising a deep ATL that is evidenced to be associated with meaningful learning outcomes. In the health sciences, a deep approach to learning has been shown to produce higher quality learning outcomes (Mattick *et al.*, 2004). A reinforced argument by Biggs (2012) and recently by Varunki and colleagues (2017) suggests that some students might always apply a certain ATL regardless of the learning environment (Biggs, 2012, Varunki *et al.*, 2017). Even in the present study, strategic ATL remained dominant among the participants despite the OADLSS intervention. Whether this approach was an inherently existing tendency among students or could be modified and transitioned to a deep approach through deliberate changes to the educational strategies and the learning environment was subject to further elucidation.

Taken together, the results of the quasi-experiment (Phase 3) suggested that despite the desire and appreciation for deep learning among participants exposed to the OADLSS intervention, some of the elucidated factors in the current educational environment that were affecting learning efficacy, as revealed by the qualitative findings (Phase 2), did not seem to be promoting and supporting the sustained adoption of deep learning on the B.Pharm. programme at UNZA. The continued dominance of a strategic ATL among the majority of

pharmacy students at UNZA reflected the nature and strong influence the learning orientation and inadvertent response to aspects such as high course load, instructional methods, and the focus of assessment methods towards rewarding recall of information and achievement of grades sufficient to merely pass the examination as a criterion for progression on the programme. Clearly, educators of pharmacy students may need to consider shifting paradigms of their educational strategies currently being used to deliver pharmacy education from achievement-focus to more application directed (deep learning) approach. Given that the principal mission statement and purpose of the B.Pharm. degree programme at UNZA was “to produce pharmacists with the requisite pharmaceutical knowledge, skills, and professionalism to address the contemporary and future pharmaceutical care needs of patients”, the finding that a strategic approach to learning predominates was somewhat in conflict with this mission and a cause for action by educators.

5.5. Contributions of the study

5.5.1. Contribution to scientific knowledge

This study confirmed existing theory that students’ ATL can be contextually and reliably ascertained using validated tools such as the Approaches and Study Skills Inventory for Students (ASSIST) inventory. Internal consistency of the ATL construct scales and subscales of the ASSIST tool, as demonstrated in this study, further informed this contribution. Furthermore, this study demonstrated that educational strategies of the curriculum, including aspects such as course load and extent of content coverage, fast-paced teaching, time constraints to meet the notional hours demanded to learn the material taught, and the assessment modalities employed, when not carefully considered largely influenced a strategic ATL among students. Evidence from this study promulgates a dogma that metacognitive practices aimed at promoting a deep ATL may well prove inefficacious when used as quick-

fix measures, especially where surface or strategic learning was already inherent and propagated by factors existing in the learning environment. To maximise educational benefit, interventions such as the OADLSS module must be meticulously designed and deliberately enshrined in the programme's educational strategies and curriculum from the onset.

5.5.2. Contribution to educational practice

The contributions of this study to contemporary and future educational practice were on three fronts. Firstly, from the evidence generated by this study, it was evident that some students continued to adopt and utilise learning approaches and studying strategies which were inappropriate for their future practice as health professionals. It is therefore important for educators to identify such students early during their time course of learning as they may need support with specific learning and study skill counselling or interventions. As earlier noted by Newble and Cannon (2002), many of such students may end up becoming persistent poor performers on the study programme. It can be very rewarding for both educators and students to realise that specific remedies, for instance the OADLSS or other similar educational interventions, can be made available to bridge the learning gap.

Secondly, by way of innovation; this study has locally designed, developed and piloted the OADLSS elective module as a targeted educational intervention towards enhancing behavioural change towards a deep ATL using metacognitive approaches. The study skills module developed in this study can be further improved upon and contextualised for different educational needs and settings where appropriate. The OADLSS module exposed students to the principles and features of deep learning and studying strategies applicable to the context of individual student needs. An opportunity exists to further refine and improve the design, content, and instructional methodologies of the OADLSS elective module for possible future utilisation to improve student learning. This is potentially future work. Furthermore, in line

with the health professions education transformational agenda of the 21st century to shift paradigms from focus on educational processes to outcomes (Norcini & Banda, 2011), locally developed and evidence-based interventions are required to address learning gaps so as to enable students undertaking health professions training programmes to attain meaningful learning outcomes that impact on the quality of health care practice they will go on to provide when they graduate. Therefore, the development of the OADLSS module as a targeted educational intervention aimed at enhancing a deep ATL in pharmacy education is posited as one such contribution to the transformational agenda.

Thirdly, results of this study may find use in future initiatives towards remodelling pharmacy education in Zambia. As described by Guile and Ahamed (2011), subjects such as pharmacy, have always faced a dual-conundrum. Often in curriculum development and review of pharmacy programmes, decisions have to be made about the scientific content of the training curriculum and how to teach it in such a way that learners attain meaningful learning outcomes that translate into pharmaceutical care practice contexts; and, the forms of organisational knowledge and skill that pharmacists require to operate effectively in these contexts. Importantly is how to support pharmacy students to develop and utilise the knowledge and skills they acquire during training (Guile and Ahamed, 2011).

The philosophical argument and controlled idea in this thesis rests on the following two established cornerstone evidence produced by this study: firstly, that students' approaches to learning can be modifiable attributes potentially influenced largely by the educational strategies of the curriculum (such as course load) and educators teaching style, the learning environment, and the assessment practices they are exposed to. Secondly, in HPE programmes like pharmacy, learning experiences offered and the dynamic environment within which such learning is expected to take place must mainstream a more constructivist instructional design towards ensuring students construct their critical thinking and problem-solving abilities to

attain meaningful learning outcomes. As posited by Isleta-Palatino (2014), *“Mastery of a profession’s core disciplines and ethos should therefore be inevitably done through exposures to an array of meaningful learning experiences and activities under the niche of that dichotomy, together with the concept of embedded notional hours to effectively invest in achieving meaningful learning outcomes in a universal sense and standard”* (Isleta-Palatino, 2014). Though not immediately demonstrated due to the adjunct nature of the OADLSS intervention used in this study, this thesis argues that the process of transitioning students towards a deep approach to learning must be intentional from the onset and not a remedial one. This is because such a process is somewhat encroached by the existing dichotomy of educational strategies employed and academic learning behaviours the learners are taken through from the time they enrol on the programme of study to their graduation.

Derived from the outcomes of this study, the researcher proposes a quadratic framework for transitioning pharmacy students towards a deep approach to learning in the context of pharmacy education in Zambia. A framework (Figure 5.1) dubbed *‘Pharmacy Education Quality Improvement (PharmEd-QI) framework’* promulgates an evidence-driven ‘end in mind’ approach - that of producing pharmacists who are deep learners, critical thinkers, problem-solvers, and innovative healthcare practitioners. The framework operationalises four key aspects identified from findings of this study as components informing paradigms required to shift local pharmaceutical training from promoting rote learning to meaningful learning outcomes. The four components of the framework are as follows: (i) the contextual (locally determined and outcomes-driven) **deep learning needs** of students on the programme; (ii) a **clear road map** to attain deep learning outcomes required in the context of need (i.e. educational objectives and strategies of the curriculum, the pedagogical process of education, methods, plans and teaching styles); (iii) a suitable **educational environment** required promotes deep learning to meet the competency requirements (i.e. teaching and learning areas,

learner support, exposures, materials and infrastructure); (iv) **Evaluation of deep learning** outcomes (i.e. professional competence, assessment planning and practice).

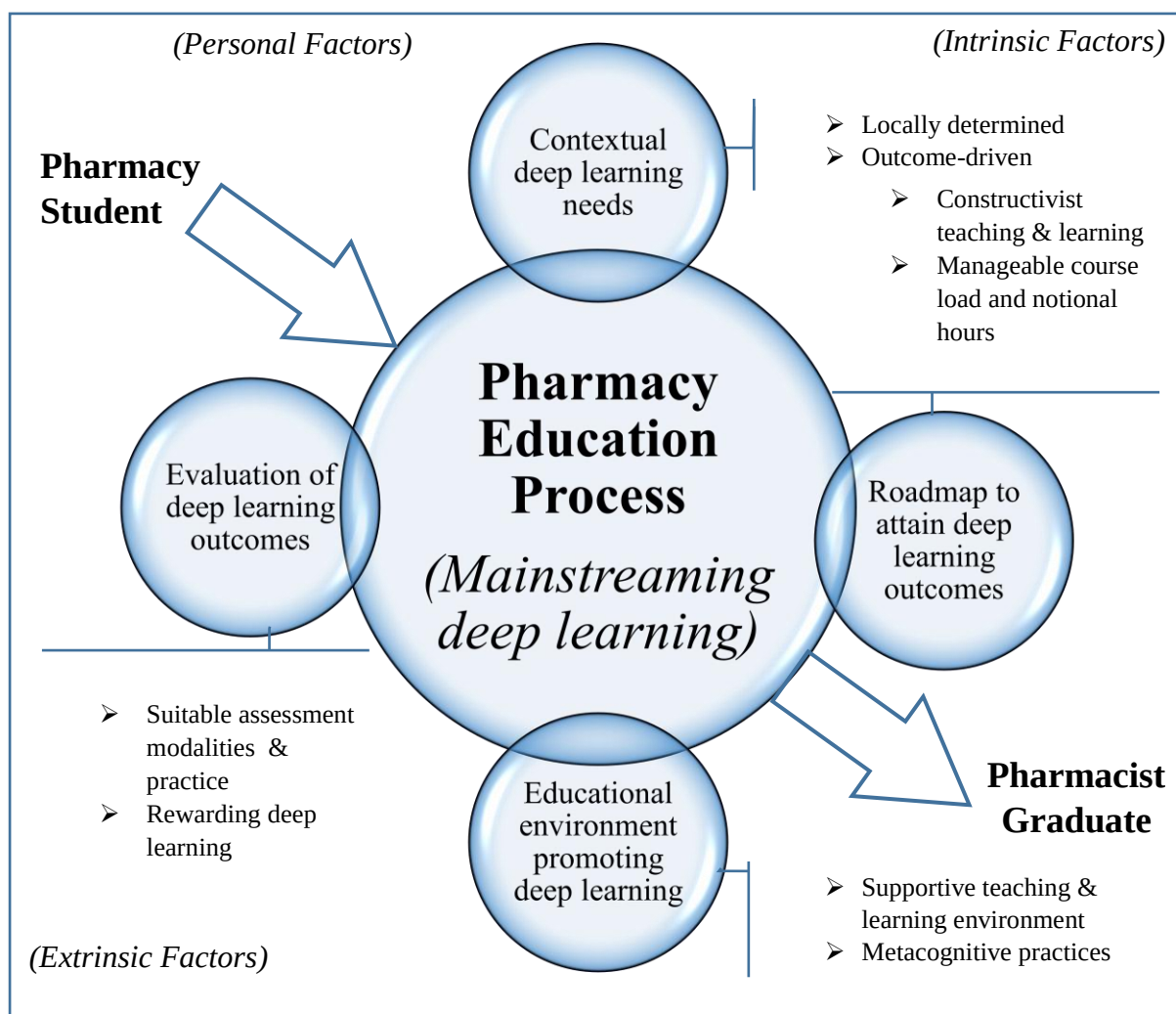


Figure 5.1. Pharmacy Education Quality Improvement (PharmEd-QI) framework

To drive the paradigm shift, extrinsic factors (i.e. workforce needs, educational system, socioeconomic environment, educational policy and contemporary professional practice demands); intrinsic factors (i.e. faculty orientation, programme vision, curriculum design, educational leadership, including learning evaluation systems), and personal factors (i.e. students' motive, academic stress management, self-efficacy for deep learning, etc.) should interplay to largely influence the success of this cyclical framework.

The proposed '*PharmEd-QI*' framework was compatible with the findings of this study and premised to influence the remodelling of pharmacy education towards more student-centred learning approaches that allow learners to have opportunities to relate ideas, use evidence, develop and utilise critical thinking, problem-solving and life-long learning skills. As the relevant stakeholders involved in pharmacy education in Zambia consider remodelling the training of pharmacists locally, the proposed framework can find use in this process. Without a vision-driven education model, benefits and gains of mainstreaming deep learning in pharmacy education translating into improved pharmaceutical care and the health system performance in general are ultimately threatened if both the education policy-makers, educators, and the learners (students) are not driving these mechanisms to feed-forward the learning outcomes into improved pharmaceutical care practice in the country.

5.6. Implications and impact on pharmacy education

Pharmacists, as healthcare professionals, are expected to demonstrate competence, detailed understanding and application of pharmaceutical knowledge, skills and professionalism in their practice (International Pharmaceutical Federation, 2014). Pharmacy education, its teaching processes and educational strategies, including assessment methods, should, therefore, strive to promote deep learning and encourage understanding of material content by students (Ofstad and Brunner, 2013, Kuit and Fildes, 2014, Tsingos *et al.*, 2015b). Whereas a strategic approach to learning may seem advantageous to the student in the short term, it encourages rote learning outcomes (characterised by poor transfer and poor application of knowledge and skill in professional practice settings) in the long term. Results from this study suggest that opportunity exists for educational interventions that can bring about positive changes in pharmacy students' learning approaches through curriculum change (Walker *et al.*, 2010) and improving the learning environment (Ezeala, 2016, Gruppen *et al.*, 2018). Existing evidence has shown that it is possible to bring about small but significant positive changes to

students' learning behaviour even in very large class sizes through curriculum change that mainstreams evidence-based educational strategies that promote deep learning among students (Walker *et al.*, 2010).

There are far-reaching benefits for utilising innovative educational strategies that promote deep learning. Entwistle and colleagues (2013) explained that students that utilise a deep approach to learning adopt holistic thinking. That is, they start with an intention to understand for themselves, intellectually engage with the learning task, and monitor the effectiveness of the learning as it progresses, linking new ideas to what they already know, and looking for recurring patterns and underlying principles (Entwistle *et al.*, 2013b). A deep learning approach also enables them to adopt critical and serialist thinking (Entwistle *et al.*, 2013b). In other words, students develop abilities to check the evidence and relate it to the conclusions reached, and adopt a generally cautious, critical stance to what they are learning. Alternating between holist and serialist processes of thinking builds up personal understanding (Entwistle *et al.*, 2013b).

As evidenced by this study, a predominantly strategic approach to learning among the majority of undergraduate pharmacy students may reflect issues associated with the high course load in the curriculum, educational strategies and assessment methods employed in the training of pharmacists in Zambia. For instance, the majority of the academic courses on the current BPharm curriculum at UNZA utilise educational strategies that place considerable emphasis on the extent of content coverage (syllabus boundness) delivered through predominantly expository lecture methods of teaching (Kalungia *et al.*, 2019), including assessment regimes that largely favour students' reproducing knowledge considered sufficient to pass the course. In as much as lectures may be the most popular and traditional pedagogical method and means of transmitting information (expository learning) in higher education today, the method is not as effective for promoting critical thinking, inspiring interest in the subject and teaching

behavioural skills (Bligh, 2002). Similarly, Entwistle (2000) also earlier argued that where the assessment regimes do not emphasize and reward personal understanding of concepts, surface strategic learning approaches may well dominate and prove adaptive (Entwistle, 2000). Evidence has also demonstrated that types of assessments such as selected response multiple-choice questions (MCQ) and short-answer recall questions tend to promote surface and strategic learning (Byrne *et al.*, 2002).

From the constructivist theory of learning (Hein, 1991), a broader set of indicators of students' learning approach and teaching preference are provided by the quality of teaching and the learning environment. This brings to the fore the styles of teaching, the role of the educator and academic quality in influencing students' approaches to learning. Trigwell, and colleagues (1999) showed evidence that higher levels of deep learning were demonstrated by students taught by lecturers who adopted a student-centred, conceptual development approach to teaching, while surface learning approaches were more common when lecturers adopted more teacher-centred and information transmission approach to teaching (Trigwell *et al.*, 1999). Other evidence further suggests deep learning is encouraged by among other things; clear goals and anticipated outcomes of the learning tasks, teaching and assessment methods that foster active and long-term engagement with learning tasks; teaching that stimulates and focuses on the meaning and relevance of the subject matter; and opportunities to exercise responsible choice in the method and content of study (Walker *et al.*, 2010). Therefore, in order to promote and enhance deep learning among pharmacy students, pharmacy education programmes should consider mainstreaming educational strategies that encourage and support students' understanding of material taught, provide appropriate and manageable course workload, well-organised and clear instruction of class activities, appropriate assessment methods, including opportunities for students to engage published literature, and allowing

student-centred interactive learning (Phanudulkitti *et al.*, 2018). Impacts of these, when implemented, can be explored by future studies.

For HPE programmes like pharmacy that require the acquisition of pharmaceutical knowledge and skills including other complex technologies existing the pharmaceutical sector, competence requirements of pharmacists go beyond memorising concepts but more about the application of knowledge and skill, critical thinking and problem solving – all attributes of deep learning. Mattick and colleagues (2004) demonstrated empirical evidence that a deep ATL was associated with higher quality educational outcomes and practice in the health sciences (Mattick *et al.*, 2004). Based on the evidence from this study, the researcher argues that educational interventions such as learning skills courses aimed at promoting cognitive and affective domains for deep learning can do well to be mainstreamed as curriculum components and complemented by educational strategies that promote deep learning. Going forward, it will be prudent that instructional methods and curriculum design in pharmaceutical education must change towards meeting the contemporary and future competence requirements of pharmacy practitioners needed for the health sector.

In order for Zambia's pharmacy education processes and curricula to transition students from being largely strategic learners to active deep learners, a paradigm shift from focussing merely on teaching and transmitting information (as the input) to ensuring students attain meaningful learning (as the outcome) is necessary. This calls for, among other things, restructuring pharmacist's training curriculum to enable it to adopt and support student-oriented deep learning of pharmaceutical sciences. As opposed to predominantly using expository lecture methods of teaching, other ways of teaching such as problem-based learning (PBL), use of collaborative and peer instruction methods, conceptual change strategies, experiential and technology-enhanced learning within a largely constructivist educational philosophy (Michael and Modell, 2003) can be introduced in subsequent curricula. This will also necessitate

instituting changes to the learning environment and teaching styles, including the roles and skills of educators from just being instructor- and content-focussed teachers to learner-focussed facilitators of deep learning (Michael, 2006).

The thrust of this study, as evidenced by its findings, attempted to provide evidence to inform decision-making at two main levels. Firstly, decision-making by the students, as primary recipients of educational information, to explore opportunities available to them within the current or future educational environments, to attain meaningful learning outcomes by adopting a deep learning approach to their pharmacy training. Secondly, decision-making by educational policymakers and the educators involved in delivering pharmacy education at the university to ensure that pharmacists' training in Zambia becomes oriented to the learning needs that meet the local and global contemporary quality healthcare practice standards of the 21st century and beyond. Findings of this study could have potential impact to influence the university's adoption of much more blended or constructivist approaches to pharmacy education programme design and educational strategies which potentially should go on to improve the quality of learning outcomes among current and future pharmacy students. Ultimately, this may impact positively on future pharmaceutical care practice by having competent pharmacists who are critical thinkers, problem-solvers, and innovators of quality health care products and services.

CHAPTER 6 : CONCLUSIONS AND RECOMMENDATIONS

6.1. Review of the study

This study investigated the approaches to learning, factors affecting learning efficacy, and the influence of raising metacognitive awareness of deep learning in a population of undergraduate pharmacy students at a public university in Zambia. This overarching research question was further unpacked to be addressed within a pragmatist ontology and epistemology operationalised through the following three specific and focussed objectives: First, to explore the predominant approach to learning and teaching style preferred among undergraduate pharmacy students. Second, to explore contextual factors affecting learning efficacy among pharmacy students on the B.Pharm. programme at UNZA, and lastly, to assess whether raising metacognitive awareness of deep learning and studying through a structured educational intervention can influence ATL and academic performance. The overall purpose was to provide tentative solutions to address the problem of high attrition rates due to poor academic performance and the quality of learning outcomes among pharmacy students at the university. A sequential multi-method design was employed in a three-phased approach. The preceding chapters of this thesis have brought out the key findings, their interpretations, implications and contributions.

6.2. Conclusions addressing the specific research questions

Question 1: What is the predominant approach to learning among undergraduate pharmacy students at UNZA?

Factual Conclusion: A strategic approach to learning was predominant among the majority (67%, n = 147) of undergraduate pharmacy students surveyed in 2017 to 2018 academic year at UNZA. Only as few as 25% of the pharmacy students adopted a deep ATL. This

predominance of a strategic ATL implied that students focussed and paid attention to assessment demands, achieving high grades, and organised studying to only those aspects they were likely to be examined on. High course load in the preclinical stage of pharmacy training was significantly associated with a strategic ATL. Male student had a higher likelihood of adopting strategic learning than female students. Effects of such an approach to learning on pharmacy students' educational outcomes will be important to monitor and evaluate in future.

Question 2: Which teaching style was predominantly preferred by undergraduate pharmacy students at UNZA?

Factual Conclusion: The majority (67%) of undergraduate pharmacy students surveyed at UNZA predominantly preferred teaching styles that involved lecturers transmitting information. Evidence showed that this style of teaching was associated with promoting surface or strategic approach to learning. Correspondingly, it was a cause of concern that less than 25% of the pharmacy students preferred teaching styles that encouraged and supported understanding of material learnt.

Conceptual Conclusion: A conceptual conclusion emerging from the two convincing findings above reflects the latent and manifest functions within which facilitation of learning and learners' intention converge. Predominance of a strategic ATL may be a latent attribute made manifest by teaching styles among other variables in the learning environment. If a deep ATL is the desired state for pharmacy education programmes, the needs to mainstream, support learners' intentions, and advocate teaching styles that promote a deep approach to learning was therefore evident. Relevant educational strategies that promote and sustain meaningful deep learning among pharmacy students were therefore required at UNZA.

Study Question 3: What factors impact the learning efficacy of undergraduate pharmacy students at UNZA?

Factual Conclusion: Four major factors impacted learning efficacy of undergraduate pharmacy students at UNZA. These were: student-related, educational programme-related, the learning environment, and assessment-related factors, respectively. Among the student-related factors; managing notional time was a substantial challenge most pharmacy students encountered to cope with the academic workload. The bulkiness of the academic courses and high course load on the curriculum were driving students to adopt a predominantly strategic learning approach for purposes of ‘surviving’ and achieving grades sufficient to ‘pass’ and progress on the respective courses they were taking on the study programme. Similarly, fast-paced teaching delivery emerged as a significant challenge for most students. In the learning environment, inadequate educational facilities and large class sizes affected the quality of learning. Summative assessment practice on the programme was also highlighted to be an aspect that the faculty needs to address in order for the process to drive student learning in the appropriate direction and to effectively measure meaningful learning outcomes.

Conceptual conclusion: Not all students perform poor academically due to lack of capacity to do well. Problem of poor academic performance driving high attrition rates could potentially be influenced by a myriad of putative factors, among them students’ ATL, lack of motivation, adaptation, and inability to deal with educational demands of a training programme. These include increased demands on personal investment of notional time required to comprehensively understand taught material and effort to attain the requisite expected level of competence expected. In the absence of interventions to deal with these factors, it was possible that attrition rates, including relatively poor academic outcomes, may further manifest among learners at the university.

Study Question 4: Does raising metacognitive awareness of deep learning and studying strategies using a structured educational intervention (a 5-day adjunct elective module dubbed ‘Orientation and Approaches to Deep Learning and Study Skills’) influence changes to the approaches to learning and academic outcomes of pharmacy students?

Factual Conclusion: Despite the 5-day ‘OADLSS’ elective module being positively rated and found beneficial, relevant, and useful by the participants exposed to the intervention, this was not accompanied by statistically significant increase in their deep ATL scores. However, there was a statistically significant decrease in their strategic ATL scores among participants exposed to the OADLSS versus those not exposed. In this study, a metacognitive educational intervention did not significantly influence immediate changes to adopting a deep approach to learning as anticipated. Based on the strength of this evidence, the null hypothesis of there being no difference in ATL after the intervention was not rejected.

Conceptual Conclusion: From the evidence established to address the specific question posed above, it emerged that specific attributes of approaches to learning, once proven adaptive, are resilient even when subjected to adjunct metacognitive interventions aimed at behaviour modification. Arguably, the influence of educational interventions such as the OADLSS elective module could be further enhanced by remodelling of the educational environment, teaching and learning methods, and assessment modalities to mainstream deep ATL on the programme. In the absence of this, strategic learning focussed on achieving remained adaptive and the predominant approach pharmacy students at UNZA take to learning.

6.3. Recommendations

Based on findings emanating from this study, the following recommendations were made:

1. Educators of health professionals to consider utilising, in their teaching practice, validated tools such as the ASSIST inventory to diagnose and ascertain the ATL prevalent among their students in order to select and tailor appropriate instructional methods to achieve meaningful learning outcomes. This study has demonstrated that the ASSIST inventory was adaptable to the local setting and reliable to detect the ATL of undergraduate pharmacy students in the local context.
2. Curriculum developers of not only pharmacy education but all HPE programmes in general, to consider a paradigm shift towards more constructivist than just behaviourist approaches to facilitating learning. A good blend of constructivist approaches to facilitating learning has been shown to promote meaningful learning outcomes in HPE. This shift will enable learners to develop the ability to relate ideas, use evidence, learn for understanding and apply critical thinking, problem-solving and life-long learning – all attributes of deep learning. The benefits of students adopting a deep approach to learning are enormous, firstly to the outcomes of their learning in the short term, and to the healthcare of patients they will go on to serve in the long term. The contemporary and future practise demands of health professionals in the 21st century will require training curricula that are responsive and adaptive to the health sectors' quest for innovation and development of evidence-based practice.
3. Educational policymakers, managers of educational programmes and university faculty, in general, to consider implementing appropriate interventions to address the contextual factors, as identified in this study, which negatively affects the learning efficacy of students at the university. Further research is also recommended to gather university-wide and nation-wide diagnosis of contextual factors that require to be addressed in both

undergraduate and postgraduate training of health professionals. It will be interesting to determine whether issues to do with the educational programme-related factors, the learning environment, and the practice of assessments may either be cross-cutting features or context-specific in Zambia's HPE sector. These require prompt decision-making to address through improved policy and practice accordingly. As more new training programmes and institutions come on board to train health professionals for the country, the benefits of improved educational policy and practice informed by research evidence will be shared. The pursuit of excellence in providing quality education should be the primary goal of every university (Ruben, 2018) and UNZA that prides itself to be a leading university in Zambia should not be an exception. It is therefore prudent that educational policy-makers give due consideration to feedback the students (as the clients the university serves) provide about their learning.

4. Another recommendation emanating from findings of this study supports the role that educators can play to diagnose problems inherent in their educational environment and develop appropriate strategies that support students to learn how to learn better so as to improve their educational outcomes. Though not quick fix solutions and often difficult to register immediate marked positive impact on students' learning as demonstrated in this study, learning and study skills courses that employ instructional designs such as online models, concept mapping tools, and alignment of interventions to assessment, have been experimentally demonstrated to positively effect changes in students' approaches to deep learning (Guyatte, 2008). Whether such learning skills courses should be integrated into curricula or offered as electives remains a decision for programme developers who may envisage benefit of their use or may have student populations in need of such interventions. Evidence does show that helping students organise their studying using effective study skills tends to achieve better learning outcomes (Tait *et*

al., 1998). Metacognitive practices by educators aimed at transitioning students from a surface-strategic approach towards a deeper learning approach should be a deliberate educational strategy that is well organised and an ongoing process (Stover and Seemiller, 2017) throughout the education process of training health professionals.

5. Additional research is also needed on the components not adequately addressed by this study. Future research is warranted because educators need to understand how to design learning exposures and environments in which students can collectively and individually learn better, understand well, relate ideas and apply information learnt in their professional practice in future (Guyatte, 2008).

6.4. Recommendations for future research

Further research is warranted to confirm approaches to learning among other student populations within UNZA and other higher learning institutions elsewhere. Undoubtedly, an opportunity exists to further develop and refine the OADLSS module or other similar educational interventions, or indeed compare effects to other similar interventions in future studies. Furthermore, research is needed to explore linkages between factors affecting learning efficacy of the perspectives of the entire student population, the faculty, and other stakeholders involved in HPE.

6.5. Application of results in health professions education

This study was informed by an identified problem of high attrition rates due to poor academic performance on an undergraduate pharmacy programme at a public university in Zambia. The conceptual framework designed finds useful application to utilise validated methods to evaluate students' ATL and systematically address the learning gaps. The contributions of this study and evidence generated from this thesis can not only inform decision-making by educators and internal stakeholders, but also guide future research to drive

quality improvement of learning and how it is facilitated on HPE programmes. Acting upon the recommendations from this study can go a long way towards repositioning pharmacy education to a competitive advantage at not only UNZA but other settings where similar challenges may exist.

“Health training institutions should always strive for the most effective approaches to facilitating students’ learning of requisite knowledge, skills and attitudes required for practice as health professionals” - Kyriakoulis et al., 2016.

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APPENDICES

Appendix 1: Data Collection Tools

A)

ASSIST[®]

Approaches and Study Skills Inventory for Students

This questionnaire has been designed to allow you to describe, in a systematic way, how you go about learning and studying. The technique involves asking you a substantial number of questions that overlap to some extent to provide good overall coverage of different ways of studying. Most of the items are based on comments made by other students. Please respond truthfully, so that your answers accurately describe your **actual** ways of studying, and work your way through the questionnaire quite **quickly**, making sure that you give a response to **every item**.

Background information:

Student I.D Number:

Age: years

Sex: M / F

Year of Study:

Entry Mode: Regular / Parallel

Department/School: Previous Study Programme (e.g. NS, Dip.Pharm, etc)

Interview Date:

A. What is learning?

When you think about the term 'LEARNING', what does it mean to you?

*Consider each of these statements carefully, and rate them in terms of how close they are to **your own** way of thinking about it.*

	Very close different	Quite close	Not so close	Rather different	Very
a. Making sure you remember things well.	5	4	3	2	1
b. Developing as a person.	5	4	3	2	1
c. Building up knowledge by acquiring facts and information.	5	4	3	2	1
d. Being able to use the information you've acquired.	5	4	3	2	1
e. Understanding new material for yourself.	5	4	3	2	1
f. Seeing things in a different and more meaningful way.	5	4	3	2	1

PLEASE TURN OVER

B. Approaches to studying

The next part of this questionnaire asks you to indicate your relative agreement or disagreement with comments about studying made by other students. Work through the comments, giving your **immediate** response. In deciding your answers, think in terms of **this specific course unit or module**, unless told to do otherwise. Again, it is very important that you answer **all** the questions: when you've finished, please check you have done that.

5 means agree (✓) 4 = agree somewhat (✓?) 2 = disagree somewhat (x?) 1 = disagree (x).

Try not to use 3 = unsure (??), unless you really have to, or if it cannot apply to you or your course.

	✓	✓?	??	x?	x
1. I manage to find conditions for studying which allow me to get on with my work easily.	5	4	3	2	1
2. When working on an assignment, I'm keeping in mind how best to impress the marker.	5	4	3	2	1
3. Often I find myself wondering whether the work I am doing here is really worthwhile.	5	4	3	2	1
4. I usually set out to understand for myself the meaning of what we have to learn.	5	4	3	2	1
5. I organise my study time carefully to make the best use of it.	5	4	3	2	1
6. I find I have to concentrate on just memorising a good deal of what I have to learn.	5	4	3	2	1
7. I go over the work I've done carefully to check the reasoning and that it makes sense.	5	4	3	2	1
8. Often I feel I'm drowning in the sheer amount of material we're having to cope with.	5	4	3	2	1
9. I look at the evidence carefully and try to reach my own conclusion about what I'm studying.	5	4	3	2	1
10. It's important for me to feel that I'm doing as well as I really can on the courses here.	5	4	3	2	1

11. I try to relate ideas I come across to those in other topics or other courses whenever possible.	5	4	3	2	1
12. I tend to read very little beyond what is actually required to pass.	5	4	3	2	1
13. Regularly I find myself thinking about ideas from lectures when I'm doing other things.	5	4	3	2	1
14. I think I'm quite systematic and organised when it comes to revising for exams.	5	4	3	2	1
15. I look carefully at tutors' comments on course work to see how to get higher marks next time.	5	4	3	2	1
16. There's not much of the work here that I find interesting or relevant.	5	4	3	2	1
17. When I read an article or book, I try to find out for myself exactly what the author means.	5	4	3	2	1
18. I'm pretty good at getting down to work whenever I need to.	5	4	3	2	1
19. Much of what I'm studying makes little sense: it's like unrelated bits and pieces.	5	4	3	2	1
20. I think about what I want to get out of this course to keep my studying well focused.	5	4	3	2	1

21. When I'm working on a new topic, I try to see in my own mind how all the ideas fit together.	5	4	3	2	1
22. I often worry about whether I'll ever be able to cope with the work properly.	5	4	3	2	1
23. Often I find myself questioning things I hear in lectures or read in books.	5	4	3	2	1

24. I feel that I'm getting on well, and this helps me put more effort into the work.	5	4	3	2	1
25. I concentrate on learning just those bits of information I have to know to pass.	5	4	3	2	1
26. I find that studying academic topics can be quite exciting at times.	5	4	3	2	1
27. I'm good at following up some of the reading suggested by lecturers or tutors.	5	4	3	2	1
28. I keep in mind who is going to mark an assignment and what they're likely to be looking for.	5	4	3	2	1
29. When I look back, I sometimes wonder why I ever decided to come here.	5	4	3	2	1
30. When I am reading, I stop from time to time to reflect on what I am trying to learn from it.	5	4	3	2	1

	√	√?	??	x?	x
31. I work steadily through the term or semester, rather than leave it all until the last minute.	5	4	3	2	1
32. I'm not really sure what's important in lectures so I try to get down all I can.	5	4	3	2	1
33. Ideas in course books or articles often set me off on long chains of thought of my own.	5	4	3	2	1
34. Before starting work on an assignment or exam question, I think first how best to tackle it.	5	4	3	2	1
35. I often seem to panic if I get behind with my work.	5	4	3	2	1
36. When I read, I examine the details carefully to see how they fit in with what's being said.	5	4	3	2	1
37. I put a lot of effort into studying because I'm determined to do well.	5	4	3	2	1
38. I gear my studying closely to just what seems to be required for assignments and exams.	5	4	3	2	1
39. Some of the ideas I come across on the course I find really gripping.	5	4	3	2	1
40. I usually plan out my week's work in advance, either on paper or in my head.	5	4	3	2	1

41. I keep an eye open for what lecturers seem to think is important and concentrate on that.	5	4	3	2	1
42. I'm not really interested in this course, but I have to take it for other reasons.	5	4	3	2	1
43. Before tackling a problem or assignment, I first try to work out what lies behind it.	5	4	3	2	1
44. I generally make good use of my time during the day.	5	4	3	2	1
45. I often have trouble in making sense of the things I have to remember.	5	4	3	2	1
46. I like to play around with ideas of my own even if they don't get me very far.	5	4	3	2	1
47. When I finish a piece of work, I check it through to see if it really meets the requirements.	5	4	3	2	1
48. Often I lie awake worrying about work I think I won't be able to do.	5	4	3	2	1
49. It's important for me to be able to follow the argument, or to see the reason behind things.	5	4	3	2	1
50. I don't find it at all difficult to motivate myself.	5	4	3	2	1
51. I like to be told precisely what to do in essays or other assignments.	5	4	3	2	1
52. I sometimes get 'hooked' on academic topics and feel I would like to keep on studying them.	5	4	3	2	1

C. Preferences for different types of course and teaching

5 means definitely like (√) 4 = like to some extent (√?) 2 = dislike to some extent (x?) 1 = definitely dislike (x).
 Try not to use 3 = unsure (??), unless you really have to, or if it cannot apply to you or your course.

	√	√?	??	x?	x
a. lecturers who tell us exactly what to put down in our notes.	5	4	3	2	1
b. lecturers who encourage us to think for ourselves and show us how they themselves think	5	4	3	2	1
c. exams which allow me to show that I've thought about the course material for myself.	5	4	3	2	1
d. exams or tests which need only the material provided in our lecture notes.	5	4	3	2	1
e. courses in which it's made very clear just which books we have to read.	5	4	3	2	1
f. courses where we're encouraged to read around the subject a lot for ourselves.	5	4	3	2	1
g. books which challenge you and provide explanations which go beyond the lectures.	5	4	3	2	1
h. books which give you definite facts and information which can easily be learned.	5	4	3	2	1

Finally, how well do you think you have been doing in your assessed work overall, so far?

Please rate yourself **objectively** on this nine-point scale, based on the grades you have actually been obtaining

Very well		Quite Well		About average		Not so well		Rather	
badly									
9	8	7	6	5	4	3	2	1	

Thank you very much for spending time completing this questionnaire: it is much appreciated.

B)

Approaches and Study Skills Inventory for Students

ASSIST[©] (Short Version)

This questionnaire has been designed to allow you to describe, in a systematic way, how you go about learning and studying on the Pharmacy programme. The technique involves asking you a substantial number of questions that overlap to some extent to provide good overall coverage of different ways of studying. Most of the items are based on comments made by other students. Please respond truthfully, so that your answers accurately describe your **actual** ways of studying, and work your way through the questionnaire quite **quickly**, making sure that you give a response to **every item**.

BACKGROUND INFORMATION:

Date:

Student Number:

Age: years old Sex: M F

Year of Study: Entry Mode: Regular Parallel Study Programme:

Previous Study/Programme (e.g. NS, Diploma, A-level, Degree, etc):

A. APPROACHES TO LEARNING & STUDYING

This next part of the questionnaire asks you to indicate your relative agreement or disagreement with comments about studying made by other students. Work through the comments, giving your **immediate** response. In deciding your answers, think in terms of **this specific study programme (Pharmacy) or courses in the programme (Pharmacy)**. Again, it is very important that you answer all the questions: when you've finished, please check you have done that.

Tick the most appropriate box that best describes your approach

*Try not to use **Unsure (??)**, unless you really have to, or if it cannot apply to you or your course.*

	<i>Strongly Agree</i>	<i>Somewhat Agree</i>	<i>Unsure</i>	<i>Somewhat Disagree</i>	<i>Strongly Disagree</i>
1. I often have trouble making sense of the things I have to remember.					
2. When I'm reading an article or book, I try to find out for myself exactly what the information means.					
3. I organise my study time carefully to make the best use of it.					

4. There's not much of the work here that I find interesting or relevant.					
5. I work steadily through the term or semester, rather than leave it all until the last minute.					
6. Before tackling a problem or assignment, I first try to work out what lies behind it.					
7. I'm pretty good at getting down to work whenever I need to.					
8. Much of what I'm studying makes little sense: it's like unrelated bits and pieces.					
9. I put a lot of effort into studying because I'm determined to do well.					
10. When I'm working on a new topic, I try to see in my own mind how all the ideas fit together.					
11. I don't find it at all difficult to motivate myself.					
12. Often, I find myself questioning things I hear in lectures or read in books.					
13. I think I'm quite systematic and organised when it comes to revising for exams.					
14. Often, I feel I'm drowning in the sheer amount of material we're having to cope with.					
15. Ideas in course books or articles often set me off on long chains of thought of my own.					
16. I'm not really sure what's important in lectures, so I try to get down all I can.					
17. When I read, I examine the details carefully to see how they fit in with what's being said.					
18. I often worry about whether I'll ever be able to cope with the work properly.					

Thank you very much for spending time completing this questionnaire: it is much appreciated.

C)

FOCUS GROUP DISCUSSION INTERVIEW GUIDE

BACKGROUND INFORMATION

1. Kindly introduce yourself and tell us why you choose to study Pharmacy?
 2. Think about your own learning, how would you compare your current learning experience on the pharmacy programme and the previous learning experience on another study programme or level of study?
 3. How does your approach to learning and studying on the current programme differ from the previous?
 4. What are your general impressions and perceptions on:
 - a) Teaching, Learning & Studying at the University:
.....
 - b) Teaching, Learning & Studying on the Pharmacy programme:
.....
 - c) Teaching & learning environment:
.....
 5. Regarding your own learning experience, kindly recall and share with the group your negative and positive learning experience or activities at (i) the University (ii) the Pharmacy programme
-

PART 2: STUDENT PERSPECTIVES ON FACTORS INFLUENCING LEARNING AND ACADEMIC PERFORMANCE IN ASSESSMENTS

1. In your own perspective, what are the key factors that influence or affect your academic performance:
 - a) At course level
 - b) At programme level
 - c) At institutional level
 - d) At individual level
 2. Regarding assessment methods employed in your respective courses on the BPharm programme, how do you feel they influence your approach to learning and studying?
-

PART 3: LEARNING OUTCOMES

1. Overall, how best do you feel your learning and academic performance can be improved to attain the envisaged curriculum competencies and learning outcomes expected?

THANK YOU FOR PARTICIPATING

D) SELF-ADMINISTERED BASELINE DEMOGRAPHIC QUESTIONNAIRE

PART A: BACKGROUND INFORMATION

Please provide background information about yourself

1. Gender: Male ☐ Female ☐
2. Age: 18 – 24 years ☐ 25 – 30 years ☐ 31 – 35 years ☐ >36 years ☐
3. Year/Level of Study: ☐ 2nd Year BPharm ☐ 3rd Year BPharm
4. Entry mode: Regular ☐ Parallel ☐
5. What is your previous academic education attainment background?
Grade 12 Certificate + A-levels/NS ☐ College Diploma ☐ University Degree ☐
Other ☐
6. Do you have any professional work experience?
☐ Yes, I have _____ years of professional work experience
☐ No

PART B: STUDYING HABITS & STRATEGIES

1. How many hours per week on average do you spend studying or preparing for class assignments (excluding attendance of class time)? _____ Hours per week.
2. Apart from academic study on the programme you are currently undertaking, how many other social, academic and/or professional activities are you currently undertaking or involved in?
None ☐ Less than 2 ☐ 3 – 4 ☐ More than 5 ☐
3. Regarding your usual way of learning and studying, how would you describe your level of satisfaction with the methods or strategies of learning and studying you employ for the course materials?
Very Satisfied ☐ Satisfied ☐ Moderately Satisfied ☐ Not Satisfied ☐

PART C: PERCEPTION AND MOTIVATION OF LEARNING

1. Regarding your usual way of learning and studying, how would you describe your level of self-motivation and drive to towards learning, studying and taking on academic tasks such as assessments?

Very Low	Low	Moderate	High	Very High
1	2	3	4	5
2. Regarding your usual way of learning and studying, how would you rate your chances of academically successfully completing the Pharmacy programme within the time allocated for the course?

Very Low	Low	Moderate	High	Very High
1	2	3	4	5
3. Regarding your usual way of learning and studying, please rate a number between 1 (lowest) and 5 (highest) which describes your perception of the teaching and learning experience on your study programme so far.

Very Poor	Poor	Average	Good	Very Good
1	2	3	4	5

THANK YOU FOR YOUR PARTICIPATION

E) ACADEMIC PERFORMANCE TRACKING (APT) FORM

Academic performance of each student will be determined by calculating the GPA score of courses taken during the academic year.

For 2nd Year courses namely: Pharmaceutics I (*credit points = 3.7*), Pharmaceutical Chemistry I (*credit points = 4.3*), Biochemistry (*credit points = 4.8*), Human Physiology (*credit points = 3.7*), and Human Anatomy (*credit points = 4.0*).

For 3rd Year courses namely: Pharmaceutics II (*credit points = 3.5*), Pharmaceutical Chemistry II (*credit points = 4.3*), General Pharmacology (*credit points = 4.3*), General Pharmacognosy (*credit points = 4.4*), Pharmacy Practice Foundation (*credit points = 5.0*), General Pathology & Microbiology (*credit points = 5.0*).

The CA tests scores for termly assessments and Final examination will be captured using the table below:

YEAR OF STUDY: 2 nd / 3 rd				GROUP: 1 [A/B] 2 [A/B]		ASSESSMENT TYPE: CA TEST / EXAM			
BASELINE/MIDLINE/ENDLINE									
S/N	Comp. No.	Sex (M/F)	Quota Mode (R/P)	Course 1 Grade	Course 2 Grade	Course 3 Grade	Course 4 Grade	Course 5 Grade	Course 6 Grade
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

Comments:

.....

Appendix 2: Ethics Approval



THE UNIVERSITY OF ZAMBIA

BIOMEDICAL RESEARCH ETHICS COMMITTEE

Telephone: 260-1-256067
Telegrams: UNZA, LUSAKA
Telex: UNZALU ZA 44370
Fax: + 260-1-250753
E-mail: unzarec@unza.zm
Assurance No. FWA00000338
IRB00001131 of IORG0000774

Ridgeway Campus
P.O. Box 50110
Lusaka, Zambia

11th August, 2017.

Your Ref: 008-06-17.

Mr. Chichonyi A. Kalungia,
University of Zambia,
Department of Pharmacy,
UTH Clinic 2 Block,
P.O Box 50110,
Lusaka.

Dear Mr. Kalungia,

RE: RESUBMITTED RESEARCH PROPOSAL: "INFLUENCE OF THE TRIPARTITE MODEL OF APPROACHES TO LEARNING ON ACADEMIC PERFORMANCE IN ASSESSMENTS AMONG 2017/2018 UNDERGRADUATE PHARMACY STUDENTS AT THE UNIVERSITY OF ZAMBIA" (REF. 008-06-17)

The above-mentioned research proposal was presented to the Biomedical Research Ethics Committee on 4th August, 2017. The proposal is approved.

CONDITIONS:

- This approval is based strictly on your submitted proposal. Should there be need for you to modify or change the study design or methodology, you will need to seek clearance from the Research Ethics Committee.
- If you have need for further clarification please consult this office. Please note that it is mandatory that you submit a detailed progress report of your study to this Committee every six months and a final copy of your report at the end of the study.
- Any serious adverse events must be reported at once to this Committee.
- Please note that when your approval expires you may need to request for renewal. The request should be accompanied by a Progress Report (Progress Report Forms can be obtained from the Secretariat).
- Apply in writing to National Health Research Authority for permission before you embark on the study.
- **Ensure that a final copy of the results is submitted to this Committee.**

Yours sincerely,

Dr. S. H Nzala PhD
VICE-CHAIRPERSON

Date of approval: 11th August, 2017.

Date of expiry: 10th August, 2018.

Appendix 3: OADLSS Elective Module Outline

DEPARTMENT OF MEDICAL EDUCATION DEVELOPMENT

EXPERIMENTAL ELECTIVE MODULE

Module Title: ORIENTATION & APPROACHES TO DEEP LEARNING & STUDY SKILLS

Type: Elective Short Course/Seminar Series

Introduction:

This is an elective module/seminar/short course designed to introduce and orient undergraduate students to approaches to deep learning and studying, including methods of becoming effective learners. In this seminar, the student will be exposed to concepts and attributes of deep learning as espoused by leading scholars and theorists, learn how to adopt deep learning and studying to their everyday learning tasks and employ study skills that enable them to develop and practice deep approach to learning and studying.

Rationale:

This seminar series introduces undergraduate students to comprehensive evidence-based learning and studying approaches. The course provides useful insights into approaches to deep learning and attributes of effective learning that provide students with the necessary abilities to apply deep learning and studying skills, including critical thinking in their contemporary higher education and training as health professionals.

Aim:

To orient students to use principles and approaches to deep learning and study skills

Module Objectives:

At the end of this module, the student will be able to:

- 1) Appreciate principles and attributes of deep learning and studying;
- 2) Adopt or adapt strategies towards deep learning and studying
- 3) Manage and organize their learning and study time in an academic environment;
- 4) Demonstrate critical thinking during learning and assessments;
- 5) Better utilize educational resources that support deep learning.

Learning Outcomes:

At the completion of this elective, the student demonstrates:

- 1) Attributes of deep learning in their contemporary academic activities;
- 2) Effective strategies towards deep learning and studying
- 3) Effective management and organization of their learning and study time;
- 4) Critical thinking skills during learning and assessments;
- 5) Effective utilization of educational resources that support deep learning

Module Structure:

A short elective (non-compulsory) module is delivered over 5 days (1-week duration). Each session is 2 hours of duration per day. The module structure is outlined below:

Day 1	The participants will be introduced to learning orientations and discuss relevant concepts of meaningful learning.
Day 2	The participants will have an overview of the attributes of deep learners, discover their preferred learning style and how to effectively utilize their learning style.
Day 3	The participants will discuss strategies and skills for deep learning, studying and critical thinking will be discussed.
Day 4	The participants will discuss effective ways towards utilization of educational resources for deep learning and organizing studying and learning activities, including review potential pitfalls of surface learning
Day 5	Module wrap-up and synthesis session; participants complete the evaluation exercises and tools, including discussing any additional issues arising during the course.

Throughout the module, the participant will gain exposure to self-evaluation and introspective aspects that will help develop the real-time application of concepts in their everyday learning activities for the future.

Pre-requisites and Co-requisites: None

Content

1. **[DAY 1] Introduction to learning orientations**
 - 1.1. Preliminary self-evaluation (pre-test inventory)
 - 1.2. Students' learning orientations
 - 1.3. Making transitions in learning
2. **[DAY 2] Overview of Approaches to Deep Learning & Studying**
 - 2.1. How do we learn: Four phases of learning
 - 2.2. Approaches to learning (Deep, Surface and Strategic learning)
 - 2.3. Developing self-efficacy towards Deep Learning: Motivation and Goal Setting
 - 2.4. Discovering and utilizing your learning style
3. **[DAY 3] Adopting motive strategies for deep learning, studying & critical thinking**
 - 3.1. How to be an effective deep learner
 - 3.2. Characteristics and Attitudes of deep learners
 - 3.3. Critical thinking skills
4. **[DAY 4] Organizing studying and learning by utilizing educational resources**
 - 4.1. Setting and achieving academic goals
 - 4.2. Time management
 - 4.3. Reading & note-taking skills

- 4.4.Utilizing educational and learning resources (library, internet & e-resources, peers & teachers)
5. **[DAY 5] Module wrap-up, Evaluation & Synthesis session**
 - 5.1.Self-evaluation (post-test inventory)
 - 5.2.Seminar evaluation by participants
 - 5.3.Addressing the next steps in the learning journey

Teaching Methods:

- Seminar presentations via lecture capture audio-visual sessions
- Tutorial & Participatory activity-based learning sessions.

Each days' content will be delivered through a combination of pre-packaged PowerPoint presentations and text readings. Interleaved quiz questions will be used to check student understanding of the material and key concepts during the sessions. Participants will be expected to complete component quizzes, including inventories as part of the seminar activities. Learning materials and seminar presentations will be locally prepared by the Module Coordinator and peer-reviewed by experts at the Department of Medical Education Development.

Contact Hours:

- Seminar: 1 hour per day
- Tutorial or Activity-based session: 1 hour per day

Credits: None

Assessment methods: The module is elective in nature and has no formal summative assessment components. Formative evaluations will be in the form of pre- and post-course evaluations using standard inventory tools and feedback forms.

Prescribed Readings:

1. Entwistle, N. J. & Ramsden, P. 1983. Understanding student learning. London: Croom Helm Ltd. Nichols Publishing Company.
2. Pritchard A. 2008. Studying and learning at university; vital skills for success in your degree. London. SAGE publications Ltd.
3. Wong L. 2009. Essential Study Skills, 6th Edition. Boston. Houghton Mifflin Company.

Recommended Readings:

1. Kolb, D. A., Boyatzis, R. E. & Mainemelis, C. 2000. Experiential Learning Theory: Previous Research and New Directions. In: R. J. Sternberg & L. F. Zhang, eds. Perspectives on cognitive, learning, and thinking styles. New Jersey: Lawrence Erlbaum.
2. Ellis D. 2011. Becoming a Master Student, 12th Edition. Boston. Wadsworth Cengage Learning.
3. Entwistle, N. J., McCune, V. & Hounsell, J. 2002. Approaches to studying and perceptions of university teaching-learning environments: Concepts, measures and preliminary findings. Occasional Report 1: Enhancing Teaching-Learning Environments in Undergraduate Courses Project (ETL), Coventry and Durham: University of Edinburg.

4. Beaty L., Gibbs G. & Morgan A. Learning Orientations and Study Contracts. Chapter 5 In: The experience of learning. pp 72 – 86.

Module Policy & Participant Requirements:

- Regular session attendance & participation
- Successful completion of inventories and seminar evaluations
- Positive attitude, integrity and honest behaviour on the course
- Computer literacy and ability to use E-resources

Module Facilitator, Coordinator & Leader:

Mr Chichonyi A. Kalungia

Email: chichokalungia@gmail.com, Tel: +260 977 800311.

Appendix 4: Module Evaluation Form

PART 1: Context	YES	UNSURE	NO
1. Was the Module on Approaches to Deep Learning & Study Skills <u>relevant</u> in relation to your learning and study needs?			
2. Was the <u>time</u> adequate for the Module Sessions?			
3. Did you <u>benefit</u> from attending this Module?			
4. Is there a <u>need</u> for this Module on Approaches to Deep Learning & Study Skills for Pharmacy Students? Would you recommend it to other students?			

PART 2: Inputs & Processes	Very Good	Good	Average	Poor	Very Poor
5. How would you rate the <u>content and material</u> covered in the Module Sessions?					
6. How would you rate the <u>quality to delivery</u> of the Module Sessions?					
7. How would you rate the <u>overall organization</u> of the Module on Approaches to Deep Learning & Study Skills?					

8. What aspects of the Module went well for you?

.....

9. What aspects of the Module did not go so well for you?

.....

PART 3: Product	Very Useful	Useful	Unsure	Not Useful	Irrelevant
10. How <u>useful</u> did you find the content, knowledge and skills learned on this Module?					
11. Overall, how would you <u>rate the module</u> on Approaches to Deep Learning & Study Skills?					

12. What are the key things you learned from this Module and wish to apply in your own learning and studying?

Appendix 5: Participant Information Sheet and Consent Form

Introduction

My name is Aubrey Chichonyi Kalungia, a researcher at the University of Zambia, Department of Medical Education Development. I am conducting a study titled: 'Influence of the tripartite model of approaches to learning on academic outcomes among undergraduate pharmacy students at the University of Zambia'. The study is supervised by Professor Sekelani S. Banda, University of Zambia.

You have been selected to take part in the study evaluating approaches to learning among undergraduate pharmacy students at the University of Zambia. This study has been approved by the University of Zambia Biomedical Research Ethics Committee (UNZABREC). The approval reference is 008-06-17.

Procedures

In this study, you will be asked to participate in a survey where a self-administered questionnaire will be used. If eligible, you will later be asked to participate in an educational 5-day elective module called 'Orientation and approaches to deep learning and study skills'. This seminar series will run for 5 days during the end of term 1 break of the 2017/2018 academic year. Each seminar session will take about 1 to 2-hour duration per day and delivered by an assigned tutor. The seminar series is free and purely experimental in nature. There will be no formal assessment tests or examinations for the elective module. The elective will be held on secured time that is separate from your academic class timetable and will not conflict with your scheduled academic classes in any way.

Confidentiality

All information collected in this study will be confidentially kept. The information collected will not contain any personal information about you except your institution, age, gender, level/year of study and the programme of study. Your identity will be protected as no names or personal information will be required at any time. The data collected and processed from this study will be reported in a thesis to be submitted to the University of Zambia for academic purposes only. Subsequent permission to publish any useful findings of this research will be sought from the University of Zambia.

Benefits and Risks

As a participant in this study, you may benefit from the educational exposures and use that towards improving your own learning and studying skills. Future students may benefit from the overall study findings that may influence or advocate for better educational practice and policy applicable to them. The information you submit will be used for this study only and WILL NOT be used anywhere else or for influencing your learning outcomes in any way. None of the information you submit will be divulged to third parties or to your academic lecturers or your fellow students in the class or university. Apart from your time to participate in the study, all processes and learning activities are not part of the academic requirements of your formal studies at the University. As such there are no known risks for you in this study. The researcher will only require access to your official published academic assessment outcomes from continuous and final examinations of respective courses taken in the academic year of the programme of study you are undertaking.

Voluntary Participation

Your participation in this study is entirely voluntary and not coerced. You will not receive any monetary incentives, payment or reward for participation. Where logistic support in terms of study materials, snacks and transportation to the study site may be required, these will be provided as per the approved budget of the study.

Participant's Rights to Withdraw or Seek Clarification

Privileges and rights you will have as a participant are the following:

- You may decide to decline or stop being a part of the research study at any time without explanation.
- You have the right to ask that any information you have contributed to that point be withdrawn or destroyed. You will still be respected for your contribution without any penalty or reprimand.
- You have the right to decline to participate in this research.
- You have the right to omit or refuse to answer or respond to any question that is asked of you as appropriate or if deemed inappropriate and without penalty.
- You have the right to have your questions about the procedures and processes answered (unless answering these questions would interfere with the study's outcome). If you have any questions as a result of reading this information sheet, you should ask the principal investigator before the study sessions begin.

Provision of Standard Care

As a participant in this study, you will be entitled to all your standard privileges as a student at the University of Zambia. You will be expected to undertake and prioritize all your scheduled academic activities as required. The researcher will accord you to receive the necessary standard academic attention whenever required. At no time will not interfere with or replace the standard academic activities of your study programme.

Contacts for further information

For any further information or clarifications concerning this research study, please contact the following focal people any time of day:

Principal Investigator: Mr Aubrey Chichonyi Kalungia, Department of Pharmacy, UTH Clinic 2 block. Email: chichokalungia@gmail.com. Mobile No.: +260 977 800311.

Principal Supervisor: Professor Sekelani S. Banda, Department of Medical Education Development, UTH Clinic 2 block. Email: ssbanda2007@gmail.com. Mobile: +260 966 758833

Queries may also be directed to:

The Chairperson, University of Zambia Biomedical Research Ethics Committee, P.O Box 50110, Ridgeway Campus, Lusaka, Zambia. Telephone: +260211256067, Email: unzarec@zamtel.zm

Consent

By signing below, you agree that:

- 1) You have read and understood the Information provided,
- 2) Queries or questions about your participation in this study have been answered satisfactorily,
- 3) You are aware of the potential benefits and risks (if any) of participation, and
- 4) You are voluntarily taking part in this study.

Participant's Signature*: _____

Participant's Name (Printed)*

Date*: _____

Name of person obtaining consent (Printed):

Signature of person obtaining consent:

Appendix 6: Permissions



**UNIVERSITY OF ZAMBIA
SCHOOL OF MEDICINE
Department of Pharmacy**

UTH Clinic 2 Block
P.O Box 50110, Lusaka, ZAMBIA

Tel (Dean's Office): +260 211 252 641
Tel (Head's Office): +260 977 704 144

Mr Chichonyi A. Kalungia
Principal Investigator
Department of Medical Education Development (DMED)
University of Zambia, School of Medicine
P.O Box 50110, Lusaka, Zambia

Dear Mr Kalungia,

RE: PERMISSION TO CONDUCT A RESEARCH STUDY IN THE DEPARTMENT

With reference to your request letter concerning the above subject matter, I write to inform you that the University of Zambia, Department of Pharmacy has no objection to grant you permission to conduct your proposed research within the Department. We will be glad to accord you the necessary support during the conduct of your research. Accordingly, prior to undertaking your research, kindly avail us a copy of the approval letter from the appropriate Ethical Clearance Committee indicating that your research protocols have been approved.

We look forward to your interesting findings from the research and their possible utilization for improving educational practice and policy at the University of Zambia.

Yours sincerely,

**Dr Derick Munkombwe, PhD
HEAD, DEPARTMENT OF PHARMACY**

REQUEST FOR PERMISSION TO USE TOOL

ENTWISTLE Noel <Noel.Entwistle@ed.ac.uk>
To: "Chichonyi A. Kalungia" <ckalungia@unza.zm>

Tue, Aug 22, 2017 at 11:45 PM

Dear Aubrey,

You can certainly use ASSIST. It is free to use by anyone.

I hope you find it useful.

Yours sincerely,

Noel Entwistle

Professor Emeritus,
University of Edinburgh

From: Chichonyi A. Kalungia <ckalungia@unza.zm>
Sent: 22 August 2017 11:55:45
To: ENTWISTLE Noel
Subject: REQUEST FOR PERMISSION TO USE TOOL

Dear Prof. Entwistle,

I trust this email finds you very well. Am a PhD student in Medical Education at the University of Zambia in Lusaka, Zambia. My research is investigating factors influencing academic performance in assessments among undergraduate students undertaking health science programmes at the University of Zambia. Am using a mixed methods design (one part quantitative and one part qualitative). In the quantitative part, I wish to utilize the 'Approaches & Study Skills Inventory for Students Tool' (ASSIST) questionnaire by Entwistle & Ramsden to determine approaches to learning.

I therefore request your permission or consent to use the tool for my study. In this study, we do not intend to make any modifications to the tool.

Your favourable consideration will be greatly valued.

With kind regards,

Aubrey C. Kalungia

Appendix 7: Focus Group Transcript (Sample)

FOCUS GROUP DISCUSSION #2

Focus Group Discussion (FGD) with Group 2 participants who were 3rd Year Undergraduate Pharmacy at University of Zambia. This FDG was conducted in DMED Boardroom situated at Clinic 2 Block, School of Medicine on 27/11/2017 at 16:00hrs. There were 11 participants that attended the FDG.

This FGD was audio recorded and transcribed verbatim by Mr Aubrey C. Kalungia (the Researcher). There verbatim recording was stored on a double audio record.

Total FGD Time: 62 minutes

Moderator: Mr Aubrey C. Kalungia (ACK)

Participants/Discussants (*Anonymised codes*):

- Participant 1: M. M
- Participant 2: A. S
- Participant 3: M. K.
- Participant 4: M. M.
- Participant 5: Z. P.
- Participant 6: H. P.
- Participant 7: N. M.
- Participant 8: P. K
- Participant 9: K. M.
- Participant 10: N. C.
- Participant 11: C. P.

Total Time Taken: 62 minutes

Introduction:

ACK: Thank you for coming. As a way of introduction, my name is Aubrey Kalungia. For today, you can call me Aubrey or you can call me Mr Kalungia or whatever you feel comfortable. Am a pharmacist by training and a lecturer in the Department of Pharmacy but also a scholar and researcher in the Department of Medical Education Development here at University of Zambia. Am conducting a study on factors influencing and affecting learning efficacy on the Bachelor of Pharmacy programme. I trust that we will have an exciting discussion about this. Feel very free to express yourself. I only have very few questions we can table together.

So there is the “about you form” before you, just fill in this form so that we just get to know some general information about you are and stimulate some discussion points so that as we go on we can address the points.

Alright, am sure some of you are asking what this is all about and why you are here. So basically, we are here to discuss aspects about factors affecting your learning and academic performance and so on. I believe all of us here are training to become pharmacists but are there things in the learning environment and process that are of concern in our development towards that goal. So are we good to go?

DISCUSSION

ACK: So let us first talk about learning and our learning orientations. If someone was to ask you in the corridors what learning is, what would you say?

Participant 1: I think learning is being able to obtain knowledge and using that knowledge.

ACK: Anyone with another take? Why do we learn? Can we learn on our own or we need others to facilitate the learning.

Participant 2: Learning can be either be on your own. Probably you can learn on your own some of the things but some of the things you can learn from someone else informing you or teaching you.

ACK: So if you ask yourself, how best do you learn?

[Silence in the room]

ACK: Anyone want to share why they chose to do pharmacy as a career?

Participant 3: Some of us were in situations where for instance you didn't intend to do pharmacy but just found yourself in pharmacy then you start facing difficulties along the way, or maybe at the end of the day you begin to like the training programme and want to pursue it.

ACK: So usually they say to find a solution, you first need to know the problem. So let us have a small discussion around the topic with some leading questions. I'll start with the same question about pharmacy training first of all, from your own learning how would you compare your current learning experience on the pharmacy programme to your previous experience before you came to do pharmacy? For example if you are from college or from natural sciences, etc? Anyone can take it up.

Participant 4: Generally I think that when you look at studying academics before I came to UNZA, I used to be performing very well before I came to UNZA, that was at high school. But Natural Sciences and this pharmacy is almost the same, because it has been challenging, maybe sometimes you say it is because of time, maybe its time management and so on, its been challenging where after learning the results have been average.

ACK: So what would you say, is it the time aspect?

Participant 4: I think since I have seen people making it and having good grades given the same time, I think it is about time management.

ACK: Do the grades matter to you very much? Do you feel more motivated to learn when you are getting better grades than just in the average grades?

Participant 4: They do, yes.

Participant 5: I think for me, if am able to apply what I learn. For me it does not sit well if I get "A+" in a test but after two weeks am unable to apply what I learnt.

ACK: So application is important to you? But currently how do you compare with what you are learning, are you able to pick up aspects to say this am able to apply and this am not?

Participant 5: There are challenges but I think it is also self-discipline as well by also learning how to apply what you have been taught. Let me go back to second year, you start learning for example, polylinkage, you have no idea if what you are learning is connected to pharmacy but at least I was able to talk to my seniors and they explained that it helps me to understand medicinal chemistry later.

ACK: Anyone else who is from another background? How does your current learning in pharmacy compare to previous ways? Anyone from college?

Participant 6: From college, like some courses you'll find that they are always referring to what they did last year and you know it becomes a challenge for us to learn. Take for example some of us have been out of college for 4 years then am starting now, then now you are in class and someone asks you a question on 'what you did last year', then I go wow, 'what I did last year?' [Laughter]. So you find that it becomes difficult for someone to follow what the lecturer will be saying, you become lost and its difficult to catch up because all the courses, ok for pharmacology and pharmchem, they are quite similar, you'll need a starting point and somewhere where you'll end, that is exactly how I feel but for things like pharmacognosy, you'll find that they are always referring to biochem like that, so you'll find that you're having challenges with catching up with the lecturer who is at a different the pace than you.

ACK: Lets talk about individually now, what are some of those key factors which affect your academic performance individually?

Participant 7: I feel like am having.....more like for us....., its more like not having the right material and because we have different lecturers and knowing exactly what the lecturer wants or expects you to do.

ACK: Anyone else?

Participant 8: For me I think it is mostly time, making time how to handle things and balance time for everything.

ACK: Time management in short?

Participant 8: Yeah. There are a lot of things coming on our way besides academia

ACK: That's important because time management is important. We know we are from diverse backgrounds, others are from home they have family to deal with, relationships, work and at the same time balance up with full time academic programme.

Participant 8: And also, the study skills from what I have observed not only from me but also the study skills, how we study the topics and everything because you can study something like the knowledge which you acquired in second year and if you can really remember and apply, if you can recall right now you will see that you are even failing [Chuckles heard in the room]. Now how to incorporate yourself in a system where when you learn something and you are intact with it, you are remembering it and yeah I don't know if it comes with memory as well or..... So your study skills, how you study things and how you perceive things, yes.

ACK: Apart from time, what else? What are those key factors? Think about your own academic performance

Participant 6: The other thing that also affects our performance is interest. You'll find that some of us at diploma level we were just told go for pharmacy it's a good course so we were pushed in without knowing what we were going to do but when we went into the field we got that interest of interacting with people so now since I have the interest I can now specialise into it thus this degree that I want to do.

ACK: Does the assessment methods used have an influence on how you learn?

Participant 9: From assessments that is where you how well your perceived course, the things that they brought, the way you have studied, that is where you gauge yourself as well. So for example like what you said, for me it is in the application and the grades that are important. For me I think everything matters, the grades and the application. If you have good grades meaning your understanding is good as well so is your application. So now if the grade is not good that is where you even get demoralised.

ACK: Let me give you something to think about, say you have a multiple choice exam or test and in the multiple choice exam there are no critical thinking questions, they are not asking you questions you can apply, its just remembering and tick ABCD. Then in another course there is an essay given a scenario that puts you in a practice situation to solve a problem then you have to think and answer. You get an 'A' in the multiple choice exam and then you get a 'C+' in the essay problem solving exam, where would you feel you are improving? So, do assessment methods also influence how you learn?

[Silence in the room]

ACK: The question is, the way you are assessed, how does that have a role in your learning? Do you feel if you are assessed in a certain way you would become a better learner?

Participant 10: I think the second method you said is the best because with critical thinking you will be able to apply at times, then again as students what we are interested in most of the time is progressing no matter what assessment method you are assessed with matters but its about going forward.

ACK: So it is more about progression?

Participant 10: Yes

Participant 1: In addition to what my brother has said, it is just the system, how the system is because at second year we had some other subjects where when you just needed to go through some specific materials for you to pass, when you use other materials it feels like there is nothing you are doing, so again it comes to the system of assessment, where the system of assessment is just you know.... there are some like over a decade they've just been using the same materials of assessment, so if you do not familiarise yourself with those materials then you fail and if you use others then you get to be asking to say what is this. So again it is about the system of assessment

ACK: So how do you feel some of the systems of assessment used on the pharmacy programme affect your learning?

Participants: [No resounding response among participants]

ACK: At programme level then, what are some of the factors within the programme that are affecting your academic performance?

Participant 3: I think it is the system of assessment because just like he said, there are just certain materials that you need to pass, so if you maybe go beyond that to read other things maybe even try the critical thinking, you wont get there

ACK: Ok, system of assessment, yes....

Participant 2: For me I think sometimes its.... we think our country is behind, those who've gone before us even tell us things like the system here in Zambia is just not ok, the level of technology advancement and all those, that kills our zeal so we are affected by that.

ACK: Yeah, that as well. Anyone else? Madam, you've not said anything since you came. What do you think?

Participant 7: Then its like you get so used to doing the same things over and over....

ACK: So there is no innovation in our learning systems?

So, at university level, what do you think? How the university systems are organized, is there anything there that affects your academic performance in assessments?

Participant 2: I think I would love to compare it with high school, from my own point of view when you compare university to high school education, in high school even if you didn't understand the material you learnt it didn't matter much, but now we are like moving or transitioning to a stage where we are expected to understand the material, we have to go deeper and we have to learn materials in depth and in the process we find the work to be bulky and challenging

ACK: Would the availability of educational resources within the university be of any impact?

Participant 9: Yes, very much. Sometimes books, some books are not available.

Participant 7: Internet, sometimes there is no internet, sometimes just over the weekend.

ACK: Talking of the numbers of students, that is the system of the university, do you think the student numbers have affected your learning?

Participant 1: Yes like for example the enrolment of numbers also matters, like if you are too many how you will be taught will be different for those who are 104 will be taught different to those who are 25 because of the number and all that where those who are 25 can even be given chance to ask questions and all that but in the 107 they (lecturers) cannot manage you all. Like I will give an example when we were at NS, it was not that much where the lecturers would really consider you asking questions and all that, but when we came here (BPharm programme), it also changed again where you are also considered you know and given a little bit of attention as well.

ACK: So it seems there are aspects that are fixed and those that are under our control in the learning environment. It is those aspects that are under our control that we all can do something about in order to become better learners. It is a difficult environment we know but it is the quality of education that you want to get out of it.

So in terms of solution, how do you think you can improve at individual level?

Participant 1: I think in as much as we can talk about the system, it is fixed and already there so the issue throws back to us where we just have to see ways in which we forge ahead on how we can beat the system. So I think it comes in where you understand the system how it is and then yeah you also get counselling from those who are ahead or in more years than us and also despite that we should also find motivation on how well to drive ourselves on what we really want to do.

ACK: Anything else, what can we do to improve individually?

Participant: For me I have found motivation to be a driving factor in education, sometimes it is just a matter of working with what you have starting from where you are, motivation is just the fuel that you need to improve.

ACK: Motivate ourselves, ok. What else? Anything that you think we can do individually?

Participant 1: I know some of the study skills again on how you tackle things, you can have everything you want, you can have many books, people to advise you, everything but how you study things, how you perceive the knowledge and apply it matters. So its in all aspects that you tackle learning and everything.

ACK: In your learning and studying, what are those things you feel you still need to address?

Participant 1: Mostly problems I may be facing are fixed problems and it will be up to me to navigate them and find ways to address them.

Participant 9: I feel the way they grade the exam, coz they start from the first page to the last page of your notebook so I feel like that we are so much bombarded that it is very difficult for me to grasp from page 1 to the last page. So if I touched only 50% of what I learnt and then that 50% doesn't come then am done. So how we can be helped is those things that are brought in a test should not be examined in the exam.

ACK: Assessments should be cumulative in short? What do you think?

Participant 11: For me what I can talk about are the courses that are too bulky and quite challenging, maybe we have, I give an example of Pathology where in it we have microbiology, we have parasitology, we have immunology, it's a bulky programme (course) and today we have this lecturer maybe talking about cell injury, again another one taking about cell adaptation and so on yet it is the same course. Then at the end of it all we are going to be examined on everything by different lecturers. I think of that one they can look into it whereby if it is immunology, it can be one person lecturing it so that you are able to understand the course itself and how to go about answering questions.

ACK: So too many courses with multidisciplinary teaching can also be a problem you feel?

Participant 10: So just to add on to what has been said, if there is one lecturer covering the components of the topic, you would know how much he has covered. Now the problem that we face with having multiple lecturers, they will just be focussed on delivering the material they've been assigned, for them the focus will be finishing the material before another one comes. Also some components are just too bulky and with scopes that are too large. Then also to disagree a bit, if achieving deep learning even when am asked two years later am able to recollect the information even if asked two years later what they learnt. I think the most cardinal point to not achieving deep learning, may be the course loads are a serious problem because they do not really work well with the learning requirement.

ACK: So going by what you are saying, there are certain things that are within our grasp while others can take some time or given the opportunity to participate in curriculum review later. Those which are low hanging fruits and are within your control such as the way we use our time and how we choose to learn are within our control. So, for the interest of time we can end the session here. Thank you all for your wonderful discussions and participation.

Are there Any questions for me before we close the discussion? Any reflections?

[Silence in the room and Moderator ends the discussion]

Appendix 8: Publications

Citations of the scholarly articles published from this thesis in peer-reviewed journals are as follows:

Kalungia, A.C., Munkombwe, D., Kaonga, P., Nzala, S., Apampa, B., Mulundu, G. and Banda, S.S., 2019. Learning approach and teaching style preferred by pharmacy students: Implications for educational strategies in Zambia. *Pharmacy Education*, 19 (1): 116 – 125. Available at: <https://pharmacyeducation.fip.org/pharmacyeducation/article/view/739/725>

Kalungia, A.C., Kaonga, P., Munkombwe, D., Mulundu, G., Chigunta, M., Sichone, J., Mwila, C. and Banda, S., 2019. Development and Evaluation of an Educational Intervention to Enhance Deep Learning and Study Skills among Pharmacy Students in Zambia. *Education*, 9 (4): 68-75. Available at: <http://article.sapub.org/10.5923.j.edu.20190904.02.html>

Kalungia, A.C., Muungo, L.T., Marshall, S., Apampa, B., May, C. and Munkombwe, D., 2019. Training of pharmacists in Zambia: Developments, curriculum structure and future perspectives. *Pharmacy Education*, 19 (1): 69 - 78. Available at: <https://pharmacyeducation.fip.org/pharmacyeducation/article/view/638/711>