

**DETERMINANTS OF ADOPTION OF AN INNOVATIVE CURRICULUM
MODEL AT THE PHARMACY DEPARTMENT OF KENYA MEDICAL
TRAINING COLLEGE, NAIROBI**

CAROLINE ADHIAMBO AWUOR BABU

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MAY 2025

DECLARATION AND APPROVAL

Declaration by Candidate:

This thesis is my original work and has not been presented for a degree in any other university or any other award.

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Caroline A. A. Babu

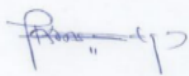
SHS/MSHPE/547-1/2021

19th April 2025

Declaration by Supervisors:

This thesis has been submitted with our approval as university supervisors.

Signature



Dr. Solomon Kilaha, PhD

Educationist and Curriculum Consultant

Adjunct Faculty/ Proposed academic Lead MSHPE

Amref International University

23rd April 2025

Signature



Dr. Elizabeth Kemigisha

Associate Research Scientist

African Population and Health Research Centre, Nairobi

25th April 2025

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ABSTRACT

Background: Curriculum analysis involves assessing important elements, integration, and presumptions to identify gaps in instructional strategies, resources, technology, and outcomes. This gives stakeholders important information they can use to enhance training programs at educational institutions. The broad objective of this study was to explore the determinants of adopting an innovative curriculum model among lecturers and learners in the Pharmacy Department at the Kenya Medical Training College, Nairobi Campus. The specific objectives were: to determine the extent to which the faculty agreed that the Diploma in Pharmacy curriculum has been developed using the Harden's Ten Questions framework (HTQF); to determine the extent to which the learners perceived that the Diploma in Pharmacy curriculum has been developed using the HTQF; and to find out the extent to which the Diploma in Pharmacy curriculum demonstrates innovativeness using the HTQF.

Method: A cross-sectional study was conducted using an online population survey based on HTQF. The estimated sample size was 153. Likert scales were used to obtain ratings of statements about the curriculum. Medians and interquartile ranges were used to summarize the ratings data. Kruskal-Wallis and Mann-Whitney U tests were used to describe differences between curriculum ratings by the various groups of students and staff members.

Findings: 84% of the 201 participants were students in the 18-35 years age category. The descriptive analyses revealed that most Participants agreed with most of the statements on various aspects of the curriculum. In contrast, some Participants were neutral or disagreed with a few statements. 83% of students and 75% of lecturers agreed that the curriculum is innovative. The innovativeness of the curriculum was based on statements that precisely agreed with the clarity of objectives, description of the relationship between basic and clinical sciences, integration of theory with clinical applications, promoting student autonomy, effective assessments, conducive educational environments, and continuous monitoring of curriculum implementation. 40% of students disagreed or were neutral about the innovativeness of the curriculum, based on the statements that include adequate coverage of information, computer technology skills, availability of instructional resources in the KMTC learning portal, sufficiency of lecturers, adequacies of instructional media and teaching materials, and availability of scholarships and grants.

Conclusion and Recommendations: Most of the Department of Pharmacy at KMTC Participants agreed with the positive statements about the diploma in pharmacy curriculum presented to them. The study concludes that the pharmacy diploma curriculum is innovative because it aligns with HTQF.

The study recommends scheduling student feedback after assessment among year 2 students to improve the innovativeness of the curriculum. It also recommends further research to determine the adoption of electives to align with an innovative curriculum model.

TABLE OF CONTENTS

DECLARATION AND APPROVAL.....	ii
COPYRIGHT.....	iii
ACKNOWLEDGEMENT	iv
ABSTRACT.....	v
TABLE OF CONTENTS.....	vi
LIST OF TABLES	xi
LIST OF FIGURES	xii
ABBREVIATIONS AND ACRONYMS.....	xiii
DEFINITION OF TERMS	xiv
CHAPTER 1: INTRODUCTION.....	1
1.1 Overview.....	1
1.2 Background.....	1
1.3 Problem Statement.....	4
1.4 Research Questions.....	5
1.5 Objectives	6
1.5.1 Purpose of the Study	6
1.5.2 Broad Objective.....	6
1.5.3 Specific Objectives.....	6
1.6 Justification.....	7

1.7 Significance of the Study	7
1.8 Scope.....	8
1.9 Summary.....	8
CHAPTER 2: LITERATURE REVIEW	10
2.1 Introduction.....	10
2.2 Theoretical Framework.....	11
2.3 Review of Related and Empirical Literature	14
2.3.1 Lecturers' Perspectives on the Application of Harden's Ten Questions	14
2.3.2 Students' Perception of the Application of Harden's Ten Questions	14
2.3.3 Innovativeness of the Diploma in Pharmacy Curriculum	15
2.4 Knowledge Gap	16
2.5 Conceptual Framework.....	18
2.6 Summary.....	18
CHAPTER 3: METHODOLOGY	20
3.1 Introduction.....	20
3.2 Research Design	20
3.3 Study Area.....	21
3.4 Target Population	21
3.4.1 Inclusion Criteria	22
3.4.2 Exclusion Criteria	22

3.4.3 Variables	22
3.5 Sample and Sampling Procedures.....	23
3.5.1 Sample Size Determination	23
3.5.2 Sampling Procedure	24
3.6 Data Collection Instruments	25
3.7 Validity and Reliability	25
3.8 Data Collection Procedures	25
3.8.1 Data Collection	26
3.9 Data Analysis and Presentation.....	27
3.10 Ethical Considerations	27
3.11 Study Constraints and Limitations.....	28
3.12 Summary.....	28
CHAPTER 4: RESULTS	29
4.1 Introduction.....	29
4.2 Presentation of Results in Line with Specific Objectives.....	29
4.2.1 Lecturers' Perspectives on the Application of Harden's Ten Questions	29
4.2.2 Students' Perception of the Application of Harden's Ten Questions	30
4.2.3 Innovativeness of the Diploma in Pharmacy Curriculum	30
4.3 Curriculum Alignment with HTQF: Checklist Mapping Findings.....	39
4.4 Demographic Characteristics of Participants.....	42

4.5 Summary.....	43
CHAPTER 5: DISCUSSION.....	45
5.1 Introduction.....	45
5.2 Discussion of Findings.....	45
5.2.1 Lecturers' Perspective on the Application of Harden's Ten Questions.....	45
5.2.2 Students' Perception of the Application of Harden's Ten Questions	45
5.2.3 Innovativeness of the Diploma in Pharmacy Curriculum	46
5.2.4 Curriculum Alignment with Harden's Ten Questions Framework: Checklist	
Mapping.....	47
5.3 Summary.....	47
CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS	49
6.1 Introduction.....	49
6.2 Conclusions.....	49
6.3 Recommendations.....	50
6.3.1 Further Research	51
6.4 Summary.....	51
REFERENCES	52
APPENDICES	58
Appendix I: Harden's Ten Questions Framework.....	58
Appendix II: Questionnaire	59

Appendix III: Checklist of Questionnaire Items Assessed Against Harden's Ten
Categories 75

Appendix IV: Informed consent form..... 76

Appendix V: Data Confidentiality Agreement..... 81

Appendix VI: Similarity Index Certificate, Research Permit, ESRC Approval Letter,
and Evidence of Publication 102



LIST OF TABLES

Table 1: Distribution of Target Population by Level of Study and Gender	21
Table 2: Median Scores for Subscales	32
Table 3: Participants' Scores of Their Agreement with the Statements on Course Content	35
Table 4: Participants' Scores of Their Agreement with Statements on Teaching Methods	36
Table 5: Participants' Agreement with Statements on Assessment Process	37
Table 6: Participants' Agreement with Statements on Communication of Course Information	37
Table 7: Participants' Agreement with Statements on the Education Environment	38
Table 8: Participants' Agreement with Statements on the Management of Curriculum Implementation	39
Table 9: Curriculum Adherence to Harden's Ten Questions Framework.....	40
Table 10: Demographic Characteristics of the Survey Participants.....	43

LIST OF FIGURES

Figure 1: Conceptual Framework	18
Figure 2: Sample Size Determination	24
Figure 3: Innovation of KMTTC Diploma in Pharmacy Curriculum	32



ABBREVIATIONS AND ACRONYMS

AMIU: Amref International University

CAT: Continuous Assessment Tests

CBE: Competence-Based Education

CDC: Centre for Disease Prevention and Control

FMUG: Faculty of Medicine, University of Gezira

FQE: Final Qualifying Exam

HND: Higher National Diploma

HOD: Head of Department

HTQF: Harden's Ten Questions framework

KMTC: Kenya Medical Training College

LMICs: Low and middle-income countries

LMS: Learning Management System

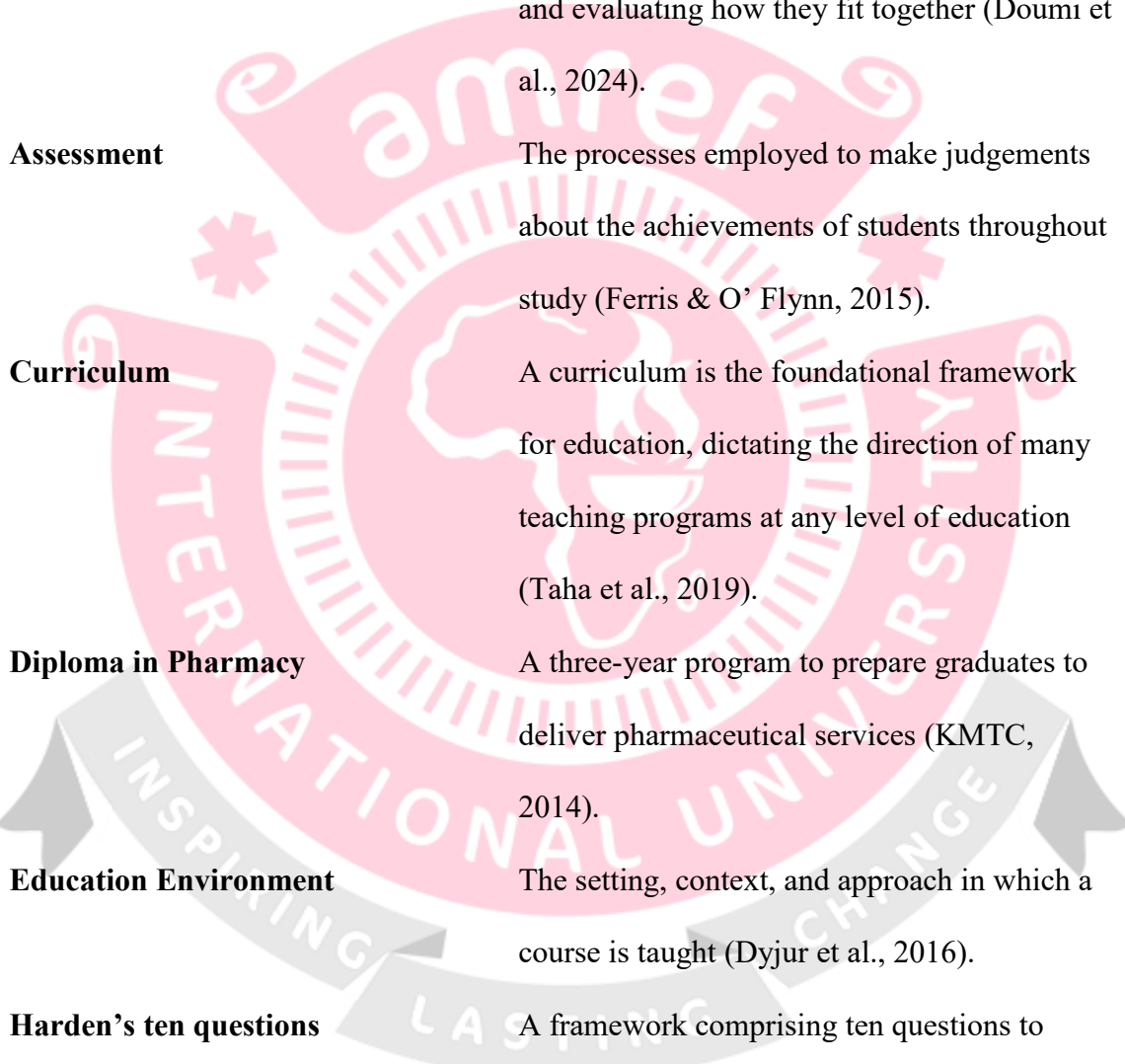
NACOSTI: National Commission for Science, Technology and Innovation

OBE: Outcome-Based Education

PPB: Pharmacy and Poisons Board

SPICES: Student-centred, Problem-based, Integrated, Community-based, Electives, and Systematic

DEFINITION OF TERMS



Analysis	Unpacking the curriculum into its components and evaluating how they fit together (Doumi et al., 2024).
Assessment	The processes employed to make judgements about the achievements of students throughout study (Ferris & O' Flynn, 2015).
Curriculum	A curriculum is the foundational framework for education, dictating the direction of many teaching programs at any level of education (Taha et al., 2019).
Diploma in Pharmacy	A three-year program to prepare graduates to deliver pharmaceutical services (KMTC, 2014).
Education Environment	The setting, context, and approach in which a course is taught (Dyjur et al., 2016).
Harden's ten questions	A framework comprising ten questions to facilitate the analysis of a curriculum (Harden, 1986).
Innovation	Implementing new educational strategies to meet the needs of students and society

demonstrates adherence to the Harden Ten Questions (Serdyukov, 2017).

Kenya Medical Training College

A premier national training institution that equips students to deliver healthcare services to Kenyans (KMTC, 2014).



CHAPTER 1: INTRODUCTION

1.1 Overview

This chapter describes the background, the problem, research questions, objectives, justification, significance, scope, and assumptions of the study.

1.2 Background

Teaching programs are built on the basic concepts of a curriculum. A curriculum forms the foundational framework for education, dictating the direction of many teaching programs at any level of education. A curriculum contains objectives, instructional approaches, and student learning outcomes for the teachers (Taha et al., 2019). Adamson and Morris (2007) opined that a curriculum represents a whole, which is more significant compared to the aggregation of the individual components. He articulated the interrelatedness of the individual parts, such as the needs and interests of learners relating to competencies and future roles, and the role of education in promoting social change. Curriculum analysis determines how well the curriculum achieves educational goals (Maryati et al., 2024). A robust and responsive curriculum is pivotal in any learning context since it lays the groundwork for developing proficient professionals. According to Ali (2018), depending on how "curriculum" is defined, the emphasis or objectives of a program assessment may also include curriculum development, the educational atmosphere, the instructional method, resources, and consumables.

A learning institution's stakeholders also value curriculum analysis, as it helps them identify gaps in instructional strategy, resources or inputs, technological improvements, and product outputs. It is assumed that the finished product complies with the contextual

requirements listed by the curriculum. The curriculum must be modified, reviewed, or updated if the finished product is suboptimal.

The Diploma in Pharmacy program is a three-year program meant to prepare competent professionals to deliver quality pharmaceutical services in Kenya (KMTC, 2014). The KMTC offers a Diploma in Pharmacy course as enshrined in its enabling legislation, the Kenya Medical Training College Act (Act No. 14 of 1990), while the Pharmacy and Poisons Act (Cap. 254) regulates the practice of pharmacy in the country.

The Kenya Medical Training College (KMTC) collaborated with the Pharmacy and Poisons Board (PPB), Kenya Institute of Education, Kenya National Examinations Council (KNEC), and the ministries of health and education to develop the harmonised curriculum for the Diploma in Pharmacy course in 2003; however, KMTC took the lead. Although there are no publicly accessible guidelines on the review of the Diploma in Pharmacy program, institutions that train pharmaceutical technologists update the harmonised curriculum to match the market dynamics while meeting PPB's registration requirements (PPB, 2003). KMTC reviews the curriculum to revise and update it according to changing market needs and trends, new policies and discoveries, and technological advances (KMTC, 2014). Most changes in the curriculum are based on the faculty's understanding of the course and the applicable instructional approaches, rather than the perspectives of the stakeholders who use the curriculum. There is a need for comprehensive curriculum reviews that incorporate the perspectives of the different stakeholders in the diploma in pharmacy course, who are mainly students, graduates, lecturers, college leadership, mentors, contextual community, policy makers, and funders.

Various institutions in health professions education have analysed their curricula using Harden's ten-question framework to assess their innovativeness. The institutions include Universiti Malaysia Sarawak (Malik, 2002), Gezira University (Albushra et al., 2017), and Kordofan University (Doumi et al., 2024). However, there is a lack of an organised and thorough examination of such programs (Maryati et al., 2024). Although sporadic evaluations have been done in various learning institutions, a structured and rigorous study is necessary to identify strengths, flaws, and improvement areas for the program in a particular institution. For instance, Laskaratos et al. (2014) depended on their experiences to critique a core medical training curriculum in the United Kingdom. Hence, their findings are not transferable. An individualized assessment targeting crucial knowledge and skills is vital to fulfill the changing needs of the pharmacy profession at the Kenya Medical Training College.

Several curriculum analysis frameworks have worldwide application in evaluating and improving health courses. The Context, Input, Process, Product (CIPP) Model by Stufflebeam (1971) offers an exhaustive view that assesses the context, resources, implementation process, and outcomes (K.C. & Baral, 2023). Other generally accepted models include Tyler's Objectives Model (1949), which emphasizes determining clear objectives and aligning instructional content and evaluation methods to them (Azzahra et al., 2022). Taba Model, on the other hand, emphasizes teacher input into the curriculum and inductive planning (Angcuan & Lumyaen, 2024). Kern's Six-Step Approach emphasizes needs assessment, goals, and evaluation (Scala et al., 2022).

Despite the importance of the other models, Harden's framework of Ten Questions (Appendix I) is uniquely suitable for health professions education due to its all-

encompassing and structured nature. It relates to curriculum planning, delivery, assessment, and how the curriculum responds to healthcare needs. It encourages critical reflection and stakeholder engagement, elements significantly lacking in the present curriculum evaluation practices at KMTC.

This study aimed to assess the innovativeness of the Diploma in Pharmacy curriculum at the KMTC Nairobi campus in the context of contemporary healthcare practice, employing Harden's Ten Question Framework to provide evidence-based suggestions for curriculum review.

1.3 Problem Statement

KMTC is expected to produce competent moral pharmaceutical technologists who fit into the national health drug policy. There have been issues about the level of preparedness of the graduates. The departmental clinical reports indicate that recent graduates do not possess practical skills and professional ability codified in the program's stated mission. Pharmacy graduates are very important in delivering safe, effective, and accessible healthcare. Anecdotal reports from clinical practice indicate that the recent Kenyan Medical Training College pharmacy graduates are far less competent in health service delivery than their predecessors. Arguably, increased demand for the program leads to opportunities for limited training, with a poor mentor-student ratio, thereby affecting mentorship and later skills development. According to Taylor et al. (2004), students with limited opportunities to interact with full-time academic pharmacists have limited opportunities to learn about the "culture of pharmacy," which impedes their transition from student to independent professional. However, while computer-based learning methods can

remove logistical challenges, such isolation can indeed prevent the formation of professional values (Taylor et al., 2004).

The core gap in the KMTC Diploma in Pharmacy program is the absence of a structured, evidence-based curriculum analysis for relevance, effectiveness, and alignment with modern healthcare needs. Outdated curricula produce pharmacists who are ill-equipped for the demands of modern healthcare. KMTC lacks a systematic curriculum evaluation mechanism and the evidence to support its need for review, while sporadically reviewing it in 2007, 2014, and 2019 under the guidance of its 2014 curriculum policy (KMTC, 2014). Even though there have been periodic reviews, there is no documented use of any standard evaluation framework, such as Harden's Ten Questions Framework (HTQF), to assess and address the critical gaps that may exist in the training. This lack of systematic review has led to the incompetence of graduates, very little mentorship, limited socialization in the profession, as well as the minimal involvement of critical stakeholders such as students, lecturers, and the head of department (HOD) as a change agent, necessary for a successful curriculum review (Oliver & Hyun, 2011). Feedback gathered from the stakeholders before the formal review will firm up curriculum innovation, which is new educational interventions to meet learners' and society's needs (Serdyukov, 2017).

1.4 Research Questions

1. To what extent do lecturers agree that the Diploma in Pharmacy curriculum has been developed using Harden's Ten Questions framework at the KMTC Nairobi campus?

2. To what extent do learners perceive that the Diploma in Pharmacy curriculum has been developed using Harden's Ten Questions framework at the KMTC Nairobi campus?
3. To what extent does the Diploma in Pharmacy curriculum demonstrate its innovation using Harden's Ten Questions framework at the KMTC Nairobi campus?

1.5 Objectives

1.5.1 Purpose of the Study

This study aimed to explore the extent to which the KMTC diploma in pharmacy curriculum has adopted an innovative curriculum model.

1.5.2 Broad Objective

To explore the determinants of adopting an innovative curriculum model among lecturers and learners in the Pharmacy Department at the Kenya Medical Training College, Nairobi Campus.

1.5.3 Specific Objectives

1. To determine the extent to which the faculty agrees that the Diploma in Pharmacy curriculum has been developed using Harden's Ten Questions framework at the KMTC Nairobi campus.
2. To determine the extent to which learners perceive that the Diploma in Pharmacy curriculum has been developed using Harden's Ten Questions framework at the KMTC Nairobi campus.

3. To determine the extent to which the Diploma in Pharmacy curriculum demonstrates its innovativeness using Harden's Ten Questions framework at the KMTC Nairobi campus.

1.6 Justification

Healthcare practice requires progressive involvement in curriculum design based on continuous innovation, enabling graduates to be fit for modern-day clinical practice. Innovativeness of any curriculum is, to a large extent, contingent upon its acceptance by the major actors, staff, and students alike. Despite attempts to reform health training in Kenya, the specific factors influencing the local uptake of these reforms remain largely unknown. This study fills this gap, examining the context-specific determinants of the adoption of an innovative curriculum in the Pharmacy Department at KMTC Nairobi Campus. The knowledge gained will help strengthen the strategies for curriculum implementation, enhance policy decisions, and improve institutional preparedness for future educational reforms.

1.7 Significance of the Study

Various stakeholders, including students, graduates, lecturers, mentors, college leadership, the local community, policymakers, and funders, will benefit from knowing the determinants of adoption of an innovative curriculum model, which will yield information on personal, institutional, and systemic level facilitators and inhibitors for effective curricula adoption. This curriculum review provides insight into this tenet since it obtained views from diverse stakeholders, thus providing a comprehensive description of the curriculum's level of innovation and opportunities for improvement based on the input from the primary users of the curriculum. Using unbiased data, curriculum assessment, and

monitoring assists program implementers in making decisions about the administration, provision of services, and program effectiveness (Ballard, Bello, & Dalla Valle, 2010). Sponsors and other stakeholders frequently demand curriculum monitoring and evaluation to demonstrate the value of their investments in a program and determine whether different strategies should be considered to increase effectiveness. Also, the study results will assist researchers, medical educators, and medical education training institutions in doing additional research and informing the process of developing, evaluating, and reviewing curricula.

1.8 Scope

The student researcher conducted an online survey among lecturers and students in the Kenya Medical Training College (KMTC), Nairobi campus pharmacy department. The head of the pharmacy department also completed the survey to promote ownership of the findings. The survey captured all aspects of Harden's Ten Questions framework for comprehensiveness.

Not every participant was presumed to be willing or available to respond, and participation was voluntary. Additionally, Participants who participated in the study were assumed to have provided honest, valid, and reflective answers based on their personal experiences and perceptions of the curriculum model.

1.9 Summary

This chapter addresses the issue of curriculum analysis and explains the need to analyse the Diploma in Pharmacy curriculum used at the KMTC Nairobi campus. It introduces

Harden's Ten Questions framework and how it was used to analyse the curriculum to identify the level of innovation of the Diploma in Pharmacy Curriculum.



CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter synthesizes the literature related to curriculum review and Harden's Ten Questions Framework for curriculum analysis. According to Hall and Hord (2015), reviewing a curriculum is a practical way to determine its effectiveness and maintain high educational standards (Albushra et al., 2017). The success of a school's curriculum can be gauged by carefully monitoring how well it is being taught and how well it is being learned, two factors that directly affect the overall level of student achievement (Ferdaus, 2018). According to Ferdaus (2018), a systematic procedure for monitoring and evaluating the curriculum over time allows for varying degrees of examination and analysis of sections at different periods, with all employees participating in the process continuously.

Teaching programs are built on the basic concepts of a curriculum. Curricula form the foundational framework for education, dictating the direction of many teaching programs at any level of education. They contain the objectives, instructional approaches, and student learning outcomes for the teachers (Taha et al., 2019). Curriculum analysis entails splitting it into individual components and examining how they best fit together (Doumi et al., 2024). Curriculum evaluation determines how well the curriculum components and teaching program achieve educational goals (Maryati et al., 2024). A robust and responsive curriculum is pivotal in any learning context since it lays the groundwork for developing proficient professionals. Student feedback is integral in curriculum development, review, and update. Real-time feedback as students progress in their studies, and using this input, is more valuable in curriculum review compared to the typical end-of-course evaluation (Hale & Adhia, 2022). The feedback ensures that students experience the changes

implemented due to their input, since it facilitates correcting issues in the curriculum as they arise. On the other hand, a lack of a system to collect regular feedback from students and lecturers can result in the accumulation of frustrations by both students and teachers (Carless & Winstone, 2023). Students appreciate when their feedback is applied to improve a course during their studies (Hale & Adhia, 2022). End-of-course feedback denies the participants the benefits of the changes informed by their feedback.

Student feedback should be collated with annual or terminal evaluations to ensure comprehensiveness. Some aspects of the curriculum can only be effectively evaluated at or after the end of the course (Hale & Adhia, 2022). It should then be used to transform the curriculum into a tool that addresses the students' needs in readiness for the practical realities.

2.2 Theoretical Framework

Ronald Harden developed the Ten Questions Framework, which is now widespread in medical and health professions education. It integrates various educational theories and is not wholly developed under one paradigm. The framework aligns with curriculum design philosophies, ranging from its internal beginnings, both practical and operational, for complex, broad studies like professional medicine. One of the significant early influences was Ralph Tyler's work on curriculum design, which emphasised clearly stated educational objectives, appropriate learning experiences within the organisation's scope, and assessment methods (Tyler & Hlebowitsh, 2013). Harden used this basis to develop a more specific and detailed context for the curriculum. It might be needed in professional education, in which the focus is on competencies and societal needs.

Constructivist Learning Theory, particularly as developed by Jean Piaget and later other educationalists, has also influenced the Harden model. Constructivism teaches us that learners create their knowledge of what they learn by interacting with the content and its context (De Almeida & Viana, 2023). Emphasis on learning outcomes and engagement with students and outcome-based learning through problem-based learning aligns with constructivist viewpoints, especially in attention to teaching strategies that foster active, student-centred learning.

The other theoretical underpinning is Knowles' theory of andragogy, which focuses on adult learning. According to Knowles, such characteristics of adult learners are self-directedness, relevance to real-life situations, and learning through experience (Moll, 2024). Harden's model, particularly in its emphasis on learner needs, learning outcomes, and the educational environment, aligns with all adult learning principles. His framework ensures that educational experiences are meaningful and professionally relevant, fostering motivation and deeper engagement among adult learners in professional settings.

Most recently, Systems Theory influenced Harden's model, which views the curriculum as a dynamic, interconnected system with inputs, processes, and outputs. Generally, systems theory applied to education would insist that a change in any one part of the curriculum will lessen or enhance effectiveness in all the rest, such as assessment about or concerning learning outcomes and teaching methods (Marialuisa et al., 2018). Embedded within this systemic orientation is the whole tenor of the Ten Questions Framework, since it addresses all important elements of element planning from objectives and content to assessment, management, and environment, which are essential for internal coherence and alignment.

Competence-Based Education (CBE) has a significant influence on Harden's approach. The foundation of this type of education comprises clearly defined learning outcomes, most often predefined competencies, which learners can demonstrate before proceeding (Leiphrakpam & Are, 2023). The first two questions of Harden relate to the following: "What are the needs in relation to the product?" and "What are the aims and objectives?" These questions indicate that it is essential to define competencies and outcome measures consistent with the demands of the healthcare profession, ensuring that graduates possess knowledge and application skills for real-world value.

Ultimately, the SPICES model developed by Harden himself closely integrates with the Ten Questions Framework. The SPICES model proposes learner-centered, community-based, issue-based, elective, integrated, and methodical curriculum design (Harden et al, 1984). These aspects inform several of the questions in the framework, particularly those related to educational strategies (Question 4), teaching methods (Question 5), and curriculum organisation (Question 6). Through SPICES, Harden provides a strategic lens through which educators assess their curricula from traditional to more innovative and effective models.

The framework, which calls for ten questions from Ronald Harden, was not the work of one single theory, but a distillation of core theories on education and some innovative practices. He referred to Tyler's objectives model, constructivism, andragogy, systems theory, CBE, and the SPICES model to develop a tool that is theoretically strong and practically useful for the ever-changing demands of professional education.

2.3 Review of Related and Empirical Literature

2.3.1 Lecturers' Perspectives on the Application of Harden's Ten Questions

Establishing a sound curriculum is the backbone of producing capable healthcare professionals, and it must be developed based on a competent framework for evaluation. Harden's Ten Questions model provides a proper logical structure to curriculum planning, focusing on the end product, educational activities, content, strategies, assessment, and resources (Harden, 1986). When such a structure is used, the curriculum becomes student-focused, competency-based, and relevant to the needs of the healthcare system. The utilisation of this approach in designing pharmacy curricula in institutions of higher learning has not been well demonstrated.

The situation at Kenya Medical Training College (KMTTC) is no different, as the performance of previous graduates is based on anecdotal reports that likely point to a deficit in the curriculum content and delivery. If educational methods do not align with the curriculum, the likelihood of skill acquisition and forming a professional identity will likely be impeded (Reissner & Armitage-Chan, 2024). Faculty involvement in curriculum design is necessary, as their perspectives determine the realities of teaching and student attitudes. Whether the diploma in pharmacy curriculum currently utilised in KMTTC Nairobi is aligned with Harden's framework is not factually settled.

2.3.2 Students' Perception of the Application of Harden's Ten Questions

Learner perceptions have been identified as a prerequisite for assessing curriculum effectiveness and relevancy in health professional education. Harden's Ten Questions framework presents a rigorous framework that considers essential ingredients such as needs

assessment, objectives, content, educational strategies, assessment practices, and learning environment (Harden, 1986). When students perceive a curriculum as well-structured and outcome-oriented, they engage with it and feel more motivated, thus increasing the overall learning effect (Filgona et al., 2020). Many institutions, including KMTC, do not involve students much in curriculum processes such as designing and evaluation Hale and Adhia (2022), limiting their opportunity to influence change to improve learning.

The Diploma in Pharmacy curriculum at the KMTC Nairobi campus undergoes periodic review, but evidence on the revision activities being based on formal frameworks like Harden's Ten Questions Framework is missing. Schepens et al. (2009) observe that a lack of student input and doubtful educational strategies negatively affect the formation of professional identity and competence. Analysing learner perceptions can unveil how the curriculum is deficient in fulfilling their academic needs and the extent of their professional preparedness.

2.3.3 Innovativeness of the Diploma in Pharmacy Curriculum

Harden's Ten Questions Framework provides a practical and comprehensive guide to examining innovation by evaluating needs assessment, objectives, content, organisation, teaching methods, assessment, strategies, communication, the learning environment, and curriculum management (Harden, 1986). This framework encourages forward-thinking in curricular development and extends beyond delivering content and testing learners. It has been widely used across disciplines, as seen in Albushra et al. (2017) assessment of the University of Gezira's Faculty of Medicine (FMUG) and Azoz et al. (2018) case study, Faculty of Medicine and Health Sciences, University of El Imam EL Mahadi, emphasizing

the application of Harden's Ten Questions Framework for curriculum development and functional analysis.

An additional insight into the value of the framework is evident in lower- to middle-income countries (LMIC), where Albushra et al. (2017) evaluated FMUG's curriculum, demonstrating alignment with community and global standards. Though this gap is addressed in LMIC, the literature suggests no comprehensive evaluation of Harden's Ten Questions framework has been done in Kenya. Applying it at KMTC Nairobi would provide important information on how the Diploma in Pharmacy curriculum responds to the changing demands of healthcare. Student and lecturer perspectives can provide sound evidence for curriculum revision (Oliver & Hyun, 2011).

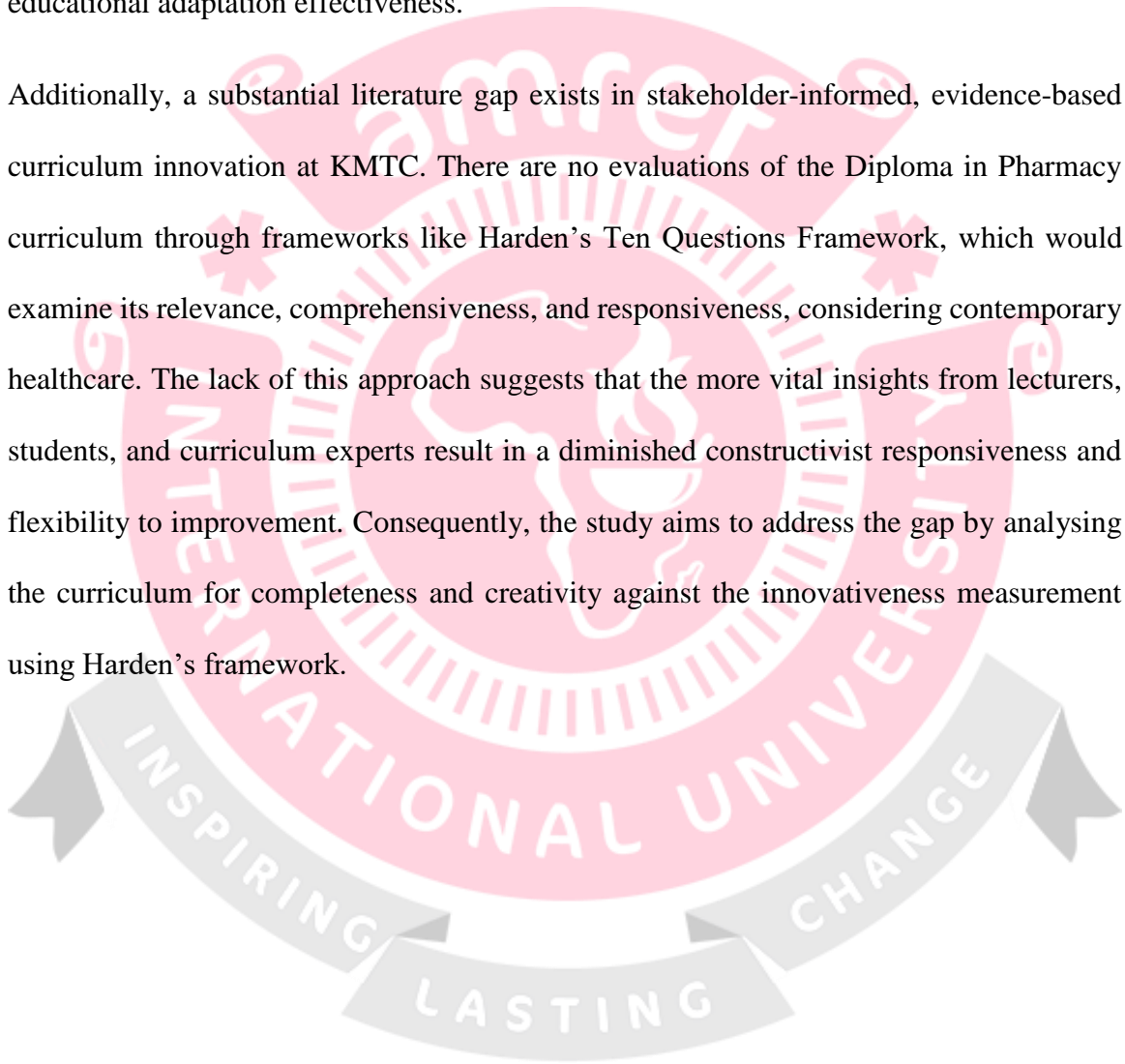
Considering the shift to competency-based education at KMTC and the dynamic nature of pharmacy, curriculum innovation may benefit from a guideline-structured curriculum analysis using Harden's framework to refine and address gaps in relevant knowledge, skills, and attitudes for pharmacy professionals. This study aims to fill these gaps through stakeholder engagement, systematic examination of curriculum parts, and articulation of evidence-based changes. It focuses on strengthening the responsiveness of the Kenyan pharmaceutical and public health systems (Loflin, 2015).

2.4 Knowledge Gap

Kenya Medical Training College (KMTC) aims to produce morally sound and competent pharmaceutical technologists in line with the Pharmacy and Poisons Act (Cap. 254). However, gaps persist between graduates' preparedness and the curriculum's intent. Clinical and anecdotal reports have highlighted a lack of practical skills, professional

competencies, and mentorship among recent Diploma in Pharmacy graduates. Nonetheless, there seems to be a lack of robust, documented evaluations that aim to identify and solve gaps within the curriculum. The curriculum has had previous reviews, but those reviews were not based on a systematic evaluation approach, significantly reducing healthcare and educational adaptation effectiveness.

Additionally, a substantial literature gap exists in stakeholder-informed, evidence-based curriculum innovation at KMTU. There are no evaluations of the Diploma in Pharmacy curriculum through frameworks like Harden's Ten Questions Framework, which would examine its relevance, comprehensiveness, and responsiveness, considering contemporary healthcare. The lack of this approach suggests that the more vital insights from lecturers, students, and curriculum experts result in a diminished constructivist responsiveness and flexibility to improvement. Consequently, the study aims to address the gap by analysing the curriculum for completeness and creativity against the innovativeness measurement using Harden's framework.



2.5 Conceptual Framework

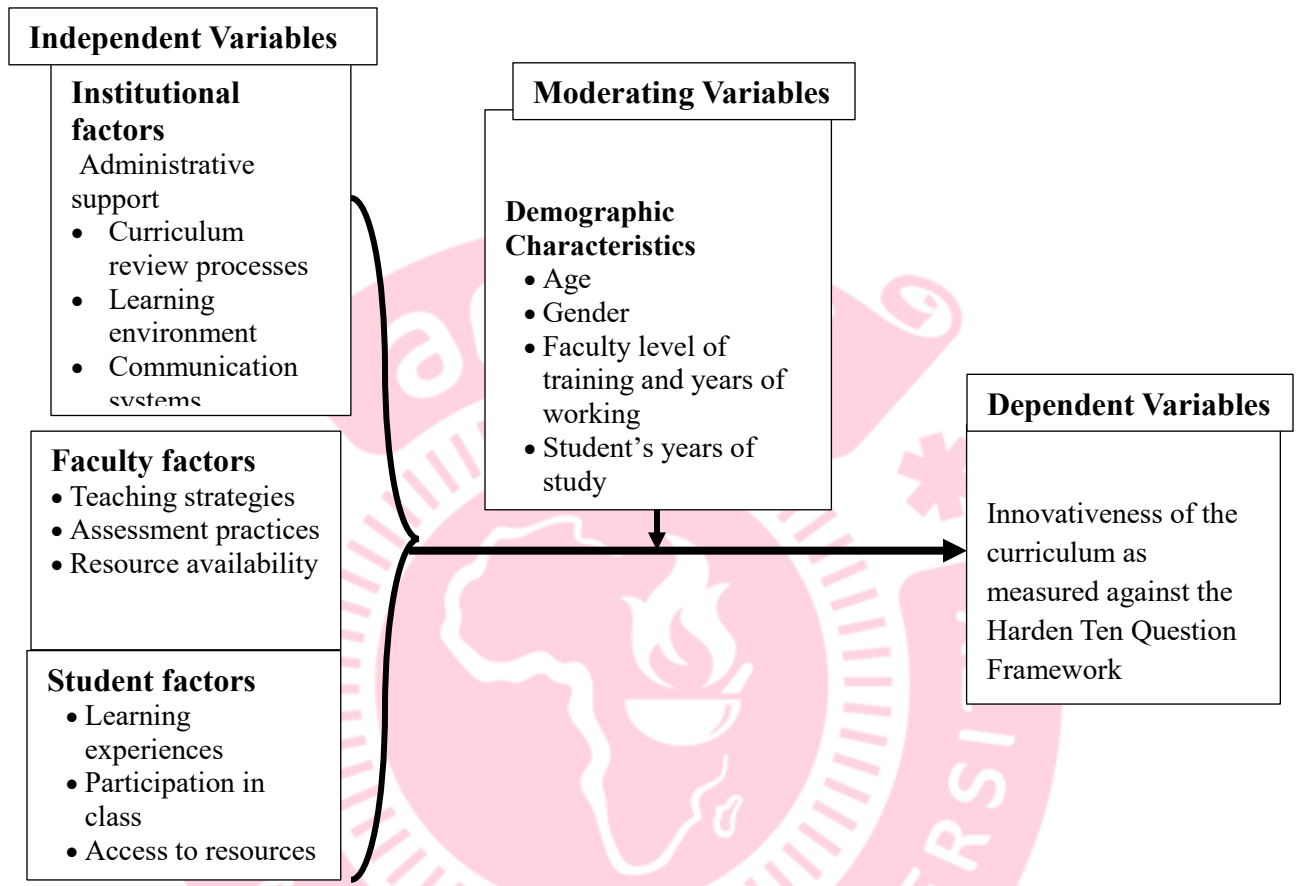


Figure 1: Conceptual Framework

2.6 Summary

Chapter 2 reviews literature on Harden's Ten Questions Framework as a comprehensive model to determine curriculum relevance, structure, and effectiveness in health professions education. The framework is based on several educational theories, including constructivism, andragogy, system, and competency-based education. Empirical evidence points to minimal application of the framework in Kenya, specifically in the Diploma in Pharmacy offered by KMTC. However, there do exist anecdotal concerns related to the preparedness of graduates. It is necessary to consider both the perceptions of lecturers and

students regarding how the curriculum meets evolving healthcare needs. The review reveals a substantial gap, with KMTC's lack of a structured, evidence-based approach to evaluate its pharmacy curriculum. This study intends to fill this gap by applying Harden's framework to assess curricular innovativeness.



CHAPTER 3: METHODOLOGY

3.1 Introduction

This chapter describes the study design, setting, target population, sampling, data collection instruments, data collection procedures, data analysis approaches, ethical considerations, and limitations of this study.

3.2 Research Design

A cross-sectional study design using an online population survey was used. The study targeted an estimated number of students and all staff members within the limited time available. The Diploma in Pharmacy curriculum was assessed through stakeholder ratings focusing on key aspects of the curriculum based on Harden's Ten Questions Framework. Participants' opinions on different curriculum aspects were gathered using Likert scales, allowing a standardized quantitative measure of how effective and professional the curriculum is perceived. This ensured that all views were absorbed in the short window provided and maintained consistency in the data collection method.

According to recent literature, curricula corresponding to at least six of the questions in Harden's Ten Questions Framework have been shown to embrace increased levels of responsiveness, learner engagement, and curriculum innovation (Albushra et al., 2017). Specifically, Azoz et al. (2018) reported that structured curriculum evaluations based on the Harden framework promoted clarity of objectives and consideration of relevance in teaching and assessment strategies, which could be translated into measured increases in student satisfaction and program outcomes. By applying this framework in the present study, the research aimed to establish how many of Harden's elements are incorporated into

the KMTC Diploma in Pharmacy curriculum and how these elements influence stakeholder perceptions regarding the innovativeness of the curriculum.

3.3 Study Area

This study was conducted at the KMTC Nairobi campus, the headquarters of KMTC. KMTC's Department of Pharmacy offers the Kenyan diploma in pharmacy program at six campuses in Nairobi, Maanza, Nyeri, Mombasa, Nakuru, and Kisumu. The Nairobi campus has approximately 250 pharmacy students, four lecturers, and the Head of Department, a population that is adequately diverse to represent the other campuses. The pharmacy diploma program started in 1968. The current curriculum was last revised in 2019 and was due for another review when this study was conducted.

3.4 Target Population

The study population was 201, comprising 189 students and 12 lecturers within the KMTC Nairobi Pharmacy Department. Of the students, 72 were Year 2, 45 were in Year 3, and 31 were Higher Diploma students in Pharmacy, and there was a reasonably even split of 77 males and 112 females. The lecturers responsible were six males and six females, representing each level of education and both sexes for an adequate evaluation of the curriculum.

Table 1: Distribution of Target Population by Level of Study and Gender

Group	Category	Male	Female	Total
Students	Year 1 Diploma	12	18	30
	Year 2 Diploma	33	50	83
	Year 3 Diploma	21	24	45
	Higher Diploma	11	20	31
	Sub-total	77	112	189
Staff	Teaching Staff	6	6	12
Overall Total		83	118	201

3.4.1 Inclusion Criteria

The head of department, faculty members in the pharmacy program, pre-service second- and third-year pharmacy students, and higher diploma in pharmacy students were included in the study since they have sufficient experience in the department to evaluate the curriculum's contents critically.

3.4.2 Exclusion Criteria

All prospective participants who expressed that they have not interacted adequately with the pharmacy curriculum at KMTC to develop a nuanced opinion on its efficacy were excluded. These are first-year diploma students, non-teaching staff, students and staff from other KMTC campuses outside Nairobi and graduates and alumni who are no longer enrolled in or teaching at KMTC Nairobi.

3.4.3 Variables

Dependent Variable. The dependent variable in the study focuses on the Diploma in Pharmacy Curriculum at KMTC Nairobi Campus, which is perceived as an innovative curriculum. This perception quality refers to the extent to which students and lecturers feel the curriculum is well-structured, modern, and aligned with contemporary health and education standards. This pertains to the capacity of the curriculum to assist diploma in pharmacy graduates in developing competencies relevant to the field. The checklist for assessing the curriculum on innovativeness is based on the responses from Participants regarding Harden's Ten Questions Framework.

Independent Variable. The independent variables are components of the Diploma of Pharmacy curriculum, following Harden's Ten Questions framework. These include course

content and organisation, teaching and instructions, assessment, course information, the educational setting, and implementation and management of the curriculum. Each of these aspects reflects on either the structure or instructions inherent in the curriculum and directly affects how it is experienced and perceived by students and lecturers. When imparted elaborately, these variables are expected to shape a genuinely innovative, competency-based curriculum responsive to the ever-changing requirements of the healthcare system.

Moderating Variables. The moderating variables in this study are contextual and modifiers of the relationship between curriculum components and program perception as innovative. They include student characteristics (academic level, prior experience), lecturer workload, professional background, mentor-student ratios, institutional support systems, and accessibility of teaching and learning resources. Such variables can either amplify or weaken the influence of curriculum components on the perception of the program's innovativeness, thus bearing on the general educational outcomes.

3.5 Sample and Sampling Procedures

3.5.1 Sample Size Determination

Participants were selected through a census-type population survey targeting all eligible participants in the Department of Pharmacy, KMTC, Nairobi campus. The research covered all second- and third-year Diploma in Pharmacy students, higher diploma students, all five pharmacy lecturers, and the Head of Department because the population was comparatively small and could provide full participation.

The sampling method was a census for students, where all students were sampled, and a purposive sampling for staff, where all lecturers were sampled and aimed to reach the

overall target of 153= n as calculated using a sample size calculation (Figure 3.1) through StatCalc from Centers for Disease Control and Prevention (CDC)'s Epi Info™ software. Students were persistently asked until this target was met to have complete stakeholder coverage in the study. The inputs into the StatCalc include that this study is a population survey, the population size, N , is 255, the frequency of satisfaction with the curriculum could be 50%, the design effect is 1, and the tolerable margin of error is 5%.

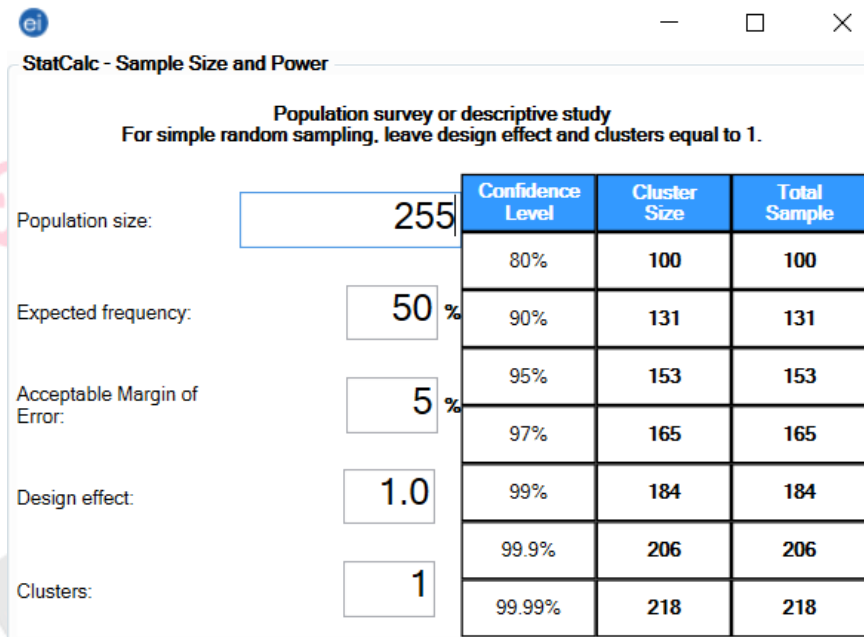


Figure 2: Sample Size Determination

3.5.2 Sampling Procedure

While the diploma in pharmacy program is available at six different KMTTC campuses, the Nairobi campus population was representative, as all campuses use the same curriculum. Each second-year, third-year, and higher diploma student was requested to complete the survey, ensuring that each group was represented. The researcher kept reminding the

participants to complete the questionnaire online until the estimated sample size of 153 was surpassed to 201 participants.

3.6 Data Collection Instruments

A population survey using Harden's Ten Questions model was conducted, which included demographic data and Likert-scale scores. Questionnaire items were derived for all ten Harden's Ten Questions Framework domains: course content, learning objectives, teaching methods, assessment, communication, curriculum management, and educational environment. Sections 1 and 2 assessed responsiveness to healthcare needs and clarity of objectives, and Sections 3 to 6 assessed instructional delivery, feedback, support systems, and monitoring. A structured checklist (Appendix I) was also used to maintain the validity of alignment of every curriculum component against the Harden's Ten Questions Framework. The end survey is presented in Appendix II.

3.7 Validity and Reliability

Several training institutions worldwide have adopted Harden's Ten Questions Framework due to its high validity and reliability. By answering Harden's 10 questions, educators can determine whether or not their curriculum is effectively addressing their goals (Taha et al., 2019).

3.8 Data Collection Procedures

Questionnaire testing was undertaken before the complete data was gathered to determine the online survey instrument's clarity, usability, and general effectiveness. A purposive sample of seven Participants who are alumni and mentors in pharmacy clinical practice, with characteristics similar to those of the target population, was approached to go through

the questionnaire. This exercise was intended to try out the clarity of questions, if logically structured, the survey length, and the technical performance. Feedback was obtained in real-time to pinpoint problem areas in understanding the questions, navigation, or technical glitches. From the feedback, necessary modifications were made to improve the questionnaire's clarity and usability. There were no outstanding problems indicating the suitability of the survey for its final deployment.

Alongside the main questionnaire for the lecturers and students, a structured checklist was devised and utilised to assess the curriculum's alignment against Harden's Ten Questions framework. The checklist acted as a validation matrix to verify whether each item in the checklist, which corresponded with the ten questions central to Harden's framework, aligned with every aspect of the curriculum analysed. The checklist was a qualitative and descriptive validation technique rather than a respondent-completed one. It was an internal consistency measure that used Harden's framework to test if the curriculum encompassed every aspect of it.

3.8.1 Data Collection

The questionnaire was administered as a Google Form online, allowing for the faster distribution of questionnaires to more Participants who could access the tool from anywhere, at any time, as most students were on clinical attachment. A link to the informed consent form was provided on the survey's first page. Some of the target population who declined to participate in the study could click a tab that directed them to exit the survey. Skip logic was applied so that the participants answered only the questions relevant to them.

3.9 Data Analysis and Presentation

The demographic data were summarized using percentages and presented using tables. The survey data were summarized using median and interquartile range. Since the statements in the survey were positively worded, a median of at least 4 with an interquartile range of zero was interpreted as a strength. On the other hand, a median of three or fewer was considered a weakness. Median scores were compared using the Mann-Whitney U test for two groups and Kruskal-Wallis test for more than two groups to determine whether any medians differed significantly from the others. Scheffe's test was applied to determine which groups were statistically significantly different in rating the curriculum.

3.10 Ethical Considerations

AMREF Ethical Scientific Research Committee granted ethical approval for this study. Each study participant signed the written informed consent form (ICF) (Appendix IV). The researcher and her supervisors undertook online courses on the protection of humans in research and signed a data confidentiality agreement (Appendix V). Responding to the survey was voluntary. The risks and benefits of the study were described to the study subjects in the consent form. The ICF also clearly described how their privacy and confidentiality would be maintained. Refusal to participate in the study at any time was not penalized or led to loss of entitled benefits. If a participant withdrew partway through the study, the already collected data were discarded, and their personal decision was respected. All the consent forms were in English, the language of instruction at KMTC, and were appropriate for all the participants.

The National Commission for Science, Technology, and Innovation (NACOSTI) granted permission to conduct the study before data collection, and the KMTC Research and Review Committee also authorized the data collection.

There is no likelihood of a health risk or harm to study participants. However, if study participants suffered emotional or psychological distress, they were referred to a counsellor for appropriate help.

This study is for academic purposes only. The information from participants who agreed to participate extensively contributed to evidence that can be applied to improve the diploma in pharmacy program at the KMTC Nairobi campus.

3.11 Study Constraints and Limitations

According to Creswell and Creswell (2017), the subjectivity of self-reported surveys exposes them to response bias. This bias may be one of the limitations of this study. Also, since the study was done at the Nairobi campus, contextual variability may limit the applicability of its findings to other KMTC campuses offering a Diploma in Pharmacy program.

3.12 Summary

This chapter specifies that the study applied a cross-sectional design and an online population survey approach to collect views of students and staff members in the pharmacy department at the KMTC Nairobi campus on their curriculum. It indicates that the estimated sample size for students and staff was 153, and the total number of participants was 201. All 12 staff members were included. Details of participant recruitment, data

collection, and analysis to answer the research questions on the level of innovation of the Diploma in Pharmacy curriculum used at the KMTC Nairobi campus have been indicated.

CHAPTER 4: RESULTS

4.1 Introduction

This chapter presents the study's results following the specific objectives, detailing the level of innovation in the curriculum and the demographic characteristics of the participants.

4.2 Presentation of Results in Line with Specific Objectives

4.2.1 Lecturers' Perspectives on the Application of Harden's Ten Questions

Participants mainly agreed that the curriculum has innovative elements according to Harden's framework. Concerning Table 4, lecturers positively rated the six curriculum components with median scores ranging from 3.5 to 4, corresponding to "agree" on the Likert scale. The highest medians were recorded in the assessment process, curriculum management, and communication areas, while moderate agreement levels appeared in teaching methods and educational environment.

Table 6 responses showed faculty concerns about the sufficiency of lecturers, instructional media, and learning materials, which appeared to be less innovative areas. Differences in perceptions between students and faculty also emerged in areas such as the coverage of personal etiquette and planning abilities (Table 5) and sufficiency of laboratory equipment (Table 6), pinpointing pockets of discrepancy from the faculty's point of view in curriculum implementation.

4.2.2 Students' Perception of the Application of Harden's Ten Questions

Students generally perceived the curriculum as innovative, given a median score of 3.8 to 4 in all six subscale categories (Table 4). This category included course content, teaching methodology, assessment, and communication. Assessment methods were highly rated, particularly in clarity of types of assessments, structure of types of assessments, and helpfulness of feedback to students (Table 7). Students also rated the communication of course information (Table 8) very highly. There were, however, areas perceived to be lacking. Students were neutral about the sufficiency of instructional resources and integration of computer technology skills (Table 5). In teaching methods, students were concerned about the adequacy of placement sites, the number of lecturers, and instructional materials (Table 6). Further, there were some challenges in the educational environment, such as limited scholarships and placement access issues (Table 9), which point out areas for support.

4.2.3 Innovativeness of the Diploma in Pharmacy Curriculum

Analysis at the subscale level did not reveal any statistically significant variations between the core aspects of the curriculum (Table 2). Both students' and staff's overall median scores for each of the six subscales were about 4, consistent with "agree" on the Likert scale. Although the Mann-Whitney U test revealed that there was a significant difference between the students' and staff's rating of course content ($p = 0.03$), both medians (3.8 vs. 3.7) represented "agree" on the Likert scale. Comparing the medians of the six aspects of the curriculum did not reveal any median that was significantly different from the rest. All the medians ranged from 3.8-4, which translates to "agree" on the Likert scale. Therefore,

it was impossible to identify the curriculum's innovation level by comparing the subscale scores.



Table 2: Median Scores for Subscales

Harden question	Total students and staff Range	Total student and staff Median (IQR)	Staff Median (IQR)	Student Median (IQR)	Test (compare median staff vs students)
Course content	4	3.8 (0.61)	3.7 (0.58)	3.8 (0.59)	0.03
Teaching methods	4	3.8 (0.69)	3.4 (0.56)	3.8 (0.75)	0.281
Assessment process	4	4 (0.67)	4 (0.67)	4 (0.67)	0.781
Communication	4	4 (0.92)	3.8 (0.67)	4 (1)	0.963
Educational environment	4	3.8 (0.54)	3.5 (0.57)	3.9 (0.5)	0.067
Management	4	4 (0.62)	4 (0.67)	4 (0.67)	0.781

The six categories of aspects of the curriculum were rated almost similarly. Overall, the participants agreed with the claims about the curriculum, especially in the assessment process, communication, and management aspects (Figure 3).

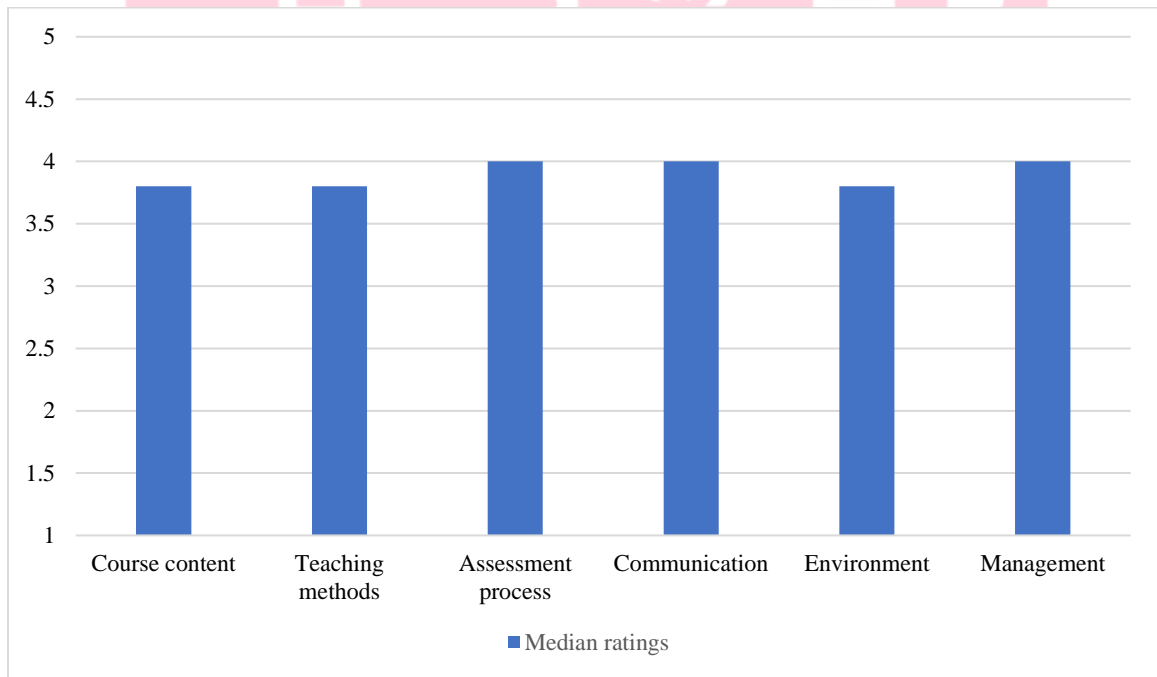


Figure 3: Innovation of KMTC Diploma in Pharmacy Curriculum

Overall, the distribution of the scores of the education environment and management aspects of the curriculum was significantly different across categories of age ($p = 0.015$)

and $p = 0.025$, respectively). The participants aged above 50 years disagreed (median = 2.9) with statements on the education environment, yet participants of the other age groups were mainly neutral regarding them (median = 3.6 – 3.9). Similarly, the participants over 50 years were neutral (median = 3) about the statements on management, yet the other age groups generally agreed (median = 4) with the statements.

Since no significant level of innovation was identifiable at the subscale level, the ratings of the individual items of the survey were compared to identify the ones that were rated the lowest and the highest. Since the items were positively worded, items that had median scores of five (strongly agree) or four (agree) with a zero interquartile range were identified as the curriculum being innovative. Items that had a median rating of less than 3 or 3 with an interquartile range of one or more were identified as the curriculum not being innovative.

Course Content. Most Participants agreed with the statements about the course content, which claimed curriculum innovation. The Participants were neutral on the availability of instructional resources and the coverage of information on computer technology skills. Most statements' responses varied between neutral and strongly agree (Table 3).

Mann-Whitney U test detected a significant variation between students' and staff members' agreements with statements on the coverage of personal etiquette and teamwork (median = 4 vs. 3, $p = 0.006$), effectiveness of the program in enhancing teamwork (median = 4 vs. 3, $p = 0.014$), effectiveness in developing planning activities (median = 4 vs. 3, $p = 0.009$), and effectiveness in developing personal and phone etiquette (median = 4 vs. 3, $p = 0.02$), respectively.

Kruskal-Wallis test detected that those students in the three years of study of the diploma in pharmacy program differed in their agreement with the statement on sufficiency and appropriateness of the portal-availed instructional resources (class 2 median = 3, other classes median = 4; $p = 0.026$). Their agreement with the statement on the adequacy of the work in the program also varied (class 1 median = 3, other classes median = 4; $p = 0.004$). Students in the diploma in pharmacy program significantly differed from their higher diploma counterparts on agreement with statements on the explanation of the objectives of the module at the beginning of the semester (median = 4 vs. 5, $p = 0.001$) and coverage of basic computer technology skills in the course (median = 3 vs 4, $p = 0.0001$), respectively. Other statements in which their extents of agreement differed include encouragement of participation by teaching and learning methods (median = 4 vs 5, $p = 0.006$), adequacy of the work in the program (median = 4 vs 5, $p = 0.0001$), and effectiveness of the program in developing independent thinking (median = 4 vs 5, $p = 0.014$), respectively.

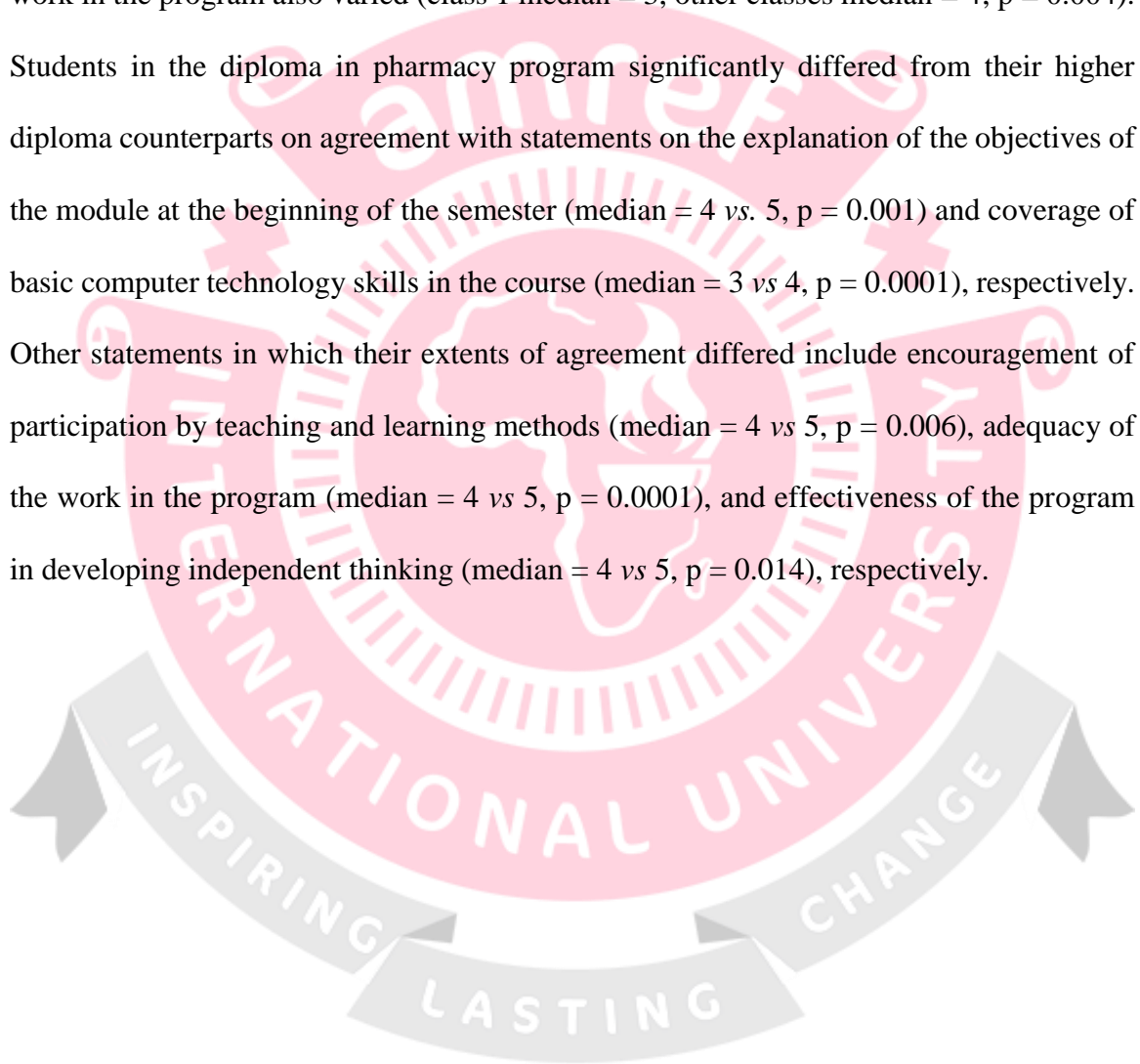


Table 3: Participants' Scores of Their Agreement with the Statements on Course Content

	Median score	Interquartile range
The objectives of each module are explained at the beginning of the semester	4	0
The module's content demonstrates how basic and clinical sciences are related	4	0
The module content explains well the steps for the dispensing skill	4	0
The instructional resources made available on the portal were sufficient and appropriate.	3	1
The module content covers personal etiquette and how to work professionally as a team with colleagues	4	1
Module content prepares students well for challenges in the working environment	4	1
The material is well organized and presented	4	1
Theoretical and practical components are interconnected.	4	1
The course covers basic information computer technology skills	3	2
The lecturers encourage group work and presentations in class	4	1
The teaching and learning methods encourage participation	4	0
The work in the program is adequate and does not induce undue pressure.	4	1
The program is effective in enhancing team-working abilities.	4	1
The program is effective in developing independent thinking.	4	0
The program is effective in developing analytical and problem-solving skills.	4	1
The program is effective in developing written communication skills	4	1
The program is effective in developing planning abilities.	4	1
The program is effective in developing personal and phone etiquette	4	1
The program prepares students for challenges in the work environment	4	1

Teaching Methods. The participants agreed with all statements on teaching methods, except for the sufficiency of the number of lecturers and instructional media, and teaching materials, where they expressed neutrality. The participants' responses varied between neutral and strongly agree for most of the statements (Table 4). Students and staff members differed on the agreement with the statements on sufficiency of laboratory equipment and working stations (median = 4 vs. 3, $p = 0.01$), sufficiency of lecturers (median = 3 vs. 1.5, $p = 0.0001$), sufficiency of instructional media and teaching materials (median = 4, $p =$

0.002), and adequacy and appropriateness of learning resources in the library (median = 4 vs. 3), respectively.

Agreements with the statements varied by class in terms of timeliness of feedback from faculty members (class 2 median = 3, other classes median = 4; $p = 0.002$), sufficiency of placement sites (class 3 median = 3, other classes median = 4; $p = 0.006$), and sufficiency of instructional media and teaching materials (class 2 median = 3, other classes median = 4; $p = 0.011$), respectively.

Table 4: Participants' Scores of Their Agreement with Statements on Teaching Methods

Item	Median score	Interquartile range
The course integrates theory with clinical applications	4	0
Research develop knowledge gathering and content integration	4	1
Assignments and group work increases student autonomy	4	0
Make use of different types of educational strategies	4	1
Clearly explain the methods of assessment from the start of the program	4	1
Faculty members provide timely feedback after each assessment	4	1
Sufficient placement sites with good student mentor ratio	4	1
Laboratory equipment and working stations sufficient for student numbers	4	1
The course content is modern and updated	4	1
Sufficient number of lecturers to meet the workload in the department	3	2
Instructional media and teaching materials are sufficient	3	1
Recommended reading books are relevant and appropriate	4	0
Provision of learning resources in the library is adequate and appropriate	4	1
The program is well structured to achieve the learning outcomes	4	0
Faculty was able to meet the program objectives	4	1
Student summative evaluation and exit performance is done to evaluate program quality	4	0

Assessment Process. The participants precisely agreed with the statements on the structure and value of assessment. Although they generally agreed that feedback on assessment is timely, most of their responses ranged between neutrality and strong agreement (Table 5). Year two diploma in pharmacy students were neutral regarding the statement on the timeliness of feedback on assessments (class 2 median = 3, other classes median = 4; $p = 0.001$).

Table 5: Participants' Agreement with Statements on Assessment Process

Item	Median score	Interquartile range
The method of assessment is well structured	4	0
Feedback on the assessment is timely	4	1
Feedback on the assessment is helpful in highlighting mistakes and correcting them	4	0

Communication of course information. The participants largely agreed with statements on the communication of course information. The responses varied from neutral to strongly agree for five of the six statements (Table 6). They were precise in their descriptions of the teaching methods at the beginning of the semester.

Table 6: Participants' Agreement with Statements on Communication of Course Information

Item	Median score	Interquartile range
Students go through orientation at the beginning of the program	4	1
Teaching methods are clearly described at the beginning of the program	4	0
Resources available for the training program are well defined	4	1
Course timetables are rolled out at the beginning of the semester	4	1
Course outlines are rolled out at the beginning of the semester	4	1
Platforms are available for easy communication between teachers and	4	1

Educational Environment. The participants agreed with all statements on the education environment except the availability of scholarships/ grants to students and the restriction of going to placement sites daily by student numbers, which they were neutral about. Most responses varied between neutral and strongly agree (Table 7). Students' and members of staff' responses differed on conduciveness of the overall environment in the classroom (median = 4 vs. 3, $p = 0.008$), sufficiency of the infrastructure (median = 4 vs. 2.5, $p = 0.011$), availability of scholarships (median = 3 vs. 2, $p = 0.027$), and the constructiveness of social relationships among students (median = 4 vs. 3, $p = 0.06$), respectively. Unlike other participants who agreed with the statement on close monitoring and follow-ups in the clinical areas, diploma in pharmacy students in year 2 were neutral (class 2 median = 3, other classes median = 4; $p = 0.002$).

Table 7: Participants' Agreement with Statements on the Education Environment

Item	Media n score	Interquartile range
The overall environment in the classroom is conducive for learning	4	0
The school environment is safe with good ambience and a positive culture	4	1
The infrastructure of the department is good and sufficient	4	1
The program is comprised of co-curricular and extracurricular activities	4	1
Scholarships/ grants are available to students in case of hardship	3	1
The social relationships among students are constructive	4	0
Students are included in creating a conducive learning environment	4	1
Lecturers provide discipline where necessary	4	0
Students are motivated to strive to excel in their studies	4	0
Support from teachers and parents contribute to the creation of positive	4	1
The nature of the school environment creates a strong influence on the way	4	0
It is challenging to get placement sites	4	1
There is close monitoring and follow-up by mentors in the clinical areas	4	1
Student numbers restrict going to placement sites daily	3	1

Management of Curriculum Implementation. The Participants agreed with the statements on managing curriculum implementation. Participants agreed with the management of curriculum implementation items, sharing a uniform median rating of 4 and an interquartile range of 1. They acknowledged that systems of curriculum monitoring, evaluation, and administrative support are in place. This reflects a general positive sentiment for how the curriculum is managed for learning. Their responses to the three statements mainly ranged from neutral to strongly agree (Table 8).

Table 8: Participants' Agreement with Statements on the Management of Curriculum Implementation

Item	Median score	Interquartile range
The curriculum implementation process is monitored continuously to identify gaps	4	1
Curriculum analysis is done to necessitate curriculum evaluation and review	4	1
The program administration is effective in supporting learning	4	1

4.3 Curriculum Alignment with HTQF: Checklist Mapping Findings

The KMTC Pharmacy Diploma Curriculum is well-aligned with certain key areas of Harden's Ten Questions Framework, particularly those concerning national healthcare needs, educational aims and objectives, and embedding professionalism and ethics in the course content. Being modular and competency-based, it offers an ascending order of learning, with plenty of stakeholder involvement during curriculum development and periodic reviews. A few important topics, such as Pharmacy Law and Ethics, are included, with learning outcomes indicated and a definite course module pathway (Table 9).

Methods of instruction have many important gaps missed in the student-centred approach, from which Problem-Based Learning (PBL) is a part. Also, the assessment strategy falls

short in assessing professional behaviour through self and peer assessment. Most teaching methods focus on traditional teaching, and an educational climate that encourages reflective and ethical learning is not defined. Strengthening these areas would assist the program in developing pharmacy professionals who can rely on both their technical skills and appropriate ethical conduct.

Table 9: Curriculum Adherence to Harden's Ten Questions Framework

Harden's Question	Theme	Key Indicators of the Theme	Covered in Curriculum? (Yes:1 No/partially:0)	Evidence from the Curriculum
1. What are the needs in relation to the product?	Production of ethically and socially responsible healthcare professionals	- Alignment with healthcare demands - Emphasis on professionalism - Responsiveness to national needs	1	Curriculum review based on training needs assessment and market demands
2. What are the aims and objectives?	Holistic development in ethics, knowledge, and attitude	- Conceptual, attitudinal, and practical objectives - Defined professional behaviour outcomes	1	Clearly stated aim to develop competent, ethical pharmaceutical technologists
3. What content should be included?	Integration of professionalism, ethics, and accountability	- Ethics, integrity, professionalism - Legal and social accountability - Knowledge, skills, and attitudes	1	Covered in modules such as "Pharmacy Law and Ethics" and professional conduct references

Harden's Question	Theme	Key Indicators of the Theme	Covered in Curriculum? (Yes:1 No/partially:0)	Evidence from the Curriculum
4. How should the content be organised?	Progressive, modular structure building toward competence	- Modular structure - Logical content progression - Competency-based approach	1	Structured with modules per semester and defined learning outcomes
5. What educational strategies should be adopted?	Competency-based, learner-centred, reflective	- Competency-based - Learner-centered - PBL - Self-directed learning	0	Competency-based learning is mentioned, but student-centred and PBL strategies are not explicit
6. What teaching methods should be used?	Active, collaborative, and experiential learning	- PBL - Group work - Reflection - Case-based learning	0	Lectures and Practicals dominate; PBL or case-based strategies are not specified
7. How should assessment be carried out?	Assessment aligned with ethical and professional behaviours	- Self and peer assessment - Professionalism checklists - Reflective evaluation	0	Assessment focuses on technical modules; it lacks tools for assessing professionalism or ethics
8. How should details of the curriculum be communicated?	Clear and accessible dissemination of curriculum structure	- Transparency - Student guides - Communication platforms	0	Curriculum structure is clear, but delivery methods (e.g., LMS, handbooks) are not mentioned
9. What educational environment or	Supportive, open, and ethical learning culture	- Non-threatening - Reflective - Interactive	0	Positive values highlighted, but learning climate

Harden's Question	Theme	Key Indicators of the Theme	Covered in Curriculum? (Yes:1 No/partially:0)	Evidence from the Curriculum
climate should be fostered?		- Tutor facilitation		features not explicitly defined
10. How should the process be managed?	Collaborative and quality-assured implementation	- Faculty training - Stakeholder involvement - Continuous review	1	Involves stakeholders in curriculum review and incorporates ongoing quality improvement

4.4 Demographic Characteristics of Participants

Most of the 201 Participants were young adults aged less than 26 years (Table 10). Participation was equally distributed across genders. Almost all of them were students pursuing a diploma in pharmacy. The majority of the diploma in pharmacy students were second years. Among the higher diploma students, barely half had completed their diploma in pharmacy at KMTC. Some of them completed the diploma in pharmacy more than 10 years ago (Table 10).

The teaching staff, mainly teaching subjects related to pharmacy, were the primary staff members who participated in the survey (Table 2). In addition to the three who had worked at KMTC for less than a year, the other eight had been at KMTC for a long time; seven had worked for more than five years. One non-teaching staff member participated.

Table 10: Demographic Characteristics of the Survey Participants

Demographic	Categories	Frequency (Percentage)
Age	18-20	51 (25.4)
	21-25	78 (38.8)
	26-35	39 (19.5)
	36-50	28 (13.9)
	51 and above	4 (2.0)
Gender	Male	102 (51.2)
	Female	98 (48.8)
Occupation	Student	189 (94)
	Staff	12 (6)
Program	Diploma in pharmacy	158 (83.6)
	Higher diploma in pharmacy	31 (16.4)
Class	First year	30 (19.0)
	Second year	83 (52.5)
	Third year	45 (28.5)
Higher diploma student	Diploma (KMTC)	17 (54.8)
	Diploma (non-KMTC)	14 (45.2)
Years since graduation from KMTC for higher diploma students	3-10	10 (58.8)
	More than 10	7 (41.2)
Staff type	Teaching	11 (84.6)
	Non-teaching	1 (15.4)
Teaches	Pharmacology and related	10 (90.9)
	Others	1 (9.1)
Job title	Lecturer	9 (75)
	Administrative	2 (16.7)
	Not teaching	1 (8.3)
KMTC working experience	Less than 1	3 (23.1)
	1-5	3 (23.1)
	6-10	4 (30.8)
	More than 10	3 (23.1)

4.5 Summary

A total of 201 participants, including students and twelve staff members, responded to the survey. They rated most aspects of the course mostly strongly, which indicates that they largely perceived the Diploma in Pharmacy curriculum as being innovative, especially in all aspects of the assessment process, communication of course information, and

management of curriculum implementation. The only lack of innovation noted includes insufficiency and inappropriateness of the available instructional resources on the portal and inadequate coverage of basic information and computer technology skills in the course content. In terms of teaching methods, an insufficient number of lecturers, given the workload, and insufficient instructional media and teaching materials, emerged as a lack of innovation. Unavailability of scholarships or grants for students in case of hardship, and student numbers exceeding placement capacity, showed a lack of innovation regarding the educational environment.



CHAPTER 5: DISCUSSION

5.1 Introduction

This chapter discusses this study's results by synthesising the results on the level of curriculum innovation in the context of related evidence.

5.2 Discussion of Findings

5.2.1 Lecturers' Perspective on the Application of Harden's Ten Questions

Based on the interviews, it was highly agreed that the curriculum meets most considerations under Harden's Ten Questions framework. Staff members acknowledged precise educational needs and learning outcomes, well-articulated course content, and a modular framework following a competency-based approach. These findings align with Ferdous (2018), who argues for the need for well-structured content for student success. However, the lecturers raised problems of teaching resources, instructional materials, and technology integration, highlighting the picture of a curriculum well thought out in theory, while being poor in realisation. Loflin (2015) concurs with the statement, arguing that curriculum fidelity requires attention to resourcing and curriculum management processes that engage stakeholders. There was also a discrepancy between faculty perception and student perception regarding instructional sufficiency and delivery, whereby alignments need to be looked into, and investments made into faculty and infrastructure capacity.

5.2.2 Students' Perception of the Application of Harden's Ten Questions

Students reported moderate to strong agreement that the curriculum was innovative and appreciated the organisation of assessments and communication clarity. They agreed on coordinating goals, content, and assessments with researched competencies. This aligns

with Almoghirah et al. (2023), who reported that modern students prefer guided feedback and relevance to the real world. However, students noted weaknesses in digital incorporation and insufficient instructional materials. In the same way as with the concerns of Alowais et al. (2024), learners in this study did not care about computer skills training and the suitability of internet learning materials. Dissatisfaction with access to placements and limited use of interactive and learner-centred pedagogies was also felt, indicating a difference between the teaching pedagogy and the demands of a competence-based approach promoted by (Wijngaards-de Meij & Merx, 2018).

5.2.3 Innovativeness of the Diploma in Pharmacy Curriculum

The entire curriculum showed moderate innovation from student and staff feedback. Innovation was associated with the specification of module aims, the integration of basic sciences and clinical, and modularity. The faculty and students agreed that the application of technology, inter-professional practice, and curriculum governance are areas where much improvement needs to be made.

Wilkerson et al. (2009) report that learning environments should facilitate reasoning and evidence-based practice, a feature that was partially facilitated under this curriculum. The stakeholders' feedback was also low in student participation in curriculum governance and top-down decision-making, which was unfavourable for flexibility and creativity. These results also reflect Hale and Adhia (2022) recommendation of more student participation and feedback incorporation in reapportioning the curriculum.

5.2.4 Curriculum Alignment with Harden's Ten Questions Framework: Checklist

Mapping

The checklist mapping against the curriculum confirms that the KMTC diploma in pharmacy curriculum was aligned with Harden's Ten Questions Framework. The data obtained through the instrument were also comprehensive, adding to its content validity for measuring curriculum innovation and adoption. The curriculum complies with Harden's Ten Questions Framework by addressing national healthcare needs, explicitly stating learning objectives, including professionalism and ethics, and operationalising content via a modular, competency-based approach. There is evidence of the application of systematic curriculum design, periodic review, and legal and ethical modules to ensure graduates are prepared to meet professional standards and community expectations.

5.3 Summary

The content of the KMTC's diploma of pharmacy curriculum is appropriate for preparing pharmaceutical technologists for care delivery to communities in Kenya. The study indicated that the KMTC Diploma in Pharmacy curriculum is innovative when mapped against Harden's Ten Questions. The curriculum demonstrates innovation in identifying educational needs, defining clear learning outcomes, and aligning content and evaluations to professional standards. However, improvement is still desirable in many areas to enhance the curriculum's performance. In particular, teaching methods remain mainly traditional, with very few learner-centred and blended learning approaches. Assessment strategies need further innovation and to become more competency-based. Furthermore, technology and interprofessional learning are poorly integrated; student input in the curriculum management is limited; there is weak engagement with industry stakeholders;

and quality assurance practice is irregular and not data-driven. These gaps require continuous review and stakeholder engagement to keep the curriculum relevant to changing healthcare needs.



CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter summarises this study's findings and recommends future practice and research activities based on the findings.

6.2 Conclusions

The study concludes that the KMTTC diploma in pharmacy curriculum is innovative in some aspects but lacks innovation in the involvement of stakeholders, student participation, and quality assurance. The findings from the staff provided strong evidence of alignment with the foundational aspects of curriculum design, particularly defining educational needs, specifying appropriate learning outcomes, and selecting the right content. Faculty members acknowledged that structured assessment existed but expressed concern about their lack of innovative practices and authenticity in evaluating real-world competencies. Lecturers pointed out gaps in curriculum delivery methods, technology and professional collaboration use, student involvement in curriculum management, and stakeholder engagement.

The findings from students corroborated some of these concerns. While students agreed that the curriculum had clear goals and relevant content, they expressed moderate satisfaction with content delivery methods and assessments. They wanted more interactive, practical, and problem-oriented learning. Limited mentoring, clinical integration, and feedback were cited as areas that set back the alignment between learning opportunities and expected outcomes. Students also mentioned their lack of involvement in decision-

making concerning curriculum governance and identified inadequacies with digital tools and access to assorted education resources.

Filling these gaps will enhance the curriculum's ability to respond to modern health needs and better prepare graduates for the changing arena of pharmacy practice.

6.3 Recommendations

Future curriculum reviews can incorporate this study's findings by enhancing aspects of the curriculum where a lack of innovation was identified. The recommended improvement initiatives include integrating digital literacy in the curriculum, hiring more lecturers, providing the missing instructional media and teaching materials, establishing partnerships with stakeholders in the healthcare sector to provide adequate mentoring and practical opportunities, and providing scholarships and grants to students with financial hardships.

The study recommends that the curriculum adopt learner-centred approaches, such as Problem-Based Learning (PBL), to enhance students' critical thinking and practical application. Additionally, blended learning and digital tools need to be used more to create more interactive teaching experiences that align with the demands of modern competency-based education.

Another recommendation is to use student-centred approaches such as Problem-Based Learning (PBL) to enhance critical thinking and practical application among students. Blended learning and technology tools must be integrated to facilitate greater interactive learning experiences that meet the needs of contemporary competency-based learning.

Opportunities for feedback generated by students and teachers must be maximised, especially since Year 2 students complained of poor digital literacy support, delayed

feedback, and inferior placement facilities. These differences indicate improved technological access, placements, and interactive feedback provisions. Students and staff alike preferred improved funding, along with a more favourable physical and social learning climate, to drive motivation and engagement.

6.3.1 Further Research

Future researchers should conduct focused group discussions and key informant interviews on the identified areas lacking innovation to gain a deeper understanding. They can obtain detailed descriptions of the interventions the students, lecturers, and partners in the field would propose to improve the curriculum, further enriching their contributions to the curriculum review.

Further research can also be conducted to determine the adoption of electives to align with an innovative curriculum model.

6.4 Summary

Overall, the Diploma in Pharmacy program used at the KMTC Nairobi campus is considered strong by students and lecturers. However, it lacks innovation in technology and resources, which presents opportunities for improvement. Some student groups and staff members have expressed unique concerns about aspects of the curriculum, indicating the need for targeted interventions. Findings of this curriculum analysis can be integrated into the forthcoming curriculum review and further researched by discussing the prominent areas where the curriculum lacks innovation with students and staff members for a more in-depth analysis.

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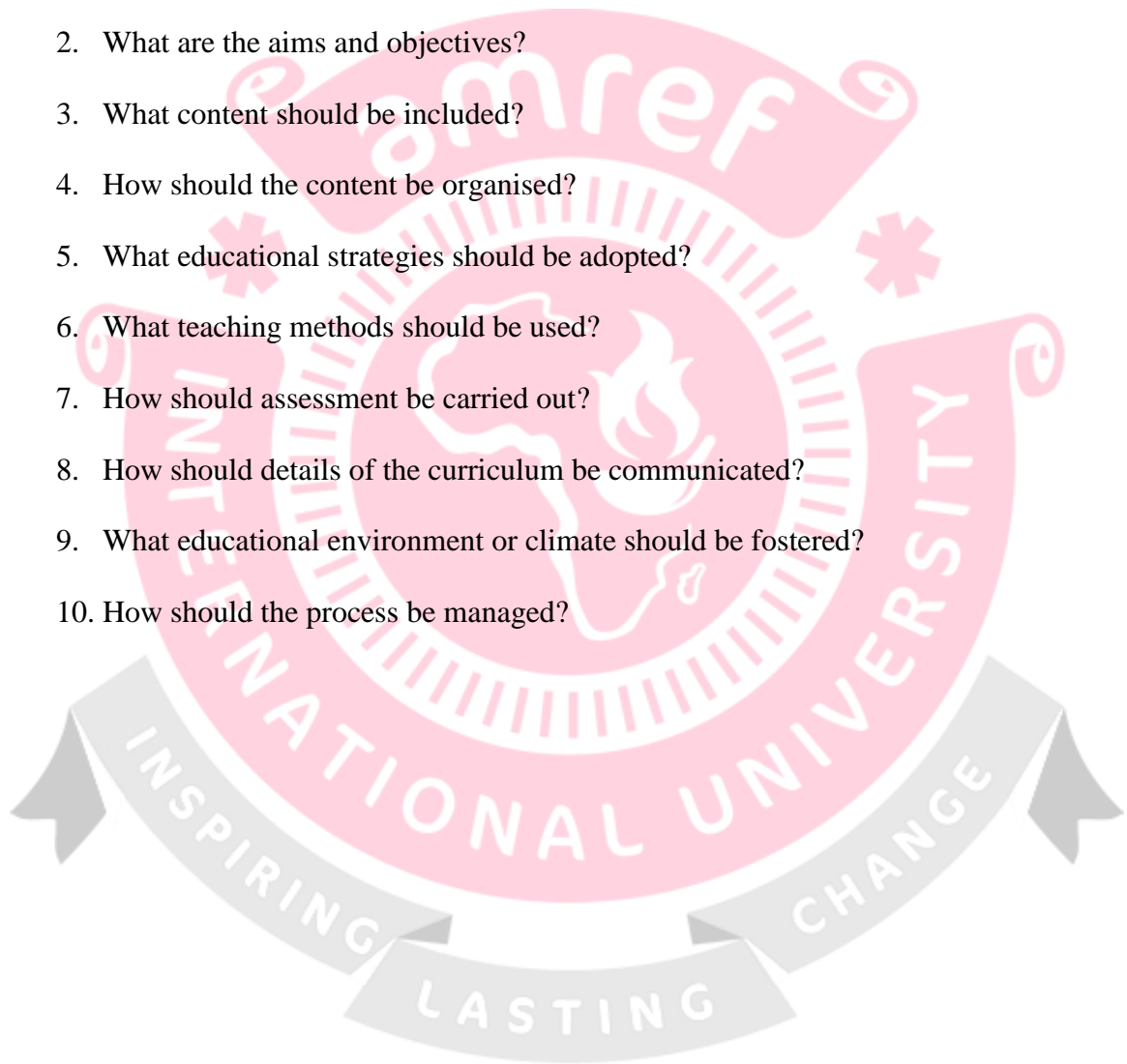
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APPENDICES

Appendix I: Harden's Ten Questions Framework

1. What are the needs in relation to the product of the training programme?
2. What are the aims and objectives?
3. What content should be included?
4. How should the content be organised?
5. What educational strategies should be adopted?
6. What teaching methods should be used?
7. How should assessment be carried out?
8. How should details of the curriculum be communicated?
9. What educational environment or climate should be fostered?
10. How should the process be managed?



Appendix II: Questionnaire

I am Caroline Babu, a master's student at AMREF International University, currently undertaking a course in Health Professional Education. I am doing a study on Determinants of Adoption of an Innovative Curriculum Model Among Lecturers and Learners in the Pharmacy Department at the Kenya Medical Training College, Nairobi Campus. My questionnaire will cover various aspects of the curriculum for the Diploma in Pharmacy at KMTCC. I am administering the questionnaire to second- and third-year Diploma in Pharmacy students at KMTCC, higher national diploma students in the Pharmacy Department at KMTCC, faculty members teaching Diploma in Pharmacy students, and Diploma in Pharmacy program leaders.

Instructions.

- Do not write your name on the questionnaire
- Information given will be private and confidential
- Tick the appropriate response

A. Demographic Information

1. What is your age?

- a. 18-20
- b. 20-25
- c. 25-35
- d. 35-50
- e. Above 50

2. What is your gender?

a. Male

b. Female

3. What is your occupation?

a. Student

b. Staff

If you are a student, proceed to 4. If you are a staff member, skip to 8

4. In which program are you currently enrolled?

a. Diploma in pharmacy

b. Higher diploma in the Department of Pharmacy

c. Other

If you are a diploma in pharmacy student, proceed to 5. If you are a higher diploma student, skip to 6.

5. In which class of the diploma of pharmacy program are you?

a. First year

b. Second year

c. Third year

6. Did you complete your diploma in pharmacy at KMTC?

a. Yes

b. No

If yes, proceed to 7

7. How many years have passed since you graduated?

a. Less than 3

b. 3-10

c. More than 10

8. Are you a teaching or non-teaching staff member?

a. Teaching staff member (specify what you teach)

b. Non-teaching staff member (specify your job title)

9. For how many years have you been working at KMTC?

a. Less than 1

b. 1-5

c. 6-10

d. More than 10.

In the following section, please indicate your level of agreement with the statements provided by selecting the correct response:

Survey Scale:

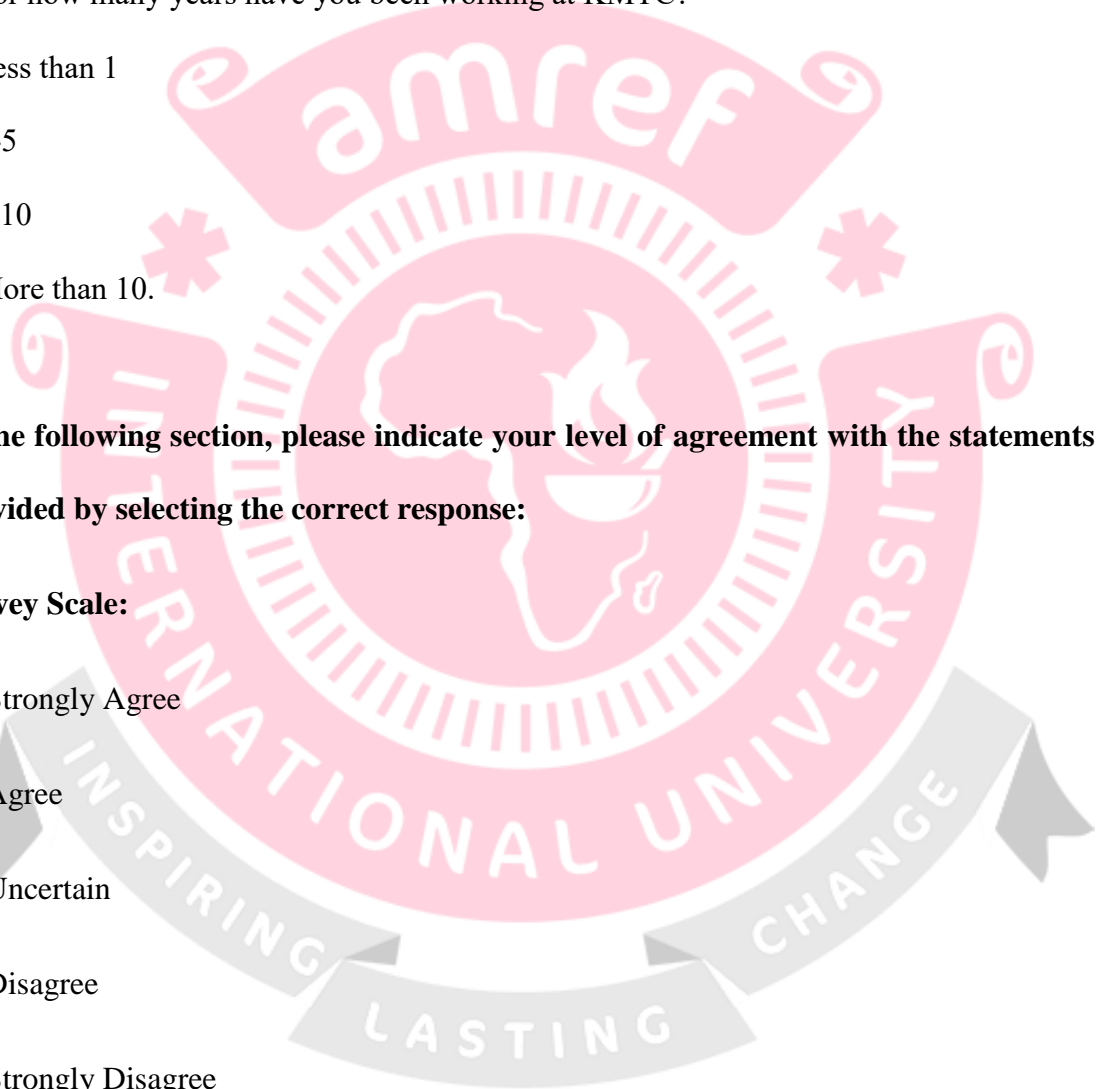
1= Strongly Agree

2= Agree

3= Uncertain

4= Disagree

5= Strongly Disagree



1. Course Content/Content Organization

No.	Item	1	2	3	4	5
1	The objectives of each module are explained at the beginning of the semester					
2	The module's content demonstrates how basic and clinical sciences are related.					
3	The module content explains well the steps for dispensing skill					
4	The instructional resources made available on the portal were sufficient and					
5	The module content covers personal etiquette and how to professionally work as					
6	Module content prepares students well for challenges in the working					
7	The material is well organized and presented					
8	The module's content demonstrates how basic and clinical sciences are related.					
9	Theoretical and practical components are interconnected.					
10	The course covers basic information computer technology skills					
11	The lecturers encourage group work and presentations in class					
12	The teaching and learning methods encourage participation					
13	The work in the program is adequate and does not induce undue pressure.					
14	The program is effective in enhancing team-working abilities.					
15	The program is effective in developing independent thinking.					
16	The program is effective in developing analytical and problem-solving skills.					
17	The program is effective in developing written communication skills					
18	The program is effective in developing planning abilities.					
19	The program effective in developing personal and phone etiquette					
20	The program prepares students for challenges in the work environment					

2. Teaching Methods/Educational Strategies

No.	Item	1	2	3	4	5
1	The course integrates theory with clinical applications					
2	Research develop knowledge gathering and content integration					
3	Assignments and group work increases student autonomy					
4	Make use of different types of educational strategies					
5	Clearly explain the methods of assessment from the start of the program					
6	Faculty members provide timely feedback after each assessment					
7	Sufficient placement sites with good student mentor ratio					
8	Laboratory equipment and working stations sufficient for student numbers					
9	The course content is modern and updated					
10	Sufficient number of lecturers to meet the workload in the department					
11	Instructional media and teaching materials are sufficient					
12	Recommended reading books are relevant and appropriate					
13	Provision of learning resources in the library is adequate and appropriate					
14	The program is well structured to achieve the learning outcomes					
15	Faculty was able to meet the program objectives					
16	Student summative evaluation and exit performance is done to evaluate program quality					

3. Assessment Process

No.	Item	1	2	3	4	5
1	The method of assessment is well structured.					
2	Feedback on the assessment is timely.					
3	Feedback on the assessment is helpful in highlighting mistakes and correcting them.					

4. Communication of Course Information

No.	Item	1	2	3	4	5
1	Students go through orientation at the beginning of the program.					
2	Teaching methods are clearly described at the beginning of the program.					
3	The resources available for the training program are well-defined.					
4	Course timetables are rolled out at the beginning of the semester.					
5	Course outlines are rolled out at the beginning of the semester.					
6	Platforms are available for easy communication between teachers and students					

5. Educational Environment

No.	Item	1	2	3	4	5
1	The overall environment in the classroom is conducive for learning					
2	The school environment is safe with good ambience and a positive culture					
3	The infrastructure of the department is good and sufficient					
4	The program comprises co-curricular and extracurricular activities.					
5	Scholarships and grants are available to students in cases of hardship.					

6	The social relationships among students are constructive.					
7	Students are included in creating a conducive learning environment.					
8	Lecturers provide discipline where necessary.					
9	Students are motivated to strive to excel in their studies.					
10	Support from teachers and parents contributes to the creation of positive					
11	The nature of the college environment creates a strong influence on the way students develop and learn.					
16	It is challenging to get placement sites.					
17	There is close monitoring and follow-up by mentors in the clinical areas.					
18	Student numbers limit daily visits to the placement sites.					

6. Management of curriculum implementation

No.	Item	1	2	3	4	5
1	The curriculum implementation process is monitored continuously to identify gaps					
2	Curriculum analysis is done to necessitate curriculum evaluation and					
3	The program administration is effective in supporting learning.					

Appendix III: Checklist of Questionnaire Items Assessed Against Harden's Ten Categories

The curriculum was assessed by observing its adherence to Harden's Ten Question Framework, using a Likert scale of 1 (Yes, the question has been adhered to) to 0 (No, the question has not been adhered to).

Harden's Question	Key Theme	Questionnaire Section(s)	Sufficiently Covered	
			Yes	No
1. What are the needs in relation to the product?	Graduate preparedness & employability	Course Content, Educational Environment		
2. What are the aims and objectives?	Stated learning goals	Course Content		
3. What content should be included?	Relevant and sufficient content	Course Content, Teaching Methods		
4. How should the content be organised?	Content structure	Course Content, Communication		
5. What educational strategies should be adopted?	Broad instructional approach	Teaching Methods		
6. What teaching methods should be used?	Specific delivery methods	Teaching Methods		
7. How should assessment be carried out?	Assessment strategies	Assessment Process		
8. How should details of the curriculum be communicated?	Transparency & clarity	Communication of Course Information		
9. What educational environment or climate should be fostered?	Learning atmosphere	Educational Environment		
10. How should the process be managed?	Implementation & monitoring	Curriculum Management		

Appendix IV: Informed consent form

Ethics & Scientific Review Committee Informed Consent Form

Study Title: Determinants of Adoption of an Innovative Curriculum Model Among Lecturers and Learners in the Pharmacy Department at the Kenya Medical Training College, Nairobi Campus

Principal Investigator: Caroline Adhiambo Awuor Babu, MSc Health Professional Education

Supervisors: Dr. Solomon Kilaha, Dr. Elizabeth Kemigisha

Sponsor/Collaborators: None

Part I: Information Sheet

I, Caroline Adhiambo Awuor Babu, a student of MSC in Health Professional Education at AMREF International University, is doing research among administrators, faculty members, and students of the diploma in pharmacy program at the Kenya Medical Training College (KMTTC) Nairobi Campus to analyze the diploma in pharmacy curriculum. I am giving you this information because I would like you to participate, you are free to choose to do so. You will continue to receive educational services the way that you normally would with no negative impact even if you chose not to participate in this study. I want to make sure that you have all the information that you need before you decide. I am here to help you understand more about the research. If you do not understand any of the words or ideas that you see on this form, please ask me to explain the information to you.

Why is this Research Important?

The aim of this study is to describe the strengths, weaknesses, and improvement opportunities for the diploma in pharmacy curriculum at KMTC. I hope to generate evidence that stakeholders involved in curriculum review and update can apply to make evidence-based modifications to the curriculum. Your ratings of the various aspects of the curriculum are of great importance to this study. I will be grateful if you are honest and trustful in answering my questions. If you agree to participate in this study, you will proceed to answer questions on your demographics and ratings of the diploma in pharmacy curriculum.

Who can participate?

You have been invited to take part in this study because you are a leader, lecturer, or student of the diploma in pharmacy program at KMTC. I feel that your experiences with the diploma in pharmacy curriculum will help me understand better the issues that I have just explained above.

Participation is your choice

Your participation in this research is completely voluntary. You will make the choice about whether you will participate or not. If you choose not to take part, you will continue to receive all of the services that you usually get in your community and nothing will change.

What is involved in this research?

If you agree to participate in this study, I would like you to answer the questions in this form by clicking “I agree.” The questions are about your occupation at KMTC and how

you find the various aspects of the diploma in pharmacy curriculum. Answering the questions will take no more than 30 minutes. Your identification details will not be collected. Apart from me and my supervisors, no one else will access your responses to the questions. If changes are made to the study or new information becomes available, you will be informed.

How long will the research last?

This study is expected to take six months.

What are the risks?

Some of the questions that will be asked are of a personal nature and may make you feel uncomfortable. Your participation is completely voluntary and you are free to refuse to answer any question if it makes you uncomfortable. You are also free to withdraw from this study at any time without penalty or loss of any benefits to which you are entitled.

An inconvenience may be the time and effort you take to be a participant. A risk may be a breach of confidentiality (something you say is accidentally provided to others) but we will take precautions to see that this does not happen.

What are the benefits?

There will be no direct benefit to you, but your participation is likely to help in the identification of improvement areas for the diploma in pharmacy curriculum. Curriculum reviewers will get evidence base for updating the curriculum from the recommendations in this study. Though there are no direct benefits to you for participating in the study, you may

find an indirect benefit in knowing you participated in an important study that could help you and others in the future.

How will we protect your information and confidentiality?

The information that we collect from this research will be kept private. We will need to keep a record of your name and this information will only be used to verify that you consented to participate in the study. Any information about you will have a number on it instead of your name. Only the researcher will know what your number is and I will keep that information in a password-protected Google Drive account only accessible by me. It will not be shared with or given to anyone outside of our research. The collected data will be stored in a password-protected computer that is accessible only by me.

What will happen with the results?

The knowledge that we get from this research will be shared with you and the KMTC fraternity before it is made widely available to the public. Each participant will receive a summary of the results in their email address. The results will then be published in a dissertation and a peer-reviewed research article. A policy brief will also be prepared to communicate the findings to the KMTC management for consideration of the recommendations in the forthcoming curriculum review.

Can I refuse to participate or withdraw from the study?

You do not have to take part in this research if you do not wish to do so. If you choose not to participate, you will continue to receive all of the normal services that you usually get and nothing will change. If you wish to stop participating in the study after you begin, you can stop at any time. If you choose to stop taking part, you will continue to get all of the

normal services that you usually get at KMTC. If you feel uncomfortable about some questions, you may skip to the next question.

Who can I contact?

If you have any questions, you can ask me. Contact me at this number 0724229172. If you have questions about your rights as a research participant, you may contact:



The Research Officer

AMREF Kenya

Wilson Airport, Lang'ata Road

Office Tel: +254 20 6994000 Fax: +254 20 606340

P.O Box 30125-00100 Nairobi, Kenya

Appendix V: Data Confidentiality Agreement

Data Confidentiality Agreement for Study Staff

This Data Confidentiality Agreement (the “Agreement”) is for study staff with respect to the study entitled:

__ Determinants of Adoption of an Innovative Curriculum Model Among Lecturers and Learners in the Pharmacy Department at the Kenya Medical Training College, Nairobi Campus__

conducted by __ Caroline Adhiambo Awuor Babu, a master’s student at AMREF International University _____

[organisation(s)]

is made

BETWEEN:

Name of study staff: __CAROLINE AHIAMBO AWUOR BABU_____

Address: _____434-00202 NAIROBI_____

AND:

Name of authorized representative: _____Dr. SOLOMON KILAHA_____

Address: _____kilahas@yahoo.com_____

The company/organisation(s) possesses valuable confidential information (as herein defined) regarding tools and materials appertaining to its research and development information and that of its participants. In consideration of the necessary disclosure of study participants' confidential information during the period of engagement in the study, the undersigned study staff hereby covenants and agrees as follows:

1. Confidentiality

The study staff acknowledges that in the course of engagement in this study, he/she will be exposed to study participants' confidential information. The study staff therefore agrees to treat all such information as confidential and to take all necessary precautions against disclosure of such information to third parties during and after the term of this agreement. The study staff acknowledges that study participants' confidential information will consist of, but not necessarily limited to participant personal identifiers and the company/organisation's tools and research materials relating to the study participants. The study staff understands that this agreement does not and will not prevent him/her from working for any other company/organisation(s) subsequent to the termination of this engagement as long as the study staff does not make use of or disclose any such confidential and proprietary information.

“Confidential Information” shall mean any non-public information that the company/organisation(s) specifically marks and designates, either orally or in writing, as confidential or which, under the circumstances surrounding the disclosure, ought to be treated as confidential. “Confidential Information” in this context includes but is not limited to, descriptive material, server (access codes) containing the participants' study

information, organisation(s)/company's information obligated to be treated as confidential and any other materials and information of a confidential nature.

“Confidential Materials” shall mean all tangible materials containing confidential information, including without limitation, statements, data collection sheets, tapes, and compact disks (CD), whether machine or user readable, and all storage containing the study information.

Data storage, sharing and security

The data from the study will be stored in a secure server where only authorised individuals will have access to the data. This data will be backed up on a secure server with access granted only by the investigators in each institution. All parties will implement and maintain appropriate technical and organisational measures to safeguard the data against unlawful and unauthorised processing and against accidental loss, destruction of and/or damage to the data. In particular, all parties will:

- Keep the data strictly private and confidential including encryption, pseudonymization or anonymization of personal data where appropriate;
- Prevent absolutely any unauthorized disclosures of personal data and minimize any authorized disclosure of personal data to third parties to the fullest extent possible.

This includes not sending or receiving the data through non-secure means such as email, social media and any other such media.

- Allow access to the data through access controls to ensure this requirement is satisfied. This means that anyone who would like to use the data, including

students, will only be allowed to do so after being granted permission from the principal investigator and after signing a data sharing agreement.

- Ensure that any recipients of the data are subject to a binding duty of confidentiality in relation to the data. This means that anyone who is granted access to the data is not allowed to share, without prior written agreement from the Principal Investigator.
- The parties will retain the data for five years after study completion. However, neither party will destroy information without first informing the other parties.
- All parties will take reasonable steps to ensure the reliability of all (whether study staff, volunteers, students, contractors or otherwise) who may have access to the personal data, and to ensure that they are adequately trained in the good handling of the data and are subject to a duty of confidentiality.
- Study Staff shall return all originals, copies and any study material of confidential information and/or confidential materials at the Principal Investigator's request.

2. Data processing and record keeping

All parties will process data only in accordance with standard procedures and established practice; and will not use the data for any purpose other than those set out in this agreement.

All parties will maintain a record of the processing activities which relate to this Agreement in accordance with the requirements of the study country's Protection Regulations as stipulated in Clause 7 of this agreement.

3. Enforcement

The study staff acknowledges and agrees that any breach of this Agreement may cause irreparable injury to the study participants and the organisations involved. The study staff

therefore agrees that if he/she commits a breach of any of the provisions of this Agreement, the responsible organisation shall have the right to enforce this Agreement in any court of law having equity jurisdiction.

4. Termination

All materials furnished to study staff by the involved organisations during this study, and all materials prepared by the study staff in connection with employee's engagement in this study including without limitation documents, source codes, along with all copies made thereof, shall be returned promptly to the responsible organisation upon termination of the study staff's engagement in the study. This Agreement commences when it is signed and dated by all parties and will continue unless terminated early for a period of one (1) year. The agreement will be renewed annually as required to ensure compliance with relevant legislation and best practice.

5. Ownership

The study staff agrees that all developments made and works created by study staff or under study staff's direction in connection with the study shall be the sole and complete property of the responsible organisation(s), that any and all copyrights and other proprietary interests therein shall belong to the responsible organisations, and that the other provisions of this Agreement shall fully apply to all such developments and works.

6. Governing Law

This agreement shall be construed in accordance with the data protection act: Kenya Law (Act No. 24 of 2019).The agreement is also intended to ensure compliance with the Data

Protection Act 1998, the General Data Protection Regulation, and the Data Protection Act 2018 by all parties.

7. Indemnification

The study staff agrees to pay liquidated damages the amount as determined by a court of law in Kenya for any violation of the covenant not to disclose confidential information contained in this Agreement.

Binding Agreement

If any parts of these promises are void for any reason, the undersigned accepts that it may be severed without affecting the validity or enforceability of the balance of the promises. This agreement constitutes the entire agreement between/among the parties with respect to the subject matter hereof. It shall not be modified except by a written agreement dated subsequent to the date of this agreement and signed by both parties.


This Agreement shall be binding upon and inure to the benefit of the parties, their successors, assigns and personal representatives.

IN WITNESS WHEREOF, each party to this Agreement has caused it to be executed at

..KENYA MEDICAL TRAINING COLLEGE.....on the date18/2/2023.....

Name of authorised representative

Study Staff

Signature  Date 18/2/23
 Dr. Solomon Kilaha, PhD
 Educationist and Curriculum Consultant
 Adjunct Faculty/ Proposed Academic Lead MSHPE
 Amref International University

Signature  Date 18/2/23
 Caroline Babu

Authorised signature

Authorised signature

DR. SOLOMON KILAHA

CAROLINE BABU

Print Name

Print Name

RESEARCH SUPERVISOR

PRINCIPAL

INVESTIGATOR

Print Title

Print Title



Data Confidentiality Agreement for Study Staff

This Data Confidentiality Agreement (the “Agreement”) for study staff with respect to the study entitled:

__Determinants of Adoption of an Innovative Curriculum Model Among Lecturers and Learners in the Pharmacy Department at the Kenya Medical Training College, Nairobi Campus__

conducted by **__ Caroline Adhiambo Awuor Babu, a Master’s Student at AMREF International University __**

[organisation(s)]

is made

BETWEEN:

Name of supervisor: **__ Dr. SOLOMON KILAHA __**

Address: kilahas@yahoo.com __

AND:

Name of student researcher: **__ CAROLINE ADHIAMBO AWUOR BABU __**

or authorized representative

Address: **_434-00202 NAIROBI _**

Caroline Adhiambo Awuor Babu possesses valuable confidential information (as herein defined) regarding tools and materials appertaining to research and development information and participants. In consideration of the necessary disclosure of study participants' confidential information during the period of engagement in the study, the undersigned hereby covenants and agrees as follows:

1. Confidentiality

The study staff acknowledges that in the course of engagement in this study, he/she will be exposed to study participants' confidential information. The study staff therefore agrees to treat all such information as confidential and to take all necessary precautions against disclosure of such information to third parties during and after the term of this agreement. The study staff acknowledges that study participants' confidential information will consist of, but not necessarily limited to participant personal identifiers and the company/organisation's tools and research materials relating to the study participants. The study staff understands that this agreement does not and will not prevent him/her from working for any other company/organisation(s) subsequent to the termination of this engagement as long as the study staff does not make use of or disclose any such confidential and proprietary information.

“Confidential Information” shall mean any non-public information that the company/organisation(s) specifically marks and designates, either orally or in writing, as confidential or which, under the circumstances surrounding the disclosure, ought to be treated as confidential. “Confidential Information” in this context includes but is not limited to, descriptive material, server (access codes) containing the participants' study

information, organisation(s)/company's information obligated to be treated as confidential and any other materials and information of a confidential nature.

“Confidential Materials” shall mean all tangible materials containing confidential information, including without limitation, statements, data collection sheets, tapes, and compact disks (CD), whether machine or user readable, and all storage containing the study information.

2. Data storage, sharing and security

The data from the study will be stored in a secure server where only authorised individuals will have access to the data. This data will be backed up on a secure server with access granted only by the investigators in each institution. All parties will implement and maintain appropriate technical and organisational measures to safeguard the data against unlawful and unauthorized processing and against accidental loss, destruction of and/or damage to the data. In particular, all parties will:

- Keep the data strictly private and confidential including encryption, pseudonymization or anonymization of personal data where appropriate;
- Prevent absolutely any unauthorized disclosures of personal data and minimize any authorized disclosure of personal data to third parties to the fullest extent possible. This includes not sending or receiving the data through non-secure means such as email, social media and any other such media.
- Allow access to the data through access controls to ensure this requirement is satisfied. This means that anyone who would like to use the data, including

students, will only be allowed to do so after being granted permission from the principal investigator and after signing a data sharing agreement.

- Ensure that any recipients of the data are subject to a binding duty of confidentiality in relation to the data. This means that anyone who is granted access to the data is not allowed to share, without prior written agreement from the Principal Investigator.
- The parties will retain the data for five years after study completion. However, neither party will destroy information without first informing the other parties.
- All parties will take reasonable steps to ensure the reliability of all (whether study staff, volunteers, students, contractors or otherwise) who may have access to the personal data, and to ensure that they are adequately trained in the good handling of the data and are subject to a duty of confidentiality.
- Study Staff shall return all originals, copies and any study material of confidential information and/or confidential materials at the Principal Investigator's request.

2. Data processing and record keeping

All parties will process data only in accordance with standard procedures and established practice; and will not use the data for any purpose other than those set out in this agreement.

All parties will maintain a record of the processing activities which relate to this Agreement in accordance with the requirements of the study country's Protection Regulations as stipulated in Clause 7 of this Agreement.

3. Enforcement

The study staff acknowledges and agrees that any breach of this Agreement may cause irreparable injury to the study participants and the organisations involved. The study staff

therefore agrees that if he/she commits a breach of any of the provisions of this Agreement, the responsible organisation shall have the right to enforce this Agreement in any court of law having equity jurisdiction.

4. Termination

All materials furnished to study staff by the involved organisations during this study, and all materials prepared by the study staff in connection with employee's engagement in this study including without limitation documents, source codes, along with all copies made thereof, shall be returned promptly to the responsible organisation upon termination of the study staff's engagement in the study. This Agreement commences when it is signed and dated by all parties and will continue unless terminated early for a period of one (1) year. The agreement will be renewed annually as required to ensure compliance with relevant legislation and best practice.

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The study staff agrees that all developments made and works created by study staff or under study staff's direction in connection with the study shall be the sole and complete property of the responsible organisation(s), that any and all copyrights and other proprietary interests therein shall belong to the responsible organisations, and that the other provisions of this Agreement shall fully apply to all such developments and works.

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Protection Act 1998, the General Data Protection Regulation, and the Data Protection Act 2018 by all parties.

7. Indemnification

The study staff agrees to pay liquidated damages the amount as determined by a court of law in Kenya for any violation of the covenant not to disclose confidential information contained in this Agreement.

8. Binding Agreement

If any parts of these promises are void for any reason, the undersigned accepts that it may be severed without affecting the validity or enforceability of the balance of the promises. This agreement constitutes the entire agreement between/among the parties with respect to the subject matter hereof. It shall not be modified except by a written agreement dated subsequent to the date of this agreement and signed by both parties.

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IN WITNESS WHEREOF, each party to this Agreement has caused it to be executed at

..KENYA MEDICAL TRAINING COLLEGE.....on the date18/2/2023.....

Name of Principal Investigator
or authorised representative

Study Staff

Signature  Date 18/2/23
Caroline Babu

Signature  Date 18/2/23
Dr. Solomon Kilaha, PhD
Educationist and Curriculum Consultant
Adjunct Faculty/ Proposed Academic Lead MSHPE
Amref International University

Authorised signature

Authorised signature

CAROLINE BABU

DR. SOLOMON

KILAHA

Print Name

Print Name

PRINCIPAL INVESTIGATOR

RESEARCH SUPERVISOR

Print Title

Print Title

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conducted by **__ Caroline Adhiambo Awuor Babu, a master’s student at Amref International University**

[organisation(s)]

is made

BETWEEN:

Name of supervisor: **__ DR. ELIZABETH KEMIGISHA__**

Address: **_AFRICAN POPULATION AND HEALTH RESEARCH CENTER, NAIROBI_**

AND:

Name of student researcher: **__ CAROLINE AHIAMBO AWUOR BABU__**

or authorized representative

Address: _434-00202 NAIROBI _

The company/organisation(s) possess valuable confidential information (as herein defined) regarding tools and materials appertaining to its research and development information and that of its participants. In consideration of the necessary disclosure of study participants' confidential information during the period of engagement in the study, the undersigned study staff hereby covenants and agrees as follows:

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- Allow access to the data through access controls to ensure this requirement is satisfied. This means that anyone who would like to use the data, including

students, will only be allowed to do so after being granted permission from the principal investigator and signing a data sharing agreement.

- Ensure that any recipients of the data are subject to a binding duty of confidentiality regarding the data. This means that anyone who is granted access to the data is not allowed to share without prior written agreement from the Principal Investigator.
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3. Enforcement

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the responsible organisation shall have the right to enforce this Agreement in any court of law having equity jurisdiction.

4. Termination

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..KENYA MEDICAL TRAINING COLLEGE.....on the date18/2/2023.....

Name of Principal Investigator
or authorised representative

Study Staff

Signature.....
Date 18/2/23
Caroline Babu

Handwritten signature

Authorised signature

Authorised signature

 CAROLINE BABU

 _DR. ELIZABETH

 KEMIGISHA_

Print Name

Print Name

 PRINCIPAL INVESTIGATOR

 RESEARCH SUPERVISOR

Print Title

Print Title



Appendix VI: Similarity Index Certificate, Research Permit, ESRC Approval Letter, and Evidence of Publication

Caroline Babu

1. TT- Caroline_THESIS CORRECTION FINAL 22ND MAY 2025 Dr AK reviewed 27 May 2025 DrAk 28 May 2025.docx

- MPH Proposals Checks
- MPH Thesis
- Amref International University (AMIU)

Document Details

Submission ID

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File Size

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61 Pages

12,099 Words

71,791 Characters



Page 1 of 67 - Cover Page

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Caroline Babu
Amref International University
P.O. Box 27691-00506
Nairobi, Kenya
Tel: +254724229172
Email: cmuwale@gmail.com

Dear Caroline Babu,

RESEARCH PROTOCOL: STRENGTHS, WEAKNESSES AND OPPORTUNITIES FOR IMPROVING THE DIPLOMA IN PHARMACY CURRICULUM AT KENYA MEDICAL TRAINING COLLEGE, NAIROBI CAMPUS

Thank you for submitting your protocol to the Amref Ethics and Scientific Review Committee (ESRC).

This is to inform you that the ESRC has reviewed and approved your protocol. Your application approval number is ESRC P1506/2023. The approval period is from November 20, 2023, to November 19, 2024, and is subject to compliance with the following requirements:

- a) Only approved documents (including informed consents, study instruments, advertising materials, material transfer agreements, etc.) will be used.
- b) All changes including (amendments, deviations, violations, etc.) are submitted for review and approval by Amref ESRC before implementation.
- c) Death and life-threatening problems and serious adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the Amref ESRC within 72 hours of notification.
- d) Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to Amref ESRC within 72 hours.
- e) Clearance for export of biological specimen must be obtained from the relevant government authorities for each batch of shipment/export.
- f) Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
- g) In case of late renewal, the Amref ESRC shall not be held responsible for any serious adverse events (SAEs) that may occur as a result of research activities that were carried out after the expiry of approval.
- h) Submission of an executive summary report within 90 days upon completion of the study to the Amref ESRC.
- i) All government regulations for prevention and control of the spread of COVID-19 including social distancing, provision of personal protective equipment for participants and research assistants should be adhered to during data collection. All research assistants should be monitored for COVID 19 symptoms and referred for testing in case they present with symptoms.



Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) <https://research-portal.nacosti.go.ke> and also obtain other clearances needed.

Please do not hesitate to contact the ESRC Secretariat (esrc.kenya@amref.org) for any clarification or query.



Chair, Amref ESRC
CC: Samuel Muhula, Senior Manager, Learning and Impact Amref Health Africa.



REPUBLIC OF KENYA

Ref No: 968320

RESEARCH LICENSE



This is to Certify that Ms.. CAROLINE ADHIAMBO BABU of Amref International University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev:2014) in Nairobi on the topic: Strengths, Weaknesses and Opportunities for Improving the Diploma in Pharmacy Curriculum at Kenya Medical Training College, Nairobi Campus for the period ending : 15/December/2024.

License No: NACOSTI/P/23/32029

968320

Applicant Identification Number

W. Adhiambo

Director General

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Verification QR Code



NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

See overleaf for conditions

The National Commission for Science, Technology and Innovation, hereafter referred to as the Commission, was established under the Science, Technology and Innovation Act 2013 (Revised 2014) herein after referred to as the Act. The objective of the Commission shall be to regulate and assure quality in the science, technology and innovation sector and advise the Government in matters related thereto.

CONDITIONS OF THE RESEARCH LICENSE

1. The License is granted subject to provisions of the Constitution of Kenya, the Science, Technology and Innovation Act, and other relevant laws, policies and regulations. Accordingly, the licensee shall adhere to such procedures, standards, code of ethics and guidelines as may be prescribed by regulations made under the Act, or prescribed by provisions of International treaties of which Kenya is a signatory to
2. The research and its related activities as well as outcomes shall be beneficial to the country and shall not in any way:
 - i. Endanger national security
 - ii. Adversely affect the lives of Kenyans
 - iii. Be in contravention of Kenya's international obligations including Biological Weapons Convention (BWC), Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), Chemical, Biological, Radiological and Nuclear (CBRN).
 - iv. Result in exploitation of intellectual property rights of communities in Kenya
 - v. Adversely affect the environment
 - vi. Adversely affect the rights of communities
 - vii. Endanger public safety and national cohesion
 - viii. Plagiarize someone else's work
3. The License is valid for the proposed research, location and specified period.
4. The license any rights thereunder are non-transferable
5. The Commission reserves the right to cancel the research at any time during the research period if in the opinion of the Commission the research is not implemented in conformity with the provisions of the Act or any other written law.
6. The Licensee shall inform the relevant County Director of Education, County Commissioner and County Governor before commencement of the research.
7. Excavation, filming, movement, and collection of specimens are subject to further necessary clearance from relevant Government Agencies.
8. The License does not give authority to transfer research materials.
9. The Commission may monitor and evaluate the licensed research project for the purpose of assessing and evaluating compliance with the conditions of the License.
10. The Licensee shall submit one hard copy, and upload a soft copy of their final report (thesis) onto a platform designated by the Commission within one year of completion of the research.
11. The Commission reserves the right to modify the conditions of the License including cancellation without prior notice.
12. Research, findings and information regarding research systems shall be stored or disseminated, utilized or applied in such a manner as may be prescribed by the Commission from time to time.
13. The Licensee shall disclose to the Commission, the relevant Institutional Scientific and Ethical Review Committee, and the relevant national agencies any inventions and discoveries that are of National strategic importance.
14. The Commission shall have powers to acquire from any person the right in, or to, any scientific innovation, invention or patent of strategic importance to the country.
15. Relevant Institutional Scientific and Ethical Review Committee shall monitor and evaluate the research periodically, and make a report of its findings to the Commission for necessary action.

National Commission for Science, Technology and
Innovation(NACOSTI),
Off Waiyaki Way, Upper Kabete,
P. O. Box 30623 - 00100 Nairobi, KENYA
Telephone: 020 4007000, 0713788787, 0735404245
E-mail: dg@nacosti.go.ke
Website: www.nacosti.go.ke

Appendix VII: Evidence of Publication



Acceptance of Manuscript

Ref: MU/1/57/002/25

Date: 23rd June 2025

Dear **Ms. Caroline Babu**,

We are pleased to inform you that your manuscript titled “**Alignment of a Diploma in Pharmacy Curriculum at a Medical Training College in Kenya with the Harden’s Ten Questions Framework: An Online Population Survey among Faculty Members and Students**” has been accepted for publication in the **African Journal of Science, Technology and Social Sciences**. The paper will be scheduled for inclusion in one of our upcoming issues.

We sincerely appreciate your contribution to the journal and your dedication to advancing knowledge in your field. We believe that your work will make a significant impact on our readership.

Thank you for choosing to publish with the African Journal of Science, Technology and Social Sciences. We look forward to the opportunity to work with you again in the future.

Please feel free to contact us if you have any further questions or need additional information regarding the publication process.

Best regards,

Dr. Zachary Chiliswa

Editor-in-Chief

African Journal of Science, Technology and Social Sciences

journal@must.ac.ke