Examining Alignment between the Intended and Enacted Curricula with Respect to LGCSE Chemistry: A Case Study of Three Schools in Leribe

BY

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DECLARATION

I, Konosoang Letsie, thus declare that this study titled "**Examining Alignment between the Intended and Enacted Curricula with Respect to LGCSE Chemistry: A Case Study of Three Schools in Leribe**" is my own work. It has never been submitted for an award for a degree or examination at any university, and all sources used have been properly cited.

Signature: …………………………………… **Date: …………………………..**

Supervisor:

Dr. M. Makhechane

Signature: ………………………………….. **Date: ………………………….**

DEDICATION

I dedicate this work to my late family members, my Father and two Brothers (Mr. Lewanika, Masupha and Chonisa Letsie), who never saw this adventure. “You will forever be a part of every breath I take and every decision I make”.

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ABSTRACT

A Curriculum and Assessment Policy framework (CAP) was developed and published in Lesotho in 2009, with the goal to guide the transformation of teaching and learning, as well as assessment (MoET, 2009). This policy framework was also adopted to guide the process of localization through the provision of principles which would guide the implementation of the Lesotho General Certificate of Secondary Education (LGCSE). However, literature has showed that such policies hardly get translated into the classrooms. The study examined the alignment between the intended curriculum as prescribed by CAP and the enacted curriculum, with respect to LGCSE Chemistry.

This qualitative study was delimited to Grade 9 Chemistry discipline in three schools in Leribe. Data were collected from three teachers using three research instruments: lesson plan, classroom observations and interview schedules. A total of six lessons were observed and audio-recorded and teachers also interviewed. Data were analysed using both deductive thematic analysis and deductive content analysis. While Stake's (1967) Countenance model only served as a guide in collection and analysis of data in this study, Bernsteim's (2000) concepts of classification and framing were employed in detailed analysis of data. The study examines this alignment in five dimensions as per CAP's prescriptions.

The findings revealed an alignment, to some degree, between CAP and the syllabus, and a misalignment between CAP and teachers' lesson plans as well as corresponding classroom instructions. The mismatch appeared to be caused by the classroom instructional approaches that are both teacher and examination driven, lack of resources and insufficient training concerning what is expected of teachers. The findings therefore suggest a need to ensure alignment between examinations and the intended curriculum, offer teachers continuous professional development workshops, and to better equip schools with the requisite resources. The study consequently advances the field of curriculum studies, through provision of useful perceptive information on how Chemistry is taught in connection with the intended curriculum.

KEYWORDS: Curriculum, Curriculum Alignment, CAP, Chemistry, and LGCSE

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS AND ACRONYMS

1. CA – Constructive Alignment
2. CAP – Curriculum and Assessment Policy
3. CAPS – Curriculum and Assessment Policy Statements
4. CIA – Curriculum, Instruction and Assessment
5. COSC – Cambridge Overseas School Certificate
6. ECM – English Church Mission
7. ECoL – Examinations Council of Lesotho
8. HOTS – Higher Order Thinking Skills
9. IR – Initiation Response structure
10. LEs – Learning Experiences
11. LGCSE – Lesotho General Certificate of Secondary Education
12. LOs – Learning Outcomes
13. MoET – Ministry of Education and Training
14. NCDC – National Curriculum Development Centre
15. PEMS – Paris Evangelical Mission Society
16. RCM – Roman Catholic Church
17. SA – South Africa

Table of Contents

CHAPTER ONE: INTRODUCTION

1.0 Introduction

This chapter outlines the background to the study by providing a short history of the Lesotho curriculum reforms, the Curriculum and Assessment Policy framework and the Lesotho General Certificate of Secondary Education programme. Additionally, the chapter presents the statement of the problem, purpose of the study, research questions and the significance of the study.

1.1 Background to the Study

Lesotho often reviews its curriculum in an attempt to meet the needs of its nation. The country has attempted a number of curriculum and assessment reforms since its independence in 1966 (Raselimo & Mahao, 2015). Those reforms include curriculum diversification reform, the core curriculum reform and the Ordinary Level (O' level) localization reform. The curriculum diversification reform was enacted in 1974 with the purpose of attaining the goals of self-reliance among the youth. The core curriculum reform, on the other hand, was intended to increase efficiency in the operations of high and secondary schools with more focus placed on three subjects that were considered core: science, mathematics and English Language (Ministry of Education, Sports and Culture, 1982).

The last reform, the O' level localization reform, which is relevant to this study, took a long time before it was enacted. One of the main reasons for this delay was the lack of understanding between the National Curriculum Development Centre (NCDC) and Examinations Council of Lesotho (ECoL) regarding what localization of education in Lesotho entails (Nketekete, 2001). Although the country conceptualised O' level localization in 1995, the process was never completed until 2006 when a common understanding of localization of senior secondary education was reached between NCDC and ECoL. A policy framework was then envisioned which would involve the restructuring of the educational system of the country (NCDC, 2006). As a result, in 2009, a Curriculum and Assessment Policy (CAP) framework was developed and published with the aim to guide the transformation of teaching and learning, as well as assessment (MoET, 2009). According to Mopeli (2017), the word policy is defined as a straightforward declaration of how an organization plans to carry out its services and activities. Therefore, CAP provides a set of guiding principles to assist in decision-making pertaining to the latest reform in the country's education system.

In order to provide a quality and relevant education, which is the main aim of CAP, the policy framework identifies five learning areas and five curriculum aspects. Those learning areas are Linguistic and Literacy, Numerical and Mathematics, Personal, Spiritual and Social, Scientific and Technological and Creativity and Entrepreneurial. Chemistry forms part of the Scientific and Technological learning area in that it forms part of the Physical Science subject. The curriculum aspects, according to CAP, underline the main life challenges and circumstances in which a learner is expected to function as an individual and a member of the society in Lesotho. These curriculum aspects include: effective communication; awareness of self and others; environmental adaptation and sustainable development; health and healthy living; and production and work-related competences. According to Letsie (2019), these curriculum aspects demonstrate the country's dedication to provide Basotho students with quality and relevant education. The author maintains that the notion of relevant education is applicable in the context of an integrated curriculum. This is because the learner is a member of the community, therefore learning should take into account their daily experiences, and consequently, school and community life needs to be interwoven (MoET, 2009). However, Letsie (2019) points out that it would be helpful to reflect on the extent to which MoET's vision, through CAP, for a transformed education system finds attainment in classroom practices, not only in syllabi, as might be the case.

The CAP framework was also adopted in order to guide the process of localization through provision of principles that would guide the implementation of Lesotho General Certificate of Secondary Education (LGCSE) (MoET, 2009). Drawing on the policy framework, the introduction of LGCSE began in 2012 and was rolled out to all schools in 2016. The programme started with, among other things, the introduction of LGCSE syllabi, memos and question papers for various subjects (Letsie, 2019). The Physical Science syllabus formed part of those introduced LGCSE syllabi and comprises Physics and Chemistry disciplines. Chemistry, which is the focus of this research, is taught as part of Science and Technology in Basic Education and is taught within the scope of Physical Science from Grade 9 up to Grade 11.

The CAP document has many sections. However, since the concern of the study with this document is with the intended pedagogy or how teachers are expected to carry out their instructions in classrooms, more emphasis will be put on the pedagogy section of the document.

According to CAP, the focus in pedagogy has moved from:

> Teaching to facilitating learning; from transfer of facts to student construction of knowledge; from memorization of information to analysis, synthesis, evaluation and application of information; from knowledge acquisition to development of knowledge, skills, values and attitude; from categorized knowledge to integrated knowledge; from didactic teaching to participatory, activity centered and interactive methodologies (MoET, 2009: 6 Executive summary).

This shift in pedagogy also changed the roles of learners and teachers. It is stated that pedagogy should shift from teaching to facilitating learning hence teachers ought to be facilitators of students' learning. They should create an environment that can empower learners to comprehend and take in new concepts (Selepe, 2016). The students, on the other hand, are expected to be knowledge creators, as it is stated that they do not come to class as empty vessels to be filled up with information. The policy explicitly stated that learners are to become more responsible for their learning, which should be to "identify, formulate and solve problems by themselves and evaluate their work" (MoET, 2009: 18).

The policy framework advocates an integrated approach in the lower grades of basic education, which sets in motion a move from compartmentalized subject-based instruction to treatment of issues holistically, relating to intelligence, personal, maturity and social development of the learner. This, according to Raselimo and Mahao (2015), reflects the country's intention to make curriculum more relevant through connecting it to real life challenges. The policy also advocates for an interdisciplinary approach in higher grades (Grades 8, 9 and 10) of basic education. The following extract demonstrates this:

> The first seven years of basic education shall follow an integrated approach, managed through five learning areas …. In the last three years of basic education (grades 8, 9 and 10), curriculum will be drawn from the core contributing subjects to the respective five learning areas (MoET, 2009: 21).

This interdisciplinary approach requires teachers to draw knowledge from other subject areas when dealing with emerging matters. Furthermore, the policy requires that formal school knowledge be connected with learners' everyday experiences (inter-discursive relations) and linked to this integrated curriculum is the concept of learner-centredness There is an envisaged shift from teacher-centred teaching strategies to learner-centred methods which, according to Letsie (2019), is not really a new concept in Lesotho education.

This envisioned shift of having learners take full responsibilities of their learning (by creating their knowledge, analyzing, synthesizing, evaluating and applying it), lends itself to the concept of higher order skills as, according to Seitz (2017), these are higher order cognitive skills. As a result, CAP's intended pedagogy can be seen as an imperative move since Bhaw and Kriek (2020) posit that cognitive skills are necessary for learners in the 21st century. Hence, the Lesotho education system's curriculum strives to give learners life and development skills in this century (Seotsanyana, 2018).

Apart from quality, efficiency and relevance, CAP also attempts to make education accessible to all students at primary and secondary levels, and in Physical Science this is reflected in the tiered curriculum content into core and extended parts. This resembles the Botswana BGCSE Physics syllabus content, which also follows a tiered curriculum, into core and extended parts (Koosimile, 2005). This, according to CAP, is done in order to serve students of different abilities. It is stated that:

> Candidates who have been observed to have the capacity to achieve a D grade or lower should be entered for paper 2, which would give them a chance of better performance. Those who are capable of obtaining a C,B or A grades and plan to pursue a career in science, should study the Extended curriculum and be entered for paper 3 (ECOL, 2012c: 9).

By implication, the Core component of the syllabus is for learners who are average and will not want to study towards scientifically inclined careers. The Extended (Supplementary) component, on the other hand, is meant for learners who do well in science and are intending to proceed with scientific careers.

According to Qhibi, Dhlamini, and Chuene (2020), curriculum standards, that is, CAP and Physical Science syllabus prescriptions in this paper, classroom instruction and assessment are three crucial educational components. These authors argue that strengthening the alignment between these three components – Standards, Instruction and Assessment – is essential for assuring quality and achieving the learning objectives. That being the case, if Lesotho through its MoET aims at improving the country's education through the LGCSE programme, it is essential that there is congruence between CAP, LGCSE syllabi, classroom instruction and assessment. Webb (2002) described an alignment as the extent to which expectations and assessments concur and together serve to lead the system towards students learning what is expected. Unfortunately, this definition does not say anything about instruction. Nonetheless, Roach, Niebling, and Kurz (2008) offered a more inclusive definition. They describe alignment as the degree to which Curriculum, Instruction and Assessment (CIA) work together to facilitate students' learning. This definition is all-encompassing and is the one that is going to be adopted in this research.

1.2 Statement of the Problem

Even though the country has made a good attempt to localise its curriculum, there are some concerns about whether or not there is alignment between the LGCSE syllabi, classroom practices and the Curriculum and Assessment Policy (CAP) framework (Raselimo & Mahao, 2015). The studies that address this issue of alignment in this country are scarce. Raselimo and Thamae (2018), to name but one, analysed alignment of LGCSE Geography and Sesotho syllabi with CAP. Moreover, in actual fact, no alignment studies were found that analysed the congruence between CAP, which is the intended curriculum policy in this study, the LGCSE syllabus and classroom practices (enacted curriculum) within the Chemistry part of the LGCSE Physical Science.

1.3 Purpose of the Study

This study aims to therefore examine the alignment between the intended and enacted curriculum with respect to the LGCSE Chemistry. The intended curriculum referred to in this study is the CAP's prescriptions concerning the recommended pedagogy while the enacted curriculum referred to are the classroom practices in LGCSE Chemistry lessons.

1.4 Research Questions

The study attempts to answer this main research question:

What is the extent of alignment between the intended and the enacted curricula, with respect to LGCSE Chemistry?

The following questions are proposed in order to address the main research question:

1. In what ways is the curricular content of LGCSE Chemistry (Physical Science) syllabus aligned with the general aims of secondary education, as stated in CAP?
2. What is the nature of Chemistry teachers' lesson planning relative to the implementation of CAP prescriptions?
3. How do teachers implement CAP prescriptions during their classroom instruction in Chemistry lessons?

The first research question examines whether or not there is congruence between the curriculum content of the Physical Science syllabus (Chemistry part), and the prescriptions concerning the intended pedagogy stated in CAP. This is because there is research evidence suggesting that teachers teach according to syllabi as the syllabi provide guidelines for them (Raselimo & Thamae, 2018), and when things are right, the two have to be aligned since a curriculum policy is considered one important tool for establishing direction and maintaining coherence in teaching and learning (Taylor, 2009). The second research question is aimed at examining whether the lesson plan designed by teachers is in accordance with its implementation in the learning process and as per CAP prescriptions. Lastly, the third research question is, on the other hand, aimed at examining how Chemistry teachers actually translate the guidelines of CAP in their lessons.

1.5 Significance of the Study

Alignment between instruction and standards should not be assumed. It is through an alignment study that gaps or mismatches between educational components can be identified. As stated earlier, the purpose of this research is to examine the alignment between what is intended to happen in classrooms and that which actually transpires with respect to LGCSE Chemistry. The findings of this study will therefore point out any gaps between the curriculum developers' intentions and what actually happens in classrooms. These results could therefore assist policymakers, curriculum developers and teachers make refinements where necessary so that curriculum and instruction support each other in what is expected of the students. Seitz (2017) argued for the same point that results of an alignment study may be utilized in deciding if restructuring is required, and if it that is so, the findings will aid in determining what adjustments need to be made in the intended, enacted and as well as assessed curricula. The study will additionally cultivate awareness about the developments relating to the enactment of the LGCSE curriculum. It will yield meaningful results that could offer a reference point for teachers in improving their teaching practices and curriculum developers in improving learning outcomes which could be beneficial to learners.

1.6 Chapters Layout

The section presents the outline of chapters in this dissertation with regard to what each chapter will include.

Chapter 1

This chapter has discussed and introduced the research with the background to the study, statement of the problem, research questions and significance of the study.

Chapter 2

Chapter 2 presents a review of literature on alignment studies conducted in Lesotho and internationally. It also includes literature on curriculum and its forms, and the theoretical framework informing the study.

Chapter 3

Chapter 3 presents and discusses the research methods that will be followed in this study for collecting and analyzing data. The chapter describes the techniques that will be used for the sample and document selection. It also describes how the ethical concerns will be addressed and the validity and reliability measures of the study.

Chapter 4

The findings of the study are presented and analysed in this chapter. Findings relating to the enacted curriculum as established through classrooms observations, teachers' lesson plans as well as their interviews as supplementary data, are presented here, guided by the theoretical framework and the research questions.

Chapter 5

In this chapter, the presented data in Chapter 4 is discussed with regard to the research questions of the study, based on the cases of the three Chemistry teachers who participated in this study.

Chapter 6

Chapter Six includes the concluding remarks, recommendations, limitations of the study, and suggestions for further studies.

1.7 Conclusion

This chapter highlighted that in the year 2009, a curriculum and assessment policy framework was developed and published, which guided the process of localization through provision of principles that would guide the implementation of LGCSE. Additionally, it described that this policy framework proposes at least five main changes – changed roles for both teachers and learners, integration, learner-centred approaches, development of higher order thinking skills (HOTS), and education accessibility. The chapter further discussed the statement of the problem, as well as the purpose of the study and the research questions guiding it. Finally, an outline of each chapter was provided. The subsequent chapter discusses the literature as well as the theoretical framework underpinning the study.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

The review of the literature relevant to the research is presented in this chapter. Firstly, a historical overview of Lesotho's education system is done, then curriculum is defined and its forms are outlined. Secondly, studies talking to alignment between educational components are reviewed through global and local lenses. Lastly, the theoretical framework underpinning the study is discussed.

2.1 Historical overview of Lesotho education system

The education system in Lesotho is categorised into three: the pre-colonial period, the colonial period and the post-colonial education (Muzvidziwa & Seotsanyana, 2002). Before the colonial period, Basotho practised traditional education, which included passing on knowledge and skills to their children both formally and informally (Letsie, 2019). According to the same author, informally, Basotho children learnt from their parents by observing what happens in the family and neighborhood and by interacting with the physical environment. Formally, Letsie (2019) asserts, education in Lesotho took place through initiation schools (*lebollo*), where boys and girls were taught separately, instilling traditional values in them (Selepe, 2016), and there were no abandonments or dropouts in this formal education. As explained by Motaba (1998), this training lasted less than a year, and boys were trained to fight using sticks and to also defend their country from attacks. For girls, on the other hand, the focus was more on respect and on taking care of their families.

Lesotho's formal education began as early as 1838 with the arrival of the missionaries. This was before colonisation, which meant a change from the traditional education to a standard curriculum (Seotsanyana, 2018). Khama (2018) called this period the era of western schooling. The first missionaries to come to Lesotho were the Paris Evangelical Mission Society (PEMS) in the year 1833 (Muzvidziwa & Seotsanyana, 2002). The Roman Catholic Mission (RCM) followed in 1862 and finally, the English Church Mission (ECM) in 1868. As PEMS missionaries established their own mission stations around the country, they also established teaching centres, and the same thing happened upon the arrival of both the RCM and ECM (Khama, 2018). Every missionary had infant and elementary schools which taught numeracy and literacy and as Khama explains, the missionaries did not consider native education significant and replaced it with the western education system. This therefore shows that the missionaries disregarded Basotho ways of living and their beliefs as a nation. They focused on offering literacy and numeracy skills to Basotho in order to produce clerks and interpreters for the colonial administration (Selepe, 2016).

The transition from the traditional political chieftaincy system to the British colonial government was an agreement reached between Moshoeshoe I (the paramount chief of that time) and the British government (Khama, 2018). As a result, Lesotho became a British protectorate in 1868, and both the missionaries and the British government were responsible for Basotho education. According to Selepe (2016), the purpose of this British colonial education was not to free the Basotho from poverty, but rather to instill the values of obedience, and during the entire colonial period, the British administration built only four schools. Basotho education during this era was mostly directed towards limited job opportunities in government administration and in churches as catechists and teachers (Khama, 2018). Therefore, it is obvious that education was not considered the main means to achieve the aspirations of national independence and economic independence at that time and, as viewed by Ralebese (2018), education is directly linked to each country's economic and social progression.

The post-independence education system is characterised by a number of national reforms that aimed to introduce drastic changes that would deviate significantly from the education of the colonial government (Seotsanyana, 2018). However, the reforms did not go as expected, because the envisaged developments did not happen. As indicated in the previous chapter, these reforms included the Curriculum diversification reform, the Core curriculum reform and the O' Level localization reform, and the latter concerns this study. Letsie (2019) indicates that the need to localise the O' Level reform stemmed from concerns about a curriculum and examination system that would meet the needs of Basotho children, for Seotsanyana (2018) maintained that examination-oriented teaching and learning maintained the status quo. Consequently, according to Raselimo and Mahao (2015), CAP 2009 was initiated as "a strategy to minimize the negative influence of examinations on the education system by integrating curriculum with assessment". These authors continue to show that though plans and strategies were put in place to introduce a localized O' Level curriculum and assessment, it took a long time, as the actual implementation of LGCSE took seventeen years. It started in 2012 and was fully implemented in schools in 2016, and this, according to Nketekete (2021), marked the end of O' Level exams held in Lesotho since 1961.

2.2 Curriculum

The word curriculum comes from the Latin word *"currere"* which means to proceed or to run (Musingafi et al., 2015). It is a broad concept in education that is defined distinctively by different scholars. The definition can go anyplace ranging from a list of subjects for a course to the view of a definite objective of education in general (Bodegas, 2007). For example, Khwaja (2014) defines it as the contract between society, state and educational professionals with regard to educational activities that learners should undergo during a certain phase of their lives to learn something desirable. Musingafi et al. (2015), on the other hand, describes it as an overall outline of the subjects to be taught and the teaching methods for ensuring that each student has learnt the appropriate materials. However, Beane et al. (1986), as cited in Ralebese (2018), concludes that the meanings of curriculum fall into four classes: curriculum as a programme, a product, planned learning, as well as the encounters of students. This parallels the description of curriculum by Richards et al. (1993) who described it as a programme that states "the educational purpose of the program, the content teaching procedures and learning experience which will be necessary to achieve this purpose, and some means for assessing whether or not the educational ends have been achieved" (p.94).

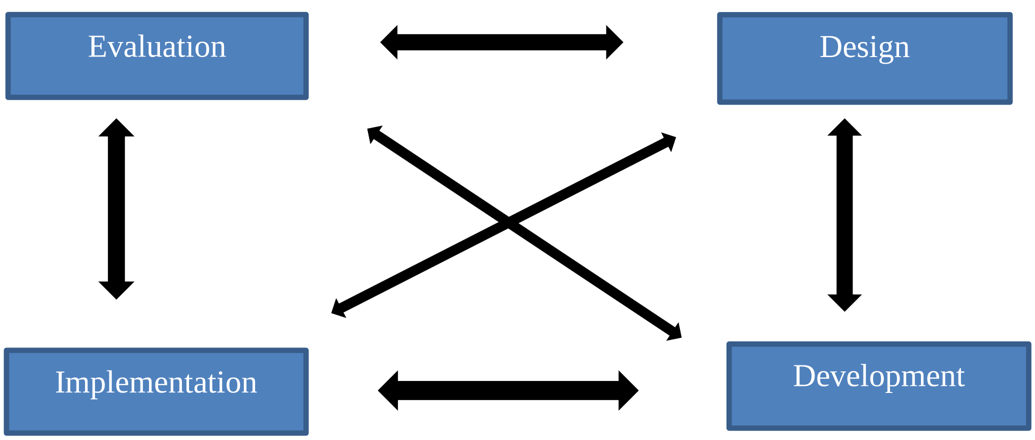
Other scholars' comprehension of curriculum makes no clear differentiation between curriculum and the syllabus. Nevertheless, Musingafi et al. (2015) distinguished clearly between the two, as they argued that even though curriculum and syllabus are sometimes used interchangeably, they are two different concepts. According to Musingafi et al., a syllabus is a list of topics that must be covered throughout a particular time period or programme, which is generated from the curriculum. In consequence, these definitions of syllabus and curriculum, according to Musingafi et al., will be the ones adopted for this study. The curriculum and syllabus will therefore be considered two distinct concepts.

In this study, CAP will be considered as the source of curriculum standards and it stipulates, among other things, the aims, learning areas, curriculum aspects and the intended pedagogy. Curriculum standards, in Rahman's (2014) opinion, are specific statements of what the learners must know and be able to do within a particular time of schooling. According to the same writer, curriculum standards cover areas of knowledge, skills and values. On the other hand, the Physical Science syllabus will be regarded as a list of topics which must be covered through a specific time period, and is generated from CAP. These two documents, the curriculum and the syllabus, are created at the national level by an appointed government department. In Lesotho, the government department responsible for the development of curriculum and syllabi is the National Curriculum Development Centre (NCDC) (Matobako & Heqoa, 2018).

2.2.1 Curriculum Development Process in Lesotho

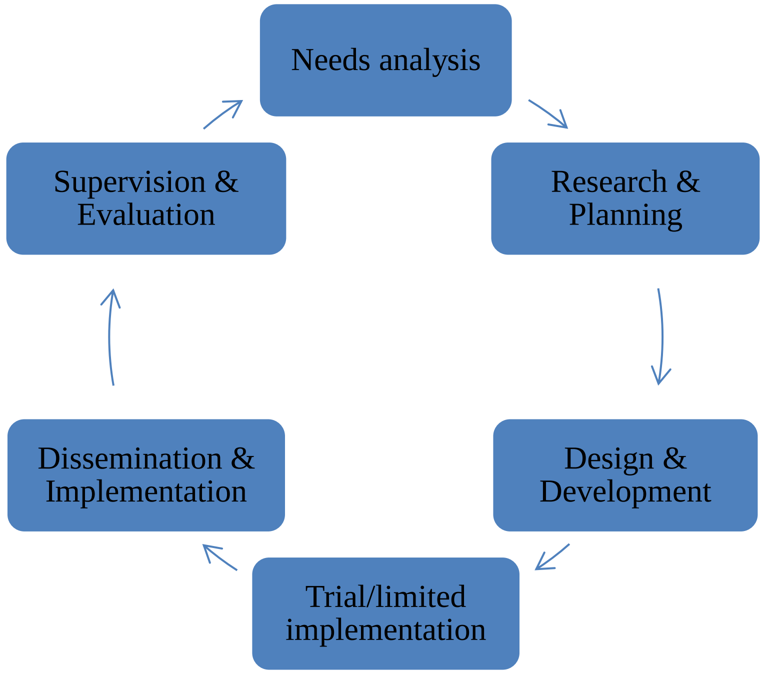
The curriculum development process involves four main phases with various steps in each phase. These phases inform and complement each other, therefore all of them need to be put into practice (Matobako & Heqoa, 2018). The phases include curriculum design, curriculum dissemination, curriculum implementation and, lastly, evaluation. Figure 1 below demonstrates these phases and how they interact with one another.

Figure 2.1: Phases of curriculum development



The process of designing a new curriculum or modifying an existing one begins with a needs analysis, followed by planning, development, piloting, dissemination, implementation, evaluation and back to needs identification (Rahman, 2014). This completes what is called a curricular cycle as illustrated by the figure below.

Figure 2.2: Curriculum cycle



Curriculum Design

This is one of the curriculum development phases where a new curriculum is strategised, or an existing one is reconsidered, or assessed (Carl, 2009). This phase, like the others, has various steps involved namely, needs analysis, research and planning, and design and development.

During this phase in Lesotho, a series of meetings (*lipitso*) were conducted starting from October 1977 to March 1978 (Mosisili, 1981). According to Mosisili (1981), this was done in order to collect the Basotho people's perspectives on the development of a curriculum that would cater for the requirements of the country. Following this, a national education dialogue was held in 1978 for further consultations. During this national dialogue, different issues linked to Cambridge Overseas School Certificate (COSC) were raised, including concerns regarding its relevance and suitability for Lesotho's educational and developmental requirements (Raselimo & Mahao, 2015). The localisation of COSC was therefore triggered by the need to enact curriculum and assessment that would match Lesotho's educational needs.

As indicated in Chapter One, the government of Lesotho then developed and published a curriculum and assessment policy with the intention of improving the quality and relevance of school curriculum. Basically, CAP is directed towards addressing the needs of both the learners and the people of Lesotho at large, by advocating for an integrated curriculum. Integration, as described in CAP, is “the holistic view and treatment of issues related to intelligence, maturity, personal and social development of the learner for survival purposes and economic development of the nation” (MoET, 2009:15). Urevbu (1994) maintains that curriculum is relevant when it is integrated with current problems of the society and, as outlined in CAP, these problems include increasing poverty, climatic and environmental degradation, HIV and AIDS pandemic and other communicable diseases (MoET, 2009).

The other aim of the curriculum design phase is to develop a curriculum model that would meet prevailing social needs. Generally, there are two ways in which curriculum may be organised. The curriculum can follow a horizontal or a vertical design (Ntoi, 2007). The former refers to the scope and integration of different disciplines while the latter is aimed at order and continuity. According to Ntoi (2007), a horizontal design brings together the content of various subjects. Shoemaker (1989) agreed that in this organization, concepts are juxtaposed, connecting one concept to another. However, in vertical design the concept is introduced in one class and reinforced in the next class, which means that concepts are introduced first in the first grades and covered in depth in the subsequent grades. Lesotho advocates a horizontal organization type of curriculum design model, which entails both interdisciplinary and inter-discursive knowledge integration (Raselimo & Thamae, 2018). Teachers in Lesotho are expected to draw knowledge from different subjects when dealing with emerging issues in their classes, and to also integrate what is being taught with learners’ everyday experiences.

Curriculum Dissemination

In the curriculum dissemination phase, stakeholders are prepared and informed about the proposed curriculum through the sharing or publication of information, ideas and concepts, and in-service training courses (Carl, 2009). Teachers are not the only trained stakeholders here, as education officers as well as district resource teachers are trained too. This is so that they could offer support to teachers as they embark on implementation of the new curriculum (Matobako & Heqoa, 2018). This phase is very important for any reform, as Rahman (2014) argued that an effective dissemination process can properly determine the success of educational change. Rahman maintained that this could affect the way the teachers understand the curriculum, and what is required of them, as well as their classroom practice.

The stakeholders in education were informed through the Lesotho media (Ralebese, 2018). That means through newspapers, radio and television. In-service training, through workshops, was also held for teachers, and according to Carless (1997), an in-service training is fundamental preparation for the new curriculum, as teachers need training in new skills and knowledge. However previous studies showed that teachers regarded those workshops ineffective and inadequate (Ralebese, 2018; Moleko, 2020). Rahman (2014) noted therefore, that ineffective and inadequate training can be a possible impediment to curriculum change enactment. This is because training is a way of ensuring that a good understanding of the theoretical and practical aspects of the reform are evident.

Curriculum Implementation

After training, the teachers begin to implement the new curriculum, which is the phase of curriculum development where appropriate design is carried out (Carl, 2009). Fixsen et al. (2005) define this phase as a specific sequence of activities designed to carry out an activity or programme of a known scope. Nevertheless, before the full implementation of the curriculum, the implementation is tested in schools or in a few schools selected for the pilot phase. The main purpose of the pilot phase is to find out if the curriculum materials are relevant to a degree (Matobako & Heqoa, 2018), and also to identify gaps and involve teachers' input in the curriculum (Phakiso, 2008). Since the pilot phase includes monitoring exercise, through which NCDC congregates information about how teachers explain and enact the curriculum, the curriculum materials are thereafter amended or improved in getting them ready for the actual implementation that follows (Matobako & Heqoa, 2018).

In the implementation phase, teachers then put the curriculum into practice in their classrooms during individual lessons. The revised syllabuses were first piloted in 1999 and rolled out to all schools shortly thereafter (Raselimo & Mahao, 2015). However, as mentioned in the previous chapter, the new curriculum (LGCSE) was only operationalised in 2012, seventeen years after the announcement of the localization of the curriculum. The current study partly focuses on this phase, because the purpose is to examine the match between CAP, LGCSE Physical Science syllabus and how teachers implement CAP prescriptions in their classrooms.

Lesson planning and Instruction

According to Frey (2011), effective teaching begins with proper planning. Teachers plan instruction in different ways and for different periods (Morine-Dershimer, 2014). The plan can be – for example – annual, quarterly, weekly and/or daily. In the case of Lesotho, teachers are given books (scheme plan) for quarterly planning and templates for daily planning (lesson plan). The Lesotho Code of Good Conduct (2011) requires teachers to prepare before presenting lessons in class and states that "in discharging his/her duties in relation to the learners, be … prepared and recognize his/her responsibilities with regard to academic and personal development of the learners" (p.216). One way to show preparedness is to compose a scheme of work and lesson plan (Ralebese, 2018).

A lesson plan is the most specific level of instructional plans (Musingafi et al., 2015). These authors describe it as a planned, organised set of topics and learning experiences that the teacher conveys to the students with details of how the teaching will happen within a lesson. There are several advantages, concerning lesson planning, revealed by literature. For example, lesson planning helps guide and make the teacher feel confident in teaching; no time is wasted in class, because the time allocated to one lesson must be used to deal with the topic of the lesson of the day; the most important content for students is identified; learning materials are correctly selected and used; and the right assessment methods and tools are used (Okai, 2010; Emiliasari & Jubaedah, 2019). As a result, if lessons are planned in advance, both learning and teaching become easier (Musingafi et al., 2015), and teaching becomes more effective (Ralebese, 2018).

The nature of the lesson plan differs depending on how it is intended to be used (Gagne et al., 2005). However, some components are the main factors in creating a lesson plan (Ralebese, 2018). To begin with, an instructional objective, which is clearly stated at the beginning of the lesson, describes the intended changes in behaviour or in mastery of skills (Shostak, 2014). Secondly, the introduction, and then the body or development – which includes the following characteristics: teacher's activities and students' activities during the period – are outlined. The final part of the lesson plan is the conclusion, which contains a summary of the lesson and an assessment, which, according to Carl (2009), defines how well the learning went and whether the learning objective was achieved. Neisari and Heidari (2014) also add other components of the lesson plan, like time; place; method and learning materials. All these aforementioned lesson plan components are in the NCDC Lesson Plan Template for secondary schools.

Scheme of work, on the other hand, describes the parts that will be studied during a term, month or week after the teacher splits the work of the year (Musingafi et al., 2015). Musingafi et al. argue that when the responsible government body sends the curriculum and the syllabus to schools, it is necessary to divide the annual content of the syllabus into a specific amount of work that can be covered during a term. For secondary schools in Lesotho, the annual content of the curriculum is split quarterly. Makokha and Ongwae (1997) describe some points which they state have to be considered when preparing this quarterly plan or scheme of work, which is to first understand the content of the syllabus; the existing scheme of the subject; reference material/teaching materials and examination; and lastly, estimated time.

Consequently, after the teachers plan the teaching and learning, they certainly implement the plan during the teaching and learning process (Emiliasari & Jabaedah, 2019). Frey (2011) thus summarises the characteristics of effective teaching, where he states that teaching is organised with gradual release of responsibility, active engagement of students at different levels, differentiation of teaching, making teaching interactive and students helping each other in groups and in pairs. These features parallel the CAP prescriptions of the proposed pedagogy. An example would be the differentiated learning envisaged by the CAP, particularly in mathematics and physical sciences, where curriculum content follows a tiered curriculum to suit all learners. Piaget (1964) also concurs with these characteristics as he describes that children should engage in discovery learning because, he argues, direct instruction pacifies them.

Curriculum Evaluation

The purpose of curriculum evaluation is to establish whether the design, development and implementation of the curriculum deliver what was intended to be achieved. Thus, it permits curriculum stakeholders to compare, maintain, revise or discontinue the programme (Carl, 2009). In Lesotho, for example, a curriculum evaluation disclosed that the previous curriculum and assessment did not meet Basotho needs and expectations, global needs and culture (Ralebese,

2018) but only encouraged development of cognitive skills and not life skills (MoET, 2009). This then led to the development of the new integrated curriculum.

Once the implementation is established, the provision of inspection and support services of the curriculum and other administrative matters are monitored by senior education officers operating in the ten districts of the country (Matobako & Heqoa, 2018). Consequently, this current study is partly conducted as part of the evaluation phase as it seeks to examine how teachers put CAP prescriptions into practice.

2.2.2 Types of Curriculum

As demonstrated by Van den Akker (2003), curriculum is determined at various organizational levels of society. Illustratively, at the macro-level which is the government level where administrative and political decisions are made, at the meso-level, which is the school and classroom level where curriculum is implemented, and finally, at the micro-level. The micro-level is the student level where the impact of the curriculum is examined through output (Van den Akker, 2003). Though different scholars name different types or levels of curriculum differently (see for example Kuiper, Fulmer, and Ottevanger, 2013), Van den Akker (2003) regards levels of curriculum as intended, enacted and attained curriculum.

The intended curriculum reflects the vision and the goals of the curriculum designers (Musingafi et al., 2015; Nosheen et al., 2018) and is determined at macro level by the educational organization system. Qhibi et al. (2020) referred to it as the content standards as emphasised in the Curriculum and Assessment Policy Statement (CAPS), CAP and LGCSE Physical Science syllabus in the context of this study. This curriculum determines what should be included in curriculum materials (for example, textbooks and lesson plans) and what should be taught in classrooms by teachers (Ndlovu & Mji, 2012). According to Van den Akker (2003) and Thijs and Van den Akker (2009), the intended curriculum has two forms, which are the ideal or ideological and the formal or written curricula. The ideological curriculum forms the original ideas of the curriculum designers, that is, the basic philosophy underlying the curriculum, and takes into account the beliefs and values of content expects outside the school (Van den Akker, 2003). He further asserted that the formal curriculum is reflected in the intentions defined in the curriculum documents and/or materials, that is, when the ideas of the curriculum designers are noted down to produce curriculum materials like syllabus.

Likewise, the enacted or implemented curriculum has two forms, which include the perceived and operational curricula. For Van den Akker (2003), the intended curriculum consists of content, teaching strategies and time allocations, which are intended to guide teachers on how to practise the intended curriculum. Kurz et al. (2010) further added that while the intended curriculum indicates what content should be covered in the classroom, the enacted curriculum emphasises the content that students had the chance to learn. Therefore, it is specified by the content of the instruction given by teachers in their classrooms. The perceived curriculum domain refers to the curriculum as interpreted by the teachers and considers the teachers' philosophy, interpretation of what is taught in the classroom, lesson plans, and schemes of work (Van den Akker, 2003). Operational curriculum, on the other hand, is the actual process of learning and teaching and considers the competence of teachers in interpreting and implementing the ideas of the curriculum developers, as well as the ability to change the way students think (Phaeton & Stears, 2016). It is worth noting that both curricula are of interest for this study. Regarding the perceived curriculum, the study will focus on teachers' lesson plans and then the actual process of teaching and learning, which is the operational domain.

Finally, the attained curriculum – which is implemented at the learner level – comprises experiential and learned curricula. Experiential curriculum refers to the learning experiences experienced by students, while learned curriculum refers to the learning outcomes of the students (Van den Akker, 2003). The attained curriculum reveals content areas from which students' achievement is tested and, according to Nosheen et al. (2018), this curriculum is essential because its results help stakeholders assess the impact of the written (intended) and the taught (enacted) curricula on students. Even though attained curriculum is relevant and equally important to the education system, it is outside the scope of this particular study.

An overview of Lesotho's Curriculum and Assessment Policy

As mentioned earlier, the Lesotho Curriculum and Assessment Policy was adopted in 2009 with the intention of providing education for social and personal development. The aim of this policy is to ensure quality, access and relevance promoted through education (MoET, 2009), and according to Kochhar (2008), the curriculum is relevant if it is "related to the life needs of society …an instrument of social change related to national integration, social justice and democratic values" (p. 67). The policy therefore stipulates that school life be integrated with community life and the daily life experiences of students in order to make the curriculum more relevant. In addition, CAP is meant to link societal problems with the general development goals of the country. These problems include the rampant spread of HIV/ADIS, high employment rates, high levels of poverty and environmental degradation, and they appear to pose a threat to Lesotho's socio-economic development.

The framework policy has fifteen sections. Nevertheless, being cognizant of the aim of this study, focus will be placed on one specific section, and particularly on one sub-section: **pedagogy**. The section Curriculum and Assessment was deemed relevant to this study hence will be the one addressed. This is because it holds significance concerning what is to be taught in secondary schools, and how it should be taught, as well as how it should be assessed, and this last part will not be discussed since it is irrelevant to the aim of the study.

Underlying pedagogical principles of CAP

Unlike previous curriculum reforms that emphasised disciplinary knowledge, CAP proposes an integrated curriculum that moves from fragmented subject-based teaching to a holistic approach to issues of intelligence, individual and social development, and maturity for survival and economic development (MoET, 2009). According to Bernstein (2000), an integrated curriculum is depicted by loose boundaries between school subjects, which allows for more integration of content across subjects. Raselimo and Thamae (2018) add that it shows a clear link between issues of curriculum content, teaching strategies and assessment and encourages a gradual progression of knowledge. However, Beane (1995) warns that an integrated curriculum should be about creating deeper meaning rather than simply combining similar concepts in the curriculum.

CAP 2009 espouses a learner-centred approach in order to address the content of school subjects. This is evident from the following quote:

> The focus in pedagogy has therefore shifted more to teaching and learning methods that can further develop creativity, independence and survival skills of learners. The learners are expected to become responsible for their own learning processes and thus should be able to identify, formulate and solve problems by themselves and evaluate their work (MoET, 2009:18).

By implication, CAP introduced a shift from teacher-dominated methods to learner-centred methods. Consequently, new roles are envisaged for both teachers and students; teachers as facilitators of learning and students as creators of knowledge. In this way, CAP challenges the existing dominant teacher-centred methods that characterise teaching and learning in the Lesotho classroom (Raselimo, 2010).

It is also clear from the quote above that CAP emphasises the development of skills (high-level thinking) and attitudes necessary to achieve rapid social and economic change. Another important aspect of the espoused pedagogy by CAP is an interdisciplinary approach, which requires teachers to use knowledge of other disciplines when dealing with emerging issues. However, Raselimo and Mahao (2015) believe that such an approach is based on the false assumption that schools have a collegial environment where teachers can freely discuss various topics. However, according to the results of Raselimo's (2010) study, this does not happen in schools. But again, since this is a finding from more than a decade ago, it is possible that it no longer prevails in schools now.

Along with the inter-disciplinary relation is an inter-discursive relation. CAP also requires teachers to connect what they are dealing with in classrooms to the everyday experiences of students. Last but not least, CAP strives to make the curriculum accessible to all students. In the LGCSE Physical Science subject, this is reflected in the tiered content of the curriculum into core and extended parts to serve students of different abilities. The core part is meant for learners with low ability in the subject and those who will surely not pursue a course in the field of science, while the extended part is meant for learners who have high ability in the subject and those who wish to pursue scientifically oriented careers (Mojarane, 2014). This being the case, a Physical Science teacher is expected to teach core and extended learners in one classroom even though the level of teaching and engagement will differ (Letsie, 2019). It, therefore, becomes interesting to observe teachers plan and conduct their lessons to examine the alignment between what is done with what is expected of them. This is because teachers had to shift from a syllabus that was not tiered, and that they had taught for more than fifty years (Nketekete, 2021).

The concept of alignment refers to the level of agreement between the intended, enacted and attained curricula and how well they work together to promote the learning of students (Roach et al., 2008; Kurz et al., 2010). Anderson (2002) emphasises that curriculum alignment is the unity of all components of an educational system, particularly the unity of standards, assessment and instruction. As indicated, according to literature, the standards are the intended curriculum, the assessment is the assessed curriculum and, lastly, instruction is referred to as the implemented or enacted curriculum. The next section looks at curricula alignment and previously conducted alignment studies, both internationally and in Lesotho.

2.3 Curriculum Alignment

Examining alignment between curricula is especially important during transition to a new curriculum to examine the success of reform efforts (Edwards, 2010), which is the case in Lesotho where there was transition from COSC to LGCSE. In literature, various expressions or terms are used to describe the situation where the three elements or forms of curriculum have a clear relationship with each other. For instance, overlap, congruence, match, alignment and so on. Given these terms, alignment is most closely related to this study, so it will be used together with the terms congruence and match, though these two will be used to a limited extent.

Crowell and Tissot (1986) developed an inclusive definition of alignment by describing it as the congruence of all components of a school curriculum which include curriculum objectives, the instructional programme and tests for assessing outcomes. Webb (2002) later described alignment as the extent to which expectations and assessment concur and together serve to lead the education system towards students learning what is expected. The first description of curriculum alignment is too broad while the latter does not talk to classroom instruction. To address this, Polikoff (2002) described what he called an instructional alignment as the extent to which teachers' instructional content matches the content specifications as stated in content standards of the state. In consequence, this description speaks to the alignment between the intended and the enacted curricula, which is what this research aims to examine.

There are two types of curriculum alignment according to English (1992) namely, design and delivery alignment. The delivery alignment, as described by English (1992), refers to the relationship between what is taught and the test, or the curriculum. Design alignment, on the other hand, refers to the relationship between the test and the curriculum. Considering these, delivery alignment is the one related to this study since the relationship between what is taught in the Chemistry classroom and the curriculum – CAP in this case – is to be examined. In other words, Aviles (2001) talks about horizontal and vertical alignment. According to this author, these two involve matching course materials either by learning content or by level of knowledge. Horizontal curriculum alignment is particularly the progression of course materials from the planning of a lesson, through to teaching and testing, and a horizontally aligned curriculum is taught and tested, rather than testing some of the materials taught (Aviles, 2001). This means that a horizontally aligned curriculum is also planned and taught, implying that what is planned should be reflected during classroom instruction.

Vertical alignment, according to the afore-mentioned author, refers to Bloom's taxonomy of educational objectives. For example, knowledge, comprehension, application, analysis, synthesis and evaluation. Bloom (1956) maintains that these levels of knowledge are hierarchical and discrete, so students must understand knowledge at lower levels before understanding it at higher levels and be cautioned that mastery of lower levels does not guarantee mastery of higher levels. Then again, vertically aligned curricula are taught and tested at the same taxonomic level. This is very crucial as Aviles (2001) advised that if students are expected to go beyond facts, professors or teachers must go beyond teaching facts. Anderson (2002) then argued that assessing curriculum alignment based on both knowledge and cognitive processes is better that other methods of determining alignment, and Porter and Smithson (2001) make the same point that instructional coverage depends on both topics covered and cognitive level at which the content is taught.

CAP shifts curricular priorities towards the development of students' cognitive skills, and Johnson et al. (2020) present three different approaches to teaching cognitive skills. They include: "1) teaching content knowledge and developing students' cognitive skills as a by-product, 2) teaching cognitive skills and developing students' content knowledge as a by-product, or 3) teaching cognitive skills with emphasis to transfer cognitive skills to new content" (Johnson et al., 2020, p. 44). These writers warn that the alignment of cognitive skills in the intended curriculum and implemented curriculum seems to be exceptionally problematic.

According to Leitzel and Vogler (1994), misalignment is then the situation which happens when the content plans and testing decisions are not aligned or congruent. Consequently, the same term can be used to describe the condition that occurs when content plans and teachers' content of instruction do not match. Other terms normally used to denote misalignment include disunity, mismatch, gap and incongruence. As described by Leitzel and Vogler (1994), when misalignment occurs, the intended or written, enacted and tested curricula operate independently. To illustrate this, Aviles (2001) indicates that misalignment happens if, for instance, students are taught the elements of an intervention plan which falls under knowledge cognitive domain but are expected to produce one (intervention plan) on testing, which then is synthesis cognitive domain.

2.3.1 Curriculum Alignment Studies

There have been numerous studies conducted which assess the congruency between curriculum standards and classroom practice in various countries and disciplines. The subsequent subsections review such studies conducted around the world and locally. Furthermore, factors that were found to hamper curriculum alignment after reforms, in different contexts, are discussed.

2.3.1.1 Global trends

Much of the alignment studies conducted are focused on evaluating the alignment between the intended and assessed curricula. For instance, in South Australia and Myanmar, Mattews and Kyi (2019) conducted a study where they analysed and compared the alignment between curricula and the examinations of those countries. In both contexts, poor alignment was revealed between the two curricula. Another study was conducted in South Africa (SA) by Bhaw and Kriek (2020) where they examined the alignment between the examinations for Grade 12 Physical Science and the Curriculum and Assessment Policy Statement (CAPS). The results showed a disjointed alignment between the exams and the curriculum, which, according to the two authors, is the possible explanation for the poor pass rate in Physical Science in SA. Likewise, in China, Liang et al. (2017) examined the alignment between standardised Physics exit exams and the national curriculum standards at secondary schools for multiple regions over a period of five years. In the same way, Liang et al. (2017) revealed that the alignment indices between the curriculum standards and exit exams were consistent across regions and time, and most importantly were not statistically significant.

All these studies show a trend of either low alignment or total misalignment between the intended and the assessed curricula, with similar causal factors. Bhaw and Kriek (2020) explained that balance of presentation and cognitive complexity in both the intended (CAPS) and assessed (Paper 1) curricula are influencing the misalignment. Similar to this, Liang et al. (2017) and Mattews and Kyi (2019) also emphasised that greater weight on cognitive levels in exams in contrast to standards is the source of mismatch between the two curricula. Then, Mattews and Kyi (2019) opined that if the cognitive range of classroom activities is derived directly from the standards, as it should be pedagogically, the materials students are exposed to will not cognitively match the assessments. This means that the standards or intended curriculum should cognitively match assessment or assessed curriculum for classroom instruction to align with assessment cognitively.

In view of this, the trend of low alignment, Mattews and Kyi (2019) assert that the classroom reality underpinning this misalignment should be the prime focus. This is in accordance with Letsie's (2019) view, that the examination of classroom practices could offer insights into how the implemented curriculum is executed. Matthews and Kyi (2019) then concluded that the examination of the classroom practices can help ensure that learners receive adequate exposure to high quality teaching, before they could be assessed. The conclusion sounds plausible since the case might be that the learners are being assessed on things they were not given the chance to learn, hence the need for examination of the enacted curriculum.

In the same way, other scholars strongly emphasise examination of the alignment among the three types of curricula. This is evidenced in Seitz's (2017) study "Curriculum Alignment Among the Intended, Enacted and Assessed Curricula For Grade 9 Mathematics" as well as in "Analysis of Curriculum Alignment At Elementary Level In Punjab-Pakistan" by Nosheen et al. (2018). The latter study examined, among other elements, the alignment of the enacted curriculum with classroom instruction, assessment and the National Curriculum Science 2006. The writers even went further to discern the alignment of the supported curriculum and the textbook with the enacted curriculum in Punjab.

As explained by Bunch (2012), the alignment process is often thought of as a triangle with three components (curriculum, instruction and assessment) which are interactive. However, Johnson et al. (2020) argue that it is crucial to examine alignment between the enacted and intended curricula, independent of their alignment with the assessed curriculum. It is because these writers observed that after a curriculum reform, there were no significant changes discovered in the teaching methods used by the teachers. These authors actually showed that all the reviewed studies that were conducted to assess the alignment between the intended and enacted curricula revealed a low alignment, with no exceptions.

Further research on curriculum reform depicts a study conducted by Albadi, Harkins, and O'Toole (2019) in Saudi Arabia after a curriculum reform. The findings revealed a low alignment, since most teachers in this study were found to be using the old ways of teaching. According to Matthews and Kyi (2019), this poor or low alignment between curricula could be a norm across countries. For example, In Turkey, Aksoy (2020) reported that in-class observations showed that there were crucial gaps in bridging theory and practice when evaluating the 2017 updated secondary school English curriculum. This was caused by inadequate class hours and lack of in-service training. Likewise, in Malaysia, Rahman (2014) found incongruence between curriculum policy and classroom practice, as the methods of teaching were transmission-based where teacher talk dominated the interaction patterns in class, which contradicted what was prescribed.

Dolma et al. (2018) also recorded similar findings in Bhutan, where teachers did not seem to have adopted the evidence-based approaches that were recommended in the curriculum document. The authors came to the conclusion that the aims of the intended curriculum in that context had not yet been fulfilled. In India, Nargund-Joshi et al. (2011) revealed a mismatch between the goals of the curriculum reform aimed at providing constructivist teaching approach in all subjects, and the classroom practices of science teachers. Lastly, another study conducted in South Africa by Phaeton and Stears (2016) revealed a serious misalignment between the intended and enacted curricula for A-Level Biology practical work, as teachers misinterpreted the curriculum. This is also similar to the teachers in Ralebese's (2018) study. According to Ralebese (2018), different teachers had different interpretations of integrated curriculum and how it should be implemented. Ralebese then argued that teachers, who Fullan (2001) claims are key change agents, must appropriately interpret the policy for a new curriculum to be implemented effectively. According to Raselimo and Thamae (2018), the low or poor alignment between two curricula is also evidenced in the Lesotho context, though only theoretically, as the writers examined it based on documents and not on classroom practice. Therefore, as indicated, the question of whether Chemistry teachers are implementing CAP as intended is yet to be answered, and this study aims to do that.

Chemistry discipline and alignment studies

While there are some researchers who have, to a greater extent, examined the alignment between intended and assessed curricula with respect to the Physics discipline, the Chemistry part of Physical Science subject appears to be under-studied in alignment research. For instance, the study conducted in South Africa in Physical Science by Bhaw and Kriek (2020), analysed the alignment between the assessment materials and the curriculum and assessment policy statement. The focus of the study was only on four physics topics and four cognitive demand levels excluding the Chemistry part of the Physical Science subject. However, Edward's (2010) study in the same country, although older, analysed the alignment of both Physics and Chemistry disciplines between standards and assessment. Another study on Physical Science was conducted in New York by Liu and Fulmer (2008), who assessed the alignment between intended and assessed curricula too. The studies by Edward and Liu and Fulmer are old and analysed the congruence between the intended and assessed curricula and not the enacted curriculum. They revealed an even lower alignment index in Chemistry discipline than in Physics. The discrepancies in both studies were found in relation to the cognitive levels, which is the case with most of the alignment studies conducted between the intended and enacted curricula. The low or misalignment often found between these curricula is normally due to examinations that emphasise more on HOTS than the standards (e.g. Bhaw & Kriek, 2020; Mattews & kyi, 2019). Liu et al. (2009) then contend that a low alignment that results from the development of higher order thinking skillscannot be considered as a negative consequence. These findings signify the necessity for curriculum alignment research in Chemistry discipline, particularly between the intended and enacted curricula where a gap in research seems to be present.

2.3.1.2 Alignment studies conducted locally

There has not been much done in Lesotho concerning research on alignment. As demonstrated in the preceding paragraphs, alignment studies have been conducted in different disciplines around the world, which include among others, Mathematics, Physics, Biology and Physical Science. In Lesotho, Raselimo and Thamae's (2018) alignment study was on Sesotho and Geography disciplines. These authors analysed the alignment between LGCSE and CAP through content analysis of the CAP document, and the Sesotho and Geography syllabi. The study demonstrated a significant alignment between the aims of secondary education as stated in CAP and the contents of the two syllabi. Nevertheless, the analysis revealed low alignment in both syllabi, with regard to linking school knowledge with daily experiences of students. The study also revealed low alignment in both syllabi in relation to connecting knowledge among different school subjects especially within the same learning areas. The study showed that the Sesotho syllabus specifically possessed just one statement illustrating connection of knowledge between different school subjects (Raselimo & Thamae, 2018). Consequently, these authors argue that these two LGCSE syllabi are unlikely to alter classroom practices as the policy intended. That being the case, research is needed on other LGCSE syllabi and most specifically on classroom practices (Raselimo & Thamae, 2018; Raselimo & Mahao, 2015). Letsie (2019) argued for the same point concerning research on classroom practices versus intended curriculum (CAP). Raselimo & Thamae (2018) explained that research on classroom practices will bring about valuable insights on how teachers put the intended curriculum into practice, and Letsie (2019) claimed that research on classroom instruction will give insights into how CAP's prescriptions are implemented.

2.4 Factors which affect alignment between the intended and enacted curricula

A review of literature indicates that the majority of alignment studies conducted over the years, and across countries, disciplines and grades, revealed a prevalence of low alignment and misalignment. According to Johnson et al. (2020), this is also evident in studies undertaken to assess alignment between the intended and enacted curricula, especially after the curriculum reforms. Consequently, research unveiled factors identified as sources of this misalignment between the intended and enacted curricula (Moodley, 2013; Mopeli, 2017; Haryani et al., 2021). They include, among others, teachers' beliefs, inadequate teachers' training concerning the new curriculum and lack of resources, over crowdedness, poor conditions of classrooms, inconsistency between standards and examinations, and non to minimal involvement of teachers in the process of curriculum development.

A number of studies have shown that teachers' beliefs are some of the factors that hamper alignment between the intended and enacted curricula (Haryani et al., 2021; Johnson et al., 2020). This factor, according to Johnson et al. (2020) plays an important role in either accepting or rejecting the change. When teachers reject change, they stick to their old ways of doing things regardless of what the new curriculum mandates. Haryani et al. (2021) went further to explain that teachers' belief that the reform is beneficial to the students is a positively influencing factor for effective implementation of the curriculum reform.

The other factor concerns inadequate teachers' training regarding the newly introduced curriculum (Moleko, 2020; Mopeli, 2017; Moodley, 2013; Badugela 2012). According to Maharajh et al. 2016, implementation of CAPS in South Africa is elusive because teachers were not adequately trained. Science teachers in Moleko's (2020) study attested to this, for they claimed that they received inadequate training with regard to the new integrated curriculum, hence were struggling to implement it effectively. Nketekete (2021) added to further show the necessity of teacher training given that teachers had taught the GCE O' Level syllabi for the past fifty years or so, and it was important to understand what they had to do differently. The other factor that concerns teachers noted by Rahman (2014) is that teachers have little or no involvement in the development of curriculum reform, which then results in them lacking a sense of ownership. The issue is indeed debatable, and the extent of involvement of Lesotho teachers in curriculum reform development phase, according to Matobako and Heqoa (2018), means the Ministry of Education and Training (MoET) often involves teachers and other stakeholders to ensure representativeness and diversity of perspectives during curriculum reform.

Teachers play very important role in implementing innovative curriculum and ensuring the effectiveness of curriculum reform, and are therefore often blamed for the failure of proposed changes (Rahman, 2014). However, there are several other factors revealed by literature that have potential to impact on the extent to which an innovation or reform is implemented. For instance, large class size or over crowdedness. This factor hinders effective learning and teaching, since it makes it difficult for students to interact well with the teacher, material and one another. Likewise, lack of resources is another factor which, according to Letsie (2019), hampers the learner-centredness envisioned by CAP in Lesotho. For this reason, Mopeli (2017) maintains that just as doctors need various apparatus to help patients get well and be healed, so are resources in schools. Teachers need them for implementing effective teaching and learning practices.

Another factor related to the discrepancy between curriculum teaching approaches and the reality of learning conditions, which is found to also constrain implementation of curriculum reform, is poor physical conditions of classrooms (Saad, 2009). As a result, the learning environment should be conducive as an antecedent for effective learning and teaching to occur.

Lastly, Fitzpatrick (2011) declared that the impact of testing and the conflict between policy goals and examinations is another factor affecting curriculum alignment. According to Raselimo and Mahao (2015), CAP was initiated as "a strategy to minimize the negative influence of examinations on the education system of Lesotho" (p. 1) through curriculum and assessment integration. Because of this factor, Rahman (2014) asserted that classroom teaching tends to emphasise the technique of answering the different types of questions that are normally asked in examinations.

2.5 Theoretical Framework

2.5.1 Stake's (1967) Countenance Model

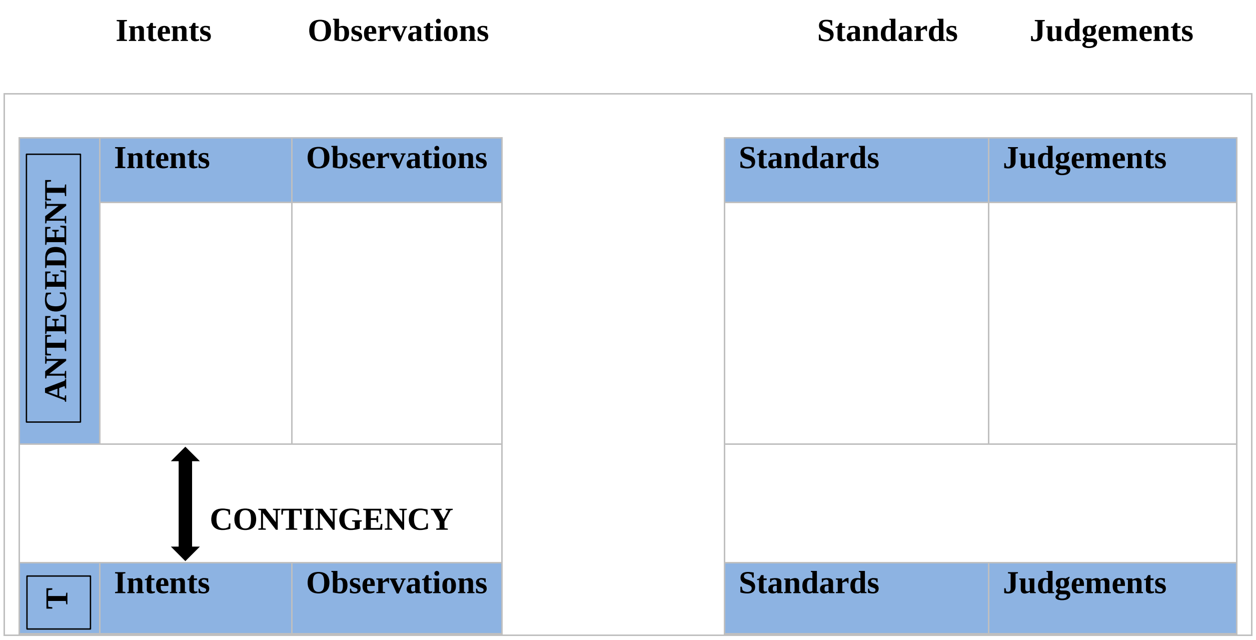
This study seeks to examine alignment between curricula, and there is a whole list of alignment models in literature, for instance, Bigg's (1999) Constructive Alignment (CA) model. CA is based on the concept that students develop or construct meaning through active engagement in activities that are applicable to pre-decided learning outcomes, and therefore is associated with internal coherence between the intended outcomes, the learning activities and assessment tasks. This study is nevertheless, carried out mainly as part of the curriculum development evaluation phase, and evaluation is described by Lynch (1996) as the systematic attempt to gather information for the purpose of making decisions or judgements.

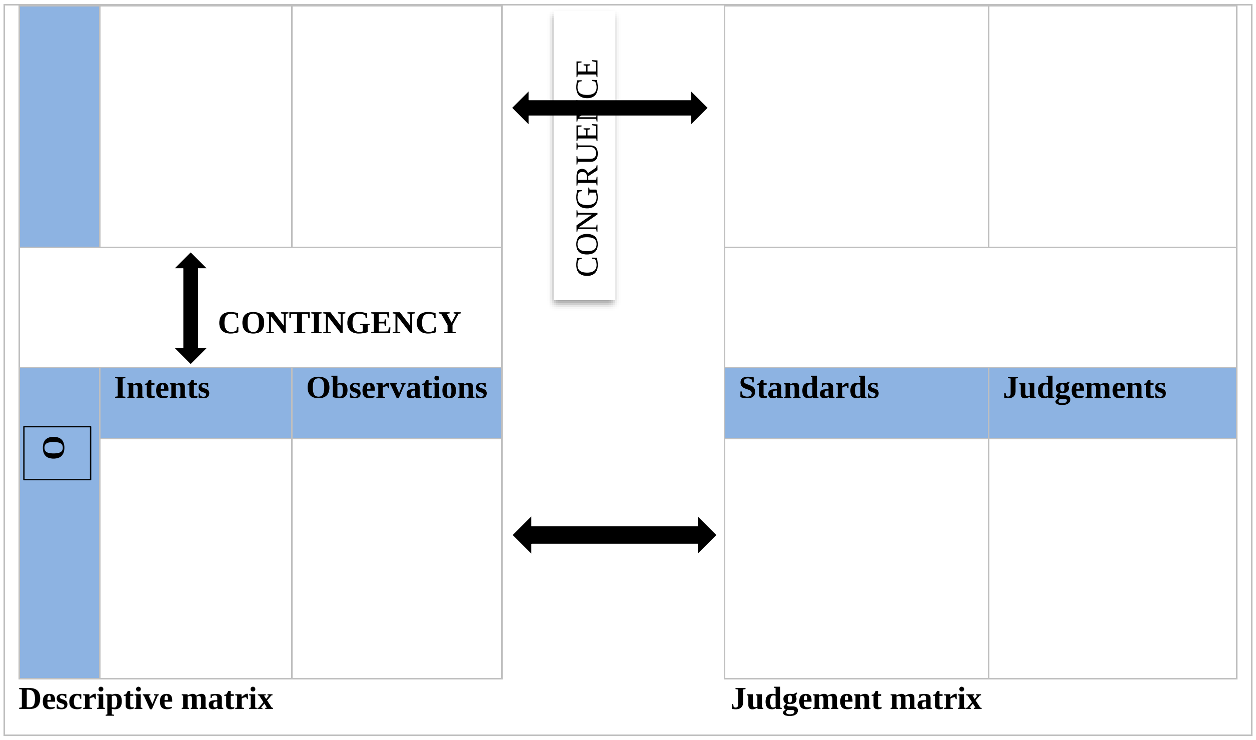
In the case of this study, Stake's Countenance (1967) model applies most appropriately and constructively to the research problem, given that it puts emphasis on the description and comparison of what was intended and what was actually observed in an educational programme. Robert E. Stake created a system for conducting evaluation in education in the 1960s when he coined the term 'responsive evaluation' to describe a technique for evaluating the effectiveness of educational programmes (Galang, 2023). Stake's Countenance model was originally formulated for curriculum studies in late 1960 and was later developed with the name Stake's Responsive Model in 1975. Stake's Countenance model, also known as the congruency-contingency model, is based on the Tylerian tradition of curriculum evaluation, which emphasises comparing planned and observed outcomes (Stufflebeam & Shinkfield, 1985). While Stake's Responsive model still incorporated aspects of the Countenance model, it diverged distinctly from the Tylerian concept and assumed that intentions change and require constant interaction between evaluator and audience to discover, explore and address issues (Stufflebeam & Shinkfield, 1985).

Stake created this model because he was dissatisfied with other evaluation models that relied too much on accountability for the success or failure of the programme being evaluated. The Countenance model is therefore used to find information about the applicability of the goals of the programme, the process that is influenced by both external and internal factors, and the results of the programme (Harjanti et al., 2019). Therefore, complex teaching environments, as well as various problems faced by teachers, are considered and, among the things, evaluated in educational programmes as programme plans which comprise curriculum, programme planning, teaching and the subjects themselves (I Putu Mas, 2017).

The programme examination or evaluation in Stake's Countenance model includes a comprehensive description of the programme, judgements of its strengths and weaknesses, as well as recommendations (Galang, 2023). Description and judgements are therefore the two main components of the model. Basically, Stake built the model on two matrices (descriptive and judgement matrices), and distinctions between the two were made. The descriptive matrix is divided into two parts: intentions and observations. Stake divided descriptive acts according to whether they refer to what was intended or what was actually observed. He even argued that both intentions and what was actually observed be fully described. Likewise, the judgment matrix is divided into two: the standards which are then used to make judgments and the actual judgments themselves. Harjanti et al. (2019) then maintain that the Countenance model consists of four stages: “a) input (antecedents), events, and output (results); b) observation, as a process of recording objective conditions; c) analysis as standard actualization with objective intensity or conditions; and d) decisions with follow up or recommendations” (p. 127). These stages help provide the researcher or evaluator with an opportunity to compare the desired outcomes with the actual outcomes.

Figure 2.3: Stake's (1967) Countenance model





These matrices have three important motivations based on the idea that a formal evaluation must address the situation before an in-class activity happens (antecedents), when in-class activities occur (transactions), and relate to different types of expectations (outcomes) (Tompong & Jailani, 2019). As a result, the Countenance model aims to get the complexity of an education reform through comparison of the intended and observed data at different levels of operations namely, antecedents, transactions and outcomes.

Antecedents

As described by Stake, antecedents are referred to as any conditions which exist before teaching and learning that may be related to the outcomes. For instance, learners' prior knowledge, teachers' planning for instruction, their training, and the environmental factors such as classroom layout and availability of teaching resources. Lukum (2015) measured this stage based on learning implementation planning standards (lesson plan). Similarly, I Putu Mas (2017) stated that the antecedent stage of Stake Countenance sought to see how well the learning plan had been done by lecturers before teaching. In consequence, in this study too, the examination of the stage of antecedents will be done through analysis of the teachers' lesson plan books. A lesson plan is very important for a teacher because it helps them get back on track whenever the learning is not going as planned (Tompong & Jailani, 2019). However, research has shown that there are times when teachers' planning for instruction does not match the standards or what they actually do in the classroom. For example, Lukum (2019) reported that the learning design is still not in line with the standards and Tompong and Jailani (2019) revealed also that there are issues in the implementation of learning that are not in line with the planning of learning. Therefore, it is imperative that this research pay attention to lesson planning before paying attention to learning.

Transactions

On the other hand, Stake describes transaction as an interactive activity which takes place between teachers and learners, learners and learners, learners and the physical, social (for example, teacher support) and educational (for instance, laboratories and classrooms) environment. Harjanti et al. (2019) argued that this interactive activity is part of the learning process, which should continue according to the learning objectives and the pre-planned curriculum. The transaction phase of the Stake Countenance model considered in this study is between teacher and students, students and students, and students and materials (such as textbooks and the laboratory and its equipment).

Outcomes

Finally, the outcome stage of the Countenance model is described as a result that is expected from the interactions that have taken place (Stake, 1967). They are concerned with the products, especially performance, which can be immediate or long range. Harjanti et al. (2019) described outcomes as results of an ongoing educational process, which can be cognitive and conative, short or long-term and personal and group. However, this phase will not be covered in this study.

Woods (1988) maintains that the starting point of the Countenance model is the identification of the intents for a particular curriculum, which he says must be described with regard to antecedents, transactions and outcomes stages. With this in mind, the intended antecedents in this study refer to the condition described in the Lesotho Code of Good Conduct, which states that before teachers could embark on the process of teaching in classrooms, they ought to prepare for their lessons (lesson planning and scheme of work) (Lesotho Code of Good Practice, 2011). The intended transactions, on the other hand, will be the envisioned pedagogy stipulated in CAP and the LGCSE Chemistry syllabus. As mentioned before, the outcomes will not be considered in this study.

In using the model, information in the descriptive matrix is analysed by looking at the congruence between the intents and observations, while in the judgement matrix, the standards are used to make judgements (Galang, 2023). Actually, there are two ways used to process data on an educational programme when using this model. These are finding the contingency between the antecedents, transaction and outcomes, as well as finding the congruence between expected goals and observed conditions. This leads to the last two crucial concepts of Stake Congruence-contingency model or Countenance model: the congruence and contingency concepts. Contingency refers to the logical coherence among the antecedents, transactions and outcomes within one curriculum (Stake, 1967). That is, contingency refers to the relationship between any two variables, for example, between antecedents and transactions or transactions and outcomes.

Congruency, on the other hand, is concerned with the similarity or alignment between planned and observed data (Stake, 1967). For instance, the similarity between the intended antecedents and observed antecedents or between the intended transactions and the observed transactions. Given this, the study will put more emphasis on the antecedents and transactions stages of the model since the intention is to examine how the curriculum developers' intentions are being both planned and carried out during classroom instruction. Therefore, both the observed antecedents and transactions will be compared with both the intended antecedents and transactions to determine the level of alignment or congruency between them, as well as their logical coherence or contingency.

According to Stake (1967), in order to evaluate curricula in one data matrix of the model, comparison between two cells of the matrix that contain goals and observations has to be done in order to record the mismatches and explain an alignment in that line. This calls for conceptualisation of the two previously discussed concepts: the contingency and congruence. As indicated, contingency refers to logical coherence among antecedents, transactions and outcomes while congruency refers to the alignment between the intents and observations. The antecedents, which are the prerequisites, have to be related or be coherent with what happens in the classrooms. The same thing applies to the transactions versus the outcomes. What actually happens in the classrooms has to be related to the observed outcomes. As a result, Harjanti et al. (2019) state that observations of contingencies rely on empirical evidence. They indicate further that the evaluator must be able to examine if the antecedents provided in the lesson plan can be obtained with the proposed transaction plan. Lastly, with regard to congruence, the intended data is examined for its alignment to the observed data. In other words, the intended antecedents will be examined for their alignment with the observed antecedents, intended transactions with observed transactions, and intended outcomes with observed outcomes. Consequently, the data for the curricula are said to be congruent if what was intended actually happens (Ntoi, 2007).

Stake's Countenance model is therefore valuable for illustrating the awareness of anticipated targets in a curriculum by providing an opportunity to compare the desired outcome with the actual outcome. Therefore, it is adopted within the scope of this present research as the purpose is to examine the congruency between CAP's prescriptions (intended) and the observed or enacted classroom practices.

Several other scholars have used this model in their research. For instance, Lukum (2015) evaluated a junior high school natural science learning programme using the Countenance model, and the results of the study revealed that both the learning planning and the learning processes are still not in accordance with standards. Equivalently, Harjanti et al. (2019) used this model in their study "Evaluating Learning Programs at Elementary School level of Sekolah Alam Indonesia". Very recently, Galang (2023) used the Countenance model to evaluate the non-graded system as applied in a school in UST Angelicum College, and the findings revealed a satisfactory congruence in the three stages of implementation (antecedents, transactions and outcomes).

Interestingly, some scholars clearly show that the misalignment that prevails across countries and subjects does not just exist between different curricula (that is, intended and enacted), but also within one curriculum. There can be some mismatches between conditions that exist before the learning and the teaching process (antecedents), and the teaching process (transactions). Illustratively, Tompong and Jailani (2019) unveiled that though the planning documents of teachers could be said to be in good terms, during the implementation of learning it was revealed that there are some things that are not in agreement with what is written in the planning documents. In the same manner, Lukum (2015) indicates that the learning planning of teachers still does not correspond with standards, as well as with the learning process. Nevertheless, as described by Polikoff (2012), alignment is not low for all teachers as some are doing a better job of tying their instruction to the intended instructional targets. As mentioned, Galang (2023) reported a satisfactory congruence in all the three stages of implementation. In the same way, Harjanti et al.

(2019) recorded quantitatively good congruency of both planning (76%) and process of implementing learning (93%) with education standards.

2.5.2 Bernstein's (2000) concept of classification

Even though Stake's (1967) Countenance model will be used as a guide for the collection and analysis of data in this study, the analysis will also draw inspiration from another theoretical construct – Bernstein's (2000) concepts of classification and framing. These concepts will be used in this study in order to best examine the extent of knowledge integration in the LGCSE Physical Science syllabus, particularly the Chemistry part of the syllabus, along with the actual Chemistry classroom transactions. It will also be used to examine the control relations in Chemistry lessons, which will in turn address CAP prescriptions concerning intended pedagogy. This will be done in order to determine the degree to which CAP is aligned with LGCSE Chemistry.

The classification concept was developed by Bernstein (2000) as a concept concerned with organization of knowledge into curriculum. Bernstein referred to it as the strength of boundary between areas of subject matter, discourses, actors, social division of labour, as well as organizational facets of pedagogical practice. In describing this concept, Bernstein (1975) indicated that it does not refer to that which is classified, rather to the strength of the boundary between classifications.

According to this concept, a strong classification (C+) is when the boundaries are clear and explicit, that is, the areas of subject content and knowledge are isolated finely into traditional subjects. Weak classification (C-), on the other hand, is when the boundaries between contents are blurred. Weak classification is therefore typical of the integrated curriculum envisaged by CAP. In an integrated curriculum, subjects are in a more open relationship (Nylund et al., 2019). As stated before, CAP is guided by the concept of integration, thereby promoting connection between school subjects as well as linkage of what is taught and learners' everyday life (MoET, 2009). According to Bernstein (2000), integration between school subjects is referred to as inter-disciplinary relations, while integration of learners' daily life experiences with school knowledge is inter-discursive relations.

On the other hand, the concept of framing pertains to the establishment of relationships within a specific classification, specifically the teacher-learner dynamic. It encompasses elements like sequence, choice, social dynamics, and pace at which knowledge is to be acquired, as well as the methods by which learning is to be assessed (Bernstein, 2000). According to Bernstein, framing is the strength of the boundary between what might and might not be taught in teaching-learning relationship. Where that boundary is sharp between what may and may not be transmitted, framing is said to be strong (F+). Selepe (2016) then claims that in a classroom with strong framing, didactic teaching approaches predominate, and the teacher has clear control over pedagogical practice. However, where there is a blurry line separating what may and may not be transmitted, framing is weak (F-), and Selepe (2016) maintains that in this case, pedagogy is progressive, and learners apparently have control over it.

As mentioned, the notion of framing is therefore used in this study to analyse control relations in Chemistry classrooms with regard to CAP prescriptions. This is done in order to examine alignment between CAP and Chemistry classroom practices over the selection of classroom activities, its sequencing, its pacing as well as the classroom social dynamics. Where the lessons are characterised by weak framing (F-), it will mean the teacher control was implicit. This can be framed in terms of those four elements – selection, sequence, pace and social dynamics. Selection denotes control over the choice of the topic, and classroom activities. Sequencing, on the contrary, denotes control over the order that the classroom activities will follow; pacing then shows control over tempo at which knowledge is to be learned; and, lastly, social dynamics which talks to control over classroom social relations. Consequently, in this study, weak framing (F-) of these four elements will demonstrate the changed role of the teachers and learners, in which teachers play their role as facilitators and not knowledge transmitters. It will mean learners are doing most of the work or are taking control over their learning. It will further demonstrate that teachers use learner-centred approaches, which might also result in stimulation of development of higher order thinking skills (HOTS) advocated by CAP. This is because, in weak framing, learners have explicit control over pedagogical relations (Pausigere, 2014), and this resonates with ideas of CAP regarding the intended pedagogy.

Stake’s (1967) model served solely as guide for the data collection and analysis, while Bernstein’s (2000) concepts of classification and framing were used in the in-depth analysis of the data. In this study Stake’s model allowed the researcher to examine the curriculum intentions or intended curriculum by analysing the curriculum materials, CAP and LGCSE syllabus. It also made it possible for her to look into the enacted curriculum through examining the planning and learning implementation of CAP's prescriptions by Chemistry teachers. This then enabled the comparisons of the two curricula to determine their alignment. On the otherhand, Bernstein's concepts were applied in this study because they provide a vocabulary for characterizing and evaluating knowledge and pedagogical concerns in LGCSE Chemistry teaching and learning, in accordance with CAP. The concepts made it possible for this study to investigate how teachers plan lessons and execute CAP in the classrooms, and also allowed for obervations of the control relations that are ingrained in the pedagogical decisions made by teachers. This gave insight into how the intended curriculum is being realised in Chemistry lesssons.

2.6 Conclusion

The chapter has discussed the literature concerning the examination of alignment amongst various educational components, both in Lesotho and other countries. It also elaborated on the factors which hamper the alignment between the intended and enacted curriculum, which are teacher training, teachers' beliefs and lack of adequate resources. This chapter also presented the theoretical underpinnings for the study, which is Stake's (1967) Countenance or Congruence-contingency model as well as Bernstein's (2000) concepts of classification and framing. Countenance model is regarded as appropriate because it offers a way to examine the alignment between CAP and LGCSE Chemistry, while Bernstein's classification and framing concepts will help in deep analysis of the extent of knowledge integration in Physical Science syllabus (in the Chemistry part), as well as in Chemistry classroom practices.

The next chapter describes the research methodology. It outlines the research design, sample, sample techniques and data collection and analysis tools. It further describes the data analysis process, trustworthiness of the study, as well as ethical considerations.

CHAPTER THREE: METHODOLOGY

3.0 Introduction

This chapter explains how the study was conducted. The nature and design of the research are discussed, as well as the population, the sample, sampling techniques and the proposed data collection and analysis techniques. The chapter will conclude by addressing the credibility and dependability issues, together with the ethical considerations concerning the research.

3.1 Research Paradigm

Literature outlines three dominant research paradigms applied in educational research, which include: positivism, interpretivism and pragmatism paradigm (Rehman & Alharthi, 2016). According to the same authors, research paradigm is about the underlying beliefs, principles and assumptions that guide how research is going to be approached. Jansen (2023) posits that in positivism paradigm, measurement and reason are the cornerstones; knowledge is derived from objective, quantifiable observation of action, activity as well as reaction. The author further asserts that pragmatism, on the other hand, emphasises the relevance and applicability of research findings while adopting a more flexible and practical approach. However, in this study, the interpretivism paradigm was the adopted paradigm. This kind of paradigm is based on the belief that reality is socially constructed, multiple, as well as subjective (Walliman, 2011). In other words, one's reality can only be understood through their experience of that reality, which may differ from that of another person and is shaped by individual, social and historical perspectives.

The study adopted this interpretivism paradigm because, contrary to positivism – which holds that solutions may be found by closely observing and evaluating data, particularly numerical data, and pragmatism which adopts a problem solving approach and looks for workable solutions to meet variety of research goals – the interpretive approach allows the researcher to use questioning and observation strategies in order to generate a deep understanding of the phenomenon and problem in its context. This is closely linked to qualitative research, which this study falls under. As a result, the intention was to observe teachers in their respective classes when planning and conducting their lessons, as well as interviewing them, in order to conceptualise how they implement CAP. Classroom observations allowed the researcher to witness the how of the teaching-learning process within its natural setting, while the interviews additionally, helped probe the interviewees and thus provided better insights into matters that could not be observed.

3.2 Research Methodology and Design

As indicated, this study is qualitative in nature, and couched in case study design. According to Smith (2012), qualitative research entails the inspection and analysis of the phenomenon in order to identify meanings and patterns in relationships without use of mathematics. De Vos et al. (2011) further pointed out that qualitative researchers are more interested in natural observations than controlled measurement. These writers concluded that qualitative researchers investigate objects in their natural environments while striving to make sense of them. Therefore, the choice of this approach was motivated by this idea that researchers who follow qualitative approach are interested in understanding the phenomenon within its natural setting, as well as investigating the reality from the insider's perspective (De Vos et al., 2011). Furthermore, qualitative research is said to be exploratory by design and is therefore used when confronted with the unknown (Moodley, 2013), making it appropriate for this study. The reason being that this study sought to examine the degree of alignment between what actually happens in the LGCSE Chemistry classrooms and what is intended to happen as per CAP's prescriptions.

Selepe (2016) posited that there are numerous research designs in qualitative research and the choice of which to utilize in a study depends on its appropriateness with regard to the phenomenon under study. For the purpose of this research, a case study design was deemed appropriate. A case study design is defined by Smith (2012) as an empirical investigation that examines a situation in its surrounding, and is described by Ary et al. (2010) as being descriptive, specific and practical or experimental. These writers explained that case studies focus on a specific phenomenon, circumstance or event. They further explained that case studies emphasise offering fresh perspectives and in-depth, descriptive information (Ary et al., 2010). Njie and Asimiran (2014) refer to a case study as qualitative research where in-depth data is gathered about an individual, programme, or event, for the purpose of learning more about an unknown or poorly understood situation. The case in this study was the phenomenon of curriculum alignment between CAP and Chemistry teachers' classroom practices in the Leribe district. As Moodley (2013) explained, in a case study a single person, programme, event, organization or phenomenon is investigated over a set period of time.

3.3 Population and Sample

Population is a group of individuals, objects, items or entities with common characteristics or attributes (Etikan & Babatope, 2019). In this study, the population was regarded as all teachers teaching the Chemistry part of the LGCSE Physical Science curriculum in the secondary schools in Lesotho. The sample, which is a subset of the population (Etikan & Babatope, 2019), accurately represents the population from which it is drawn, and hence from it a conclusion can be generalized to the population (Mopeli, 2017). Three teachers (one from each school) teaching Chemistry in the chosen schools constituted the sample for the study.

3.3.1 Sampling Technique

There are different strategies researchers can use to get a representative sample from the population, which are referred to as sampling techniques. Non-probability sampling technique was used in this study in order to select teachers who participated and to ensure that appropriate data was collected. This choice of sampling technique was made because, with probability sampling, there was a chance of ending up with teachers who did not have the qualities needed to contribute relevant data for the research questions asked. Ary et al. (2010) posited that probability sampling includes selecting a sample from which the participants are chosen at random, while non-probability sampling includes non-random techniques of selecting the participants. These include snowball sampling, quota, self-selection (volunteer), convenience, and purposive sampling. According to Nikolopoulou (2023), snowball sampling is utilized when the population the researcher wishes to study is difficult to reach, or cannot be located using a database, while self-selection sampling depends on participants who willingly consent to take part in the study. De Vos (2011) defined quota sampling as a technique typically employed by market researchers, in which a percentage of units (quota) is chosen that is as near to a true replication of the population as feasible.

Purposive sampling is based solely on researcher's judgement as to whether the sample is made up of traits that are representative of the population (De Vos, 2011), while convenience sampling is used to collect data from participants that are easily accessible to the researcher. In the current study, a convenient purposeful sampling was used to select participating teachers which enabled for selection of participants with specific characteristics required to conduct this study (Bloomberg & Volpe, 2008). Three high school Chemistry teachers from three different schools in the Leribe district participated in the study. These teachers were selected on the basis that they were qualified

Chemistry teachers, teaching Grade 9 Chemistry, and that they were available and willing to participate in the research. The schools were selected conveniently on the criterion that they were accessible to the researcher, while the grade was chosen because it is the lowest grade in which disciplinary knowledge is emphasised for the first time. Therefore Chemistry is taught separately from Physics, though they both form one subject – Physical Science. As a result, it was anticipated that instruction at this level is not exam-driven as could be in the upper grades (10 and 11). At this level, the teaching and learning process focuses on skills and knowledge acquisition and not on exam mastery.

Among the factors that attention was paid to in the selection of these teachers were their teaching experience in CAP, as well as their qualifications. Consequently, the sample for the study comprised three qualified Chemistry teachers, one from each school, and the table below shows their demographic profiles.

Table 3.1: Demographic profiles of Chemistry teachers participating in this study

Teacher	Gender	Teaching Qualification	Subject Majors	Experience in CAP (in years)
Teacher 1 (School A)	Female	Bsc.Ed Degree	Biology and Chemistry	06
Teacher 2 (School B)	Female	BSc.Ed Degree	Biology and Chemistry	11
Teacher 3 (School C)	Female	BSc.Ed Degree	Biology and Chemistry	11

3.4 Document Selection

The documents selected were those that depicted the intended curriculum. For the purpose of this study, those documents included the CAP document and the LGCSE Physical Science Syllabus, with more focus put on the Chemistry part of the syllabus. This part of the syllabus was chosen purposely because it is the researcher's area of specialty. In particular, the study placed more focus on the NCDC syllabus, and not the ECoL syllabus. This is because, the NCDC syllabi are the ones meant for classroom instruction, and they prepare learners for both exams as well as the outside world. However, the ECoL syllabi are one general syllabi meant to just guide teachers in terms of assessment, and assessment, as mentioned, falls outside the scope of this research.

Other selected documents for the study included teachers' lesson plan books, which were selected because they represented antecedents or conditions that existed before the classroom practices. As stated before, teachers are expected to plan before instruction, both daily and quarterly (Lesotho Code of Good Conduct, 2011).

3.5 Data Collection Instruments

This section describes how data were collected and the instruments that were used. Three different instruments were used to examine the alignment of LGCSE chemistry with the prescriptions of CAP. They include documents, classroom observation schedule and interview schedule. The purpose of using these multiple sources to data collection was to triangulate sources, which therefore assisted in intensifying validation of findings through convergence of data from different sources (Bhandari, 2022).

3.5.1 Documents

Ary et al. (2010) define document as referring to a broad category of written, tangible, and visual resources, including those that other authors could refer to as artifacts. De Vos (2011) then classified them as personal documents (like diaries), non-personal or official (such as annual reports), and mass media (like magazines). This study used written, official documents from both MoET and the respective teachers, which included CAP, LGCSE Physical Science syllabus, and teachers' lesson plans of the observed classes. These documents were chosen because it was anticipated that they would provide an understanding of how teachers are expected to conduct their lessons (CAP & Physical Science syllabus), which then depicts the intended curriculum. Lesson plan books were selected because they revealed how teachers intended to conduct their lessons. As asserted by Ary et al. (2010), written documents are used by qualitative researchers to get insight into the phenomenon they are studying.

According to Bordens and Abbott (2011), analysing documents allows one to explore their underlying meaning while looking for the themes related to a phenomenon. These enabled the researcher to gather data about the alignment between the intended and implemented/enacted LGCSE Chemistry curriculum.

3.5.2 Classroom observations schedule

Carless (2004) emphasised that when evaluating the success of an innovation, there is a need to learn how teachers implement the new curriculum in their classrooms. This can be done effectively through classroom observations because the kinds of interactions that are to be observed are not planned beforehand but rather happen naturally in teaching and learning environments (Rahman, 2014). Since the study aimed at examining the alignment between what is intended to happen in the classroom and that which actually happens, the classroom observation schedule seemed to be the best instrument for examining that which happens in classrooms. Furthermore, Ary et al. (2010) posited that the purpose of observations in qualitative research is to comprehend the complicated interactions in natural settings, like classrooms in this context. The classroom observation schedule was developed through guidance from the literature and the theoretical framework informing this study and then reviewed by the supervisor.

Non-participant classroom observations were used in this study, in which the researcher recorded and took notes while observing but did not participate in the activity being observed (Rahman, 2014). As argued by Cohen et al. (2011), a classroom observation “offers an investigator an opportunity to gather ‘live’ data from naturally occurring social situations and allows the investigator to look directly at what is taking place *in situ* rather than relying on second-hand accounts” (p.456). These classroom observations focused on the highlights of CAP’s prescriptions concerning the stipulated pedagogy. As a result, these observations helped unveil the actual practices on how CAP’s prescriptions are implemented in Chemistry lessons. The captured audio records of observed lessons were replayed by the researcher more than once while interpreting the data (Penn-Edwards, 2004) to avoid misinterpreting the participants. In addition to the recordings (audio) and notes taken during classroom observations, pictures of moments or activities found interesting and worth capturing were taken.

Each teacher who participated in this research was observed twice, in covalent bonding (lone and bonding pairs), allotropes of carbon and balancing chemical equations topics. The reason for observing the different topics was that the concern was not on the content part of the subject but rather on how the subject was taught, that is, the delivery.

3.5.3 Interviews

The observed teachers were then interviewed, in order to determine their familiarity with CAP and its prescriptions concerning intended pedagogy, as well as to attain clarity on some of the actions captured in class. Boyce and Neale (2006) defined interviews as qualitative research methods that entail one-on-one, in-depth discussions with a limited number of respondents to learn about their viewpoints on a specific concept, programme, or circumstance. De Vos et al. (2011) described them as just social interaction between a participant and a researcher with the goal of exchanging information. Interviews therefore have a capacity to provide the researcher with rich information about the participant's thoughts, beliefs, knowledge, reasoning, motivations, and feelings about the topic (Burke & Christensen, 2020). As argued further by Ary et al. (2010), interviews have the potential to provide information that cannot be obtained through observations, or they can even be used to validate observations. For these reasons, the study also adopted the interview method as an appropriate means of data collection. This is because, through interviews, the researcher better comprehended some of the activities that took place in the classroom during the observation, as well as determined teachers' familiarity with CAP and its prescriptions. This session also gave teachers a chance to justify their actions and practices in the classrooms.

In actuality, interviews are categorised into three types which include structured, unstructured and semi-structured interviews (Ary et al., 2010). While structured interviews are characterised by predefined set of questions in a set order (George & Merkus, 2023), unstructured interview is one in which there is no predetermined set or pattern of questions (George, 2022). On the other hand, the semi-structured interviews which are the ones employed in this research, are suitable for gathering data in case studies and are said to offer an interviewee a fair degree of freedom in what is being asked (Bearman, 2019). In semi-structured interviews, questions are developed before the interview and may be modified as the interview progresses. The advantage of a semi-structured interview is that it consists of key questions that help to define the areas to be explored and also allows the interviewer or interviewee to diverge in order to pursue an idea or response in more detail (Gill et al., 2008). This, therefore, aided in obtaining the needed clarity and understanding during the interview process.

Teachers in the study were interviewed after every classroom observation session in order to acquire a clear picture regarding their practices. These post-observation interviews were conducted immediately after the class when teacher did not have another class to attend after the observed lesson. In the case where the teacher had another class to attend immediately after the observed lesson, the time was decided on by the respective teacher. The interview session used an interview guide, which was carefully developed by the researcher with guidance from the theories informing this research, the literature, and then was checked by the supervisor. All interviews were audio recorded with the consent of the teachers.

3.6 Data collection procedure

To capture the alignment between the intended and enacted LGCSE Chemistry curriculum, data collection was done in three different stages: before, during, and after the teaching of Chemistry.

Stage 1: Before the teaching of Chemistry

First, documents that talked to the intended curriculum were collected, which are CAP and the Physical Science syllabus for Grade 9. In the CAP document, more focus was put on the pedagogy section of the Policy framework, while in the LGCSE Physical Science syllabus, focus was placed on the Chemistry section. This data enabled the researcher to explain how the curriculum expects the teachers to conduct their lessons (the intended curriculum). The Chemistry teachers' lesson plan books were also collected to determine how they planned to conduct their lessons which formed part of the enacted curriculum.

Stage 2: During the teaching of Chemistry

Three participants were observed teaching Chemistry to Grade 9 students. All the teachers were observed in two lessons, each of which lasted forty minutes. Every lesson was audio-recorded by the researcher. Observing the teachers in their classroom practices of teaching Chemistry concepts enabled the researcher to establish how they implemented the Chemistry curriculum and determine its alignment with the intended curriculum. At this stage, data was collected through observation notes, audio recordings and pictures.

Stage 3: After the teaching of Chemistry

The three teachers were interviewed after each lesson observation for them to reflect on their lessons and to also provide clarity on some interesting classroom occurrences. All interviews were audio-recorded.

3.7 Data analysis

After the collection of data, the researcher has to make meaning out of the collected data. Therefore, data analysis is defined by Cohen et al. (2007) as the arranging, accounting for and explaining of the data. The authors further stated that it also includes interpreting data in light of the participants' perceptions of the situation and noting patterns and themes (Cohen et al., 2007). Qualitative data analysis is the most important step in the qualitative research process because it assists researchers to make sense of their qualitative data (Ngulube, 2015).

To analyse data in this study, both thematic and content analysis approaches were used. According to Mayring (2000), qualitative content analysis is a process of methodical analysis and interpretation of the contents of texts, images or any other reality without involving any numbers or quantification. According to Kibiswa (2019), content analysis can either be inductive or deductive in nature. In an inductive content analysis, the themes that guide the research are established by the researcher using data that they collected while in a deductive analysis the themes are established by the researcher using an established theory (Kibiswa, 2019). Consequently, the aim of deductive analysis, which is also known as directed analysis, is effectively summarised by Delve and Limpaecher (2020) as identifying core themes and categories from earlier research or theory, then applying them as coding instructions to examine source materials and expand on a phenomenon.

This study employed an inductive/direct content analysis approach to analyse data collected from the documents. As explained by Ary et al. (2010), content analysis normally starts with a question that a researcher hopes can perfectly be answered through studying documents. In this study, documents attempted to answer the first research question that sought to examine the alignment between CAP and the Chemistry component of the LGCSE Physical Science syllabus. The researcher started the analysis by carefully reading and examining the LGCSE Physical Science syllabus, with more focus put on the curriculum content. This was done with the intention to determine the congruence between this curriculum content and the CAP's prescriptions concerning intended pedagogy, as well as knowledge integration. The five main changes envisaged by CAP in terms of pedagogy (1. Education accessibility/tiered curriculum; 2. Learner centredness; 3. Changed roles for teachers and learners; 4. Development of HOTS; 5. Knowledge integration) were considered coding instructions guiding the search in the syllabus, for Taylor-Powel and

Renner (2003) asserted that preconceived categories are crucial in providing direction for what to look for in the data.

Data from both the lesson plan books (antecedents) and classroom observations (transactions) were thematically analysed using pre-conceived themes from Bernstein's (2000) concept of classification and framing (see Tables 3.2 and 3.3). The data from classroom observation audio records was first transcribed verbatim. The entire data (lesson plans and transcribed lesson observations) went through a detailed analysis using a five-stage thematic analysis process based on Braun and Clarke (2006). In the first step, which involves *familiarization of data*, the written transcriptions and observation notes were viewed several times in order to get to know the collected data. The second step was *data coding* where the researcher highlighted phrases that reflected control (framing with respect to selection, sequence, pacing and social dynamics) and strength (classification in terms of knowledge integration) relations as depicted by Bernstein's two concepts. In the third step, these *codes were classified under predetermined themes* generated from Stake's model – observed antecedents (plan) and observed transactions (classroom practice). The fourth step involved *reviewing themes* where irrelevant themes were removed. It should be noted however that data from the interviews was also transcribed, read carefully and then used to provide supplementary data used to verify findings from both observations and documents. Finally, the *themes were examined* for their contingency and congruency and *then discussed* in the results chapter.

In thematic analysis approach, the researcher attentively examines the data to locate common themes – subjects, concepts and patterns of meaning that crop up frequently, and it is deductive if it includes approaching data with preconceived themes that one expects to find reflected in the data based on theory or current knowledge (Caulfield, 2019). The same writer further asserts that the approach is latent when it does not entail examining the data's explicit substance (semantic approach), but rather delves into the subtext and underlying assumptions.

The following tables, adopted from Hoadley (2006) and Selepe (2016) were used with the criteria detailed inside, to deeply analyse CAP's prescriptions in Chemistry classroom practices as well as in teachers' lesson plans. Table 3.2 describes how the analysis was done using Bernstein's (2000) framing concept.

Table 3.2: Data analysis with regard to the concept of framing

Theoretical construct	Coding	Indicators
Selection	F+ F-	Teachers have control over the choice of classroom activities and knowledge, and the learners have no input on this. Learners' control is explicit over classroom activities.
Sequence	F+ F-	Teachers have control over the order in which the lesson activities follow and do not divert from set order. Learners have control over the order of classroom activities; their input wholly or partly determines the order of lesson events.
Pacing	F+ F-	Teachers have control on how quickly the learning process goes, and are not slowed down by learners' input. Learners' input (questions and comments) determine how fast or slowly the teaching and learning goes.
Social interactions	F++ F+ F- F--	The teacher gives orders and explicit instructions, as well as retains authority. Learners do talk, but when responding to teachers' questions and rarely ask questions themselves. Teacher control still explicit but allows negotiations and open relations. Teacher control implicit, creates environment for dialogue and critical engagement. Open relations.
All the theoretical constructs	F^0	The teacher makes no comment on the activities to be done. The goal of an activity or discussion is unclear. Framing (as weak or strong) of a construct is difficult to be done or construct is not observable.

*Table derived from Hoadley (2006) and Selepe (2016) and slightly modified.

From the above table, F demonstrates framing, where F++ denotes very strong framing, which meant that teacher control was extremely explicit, and F+ shows strong framing, where the teacher control is still explicit. Weak framing is reflected by F- which shows that even though the teacher still retained authority, she/he still permits open relations, while F-—–denotes very weak framing which demonstrates that teacher control is very implicit, hence relations between teacher and learners, and among learners was very open. Lastly, F^0 denotes an unobservable construct.

Table 3.3 reflects how the analysis was done using Bernstein's (2000) classification concept. This concept was used in order to examine the degree of knowledge integration in Chemistry lessons, as well as whether differentiation with regard to core and extended curriculum components is made. Likewise, the four scale used in framing in the above table was still used in classification.

Table 3.3: Data analysis with regard to the concept of classification

Theoretical construct	Coding	Indicators
Interdisciplinary relations and Inter-discursive relations	C++	Very strong classification: no integration. There is distinct demarcation between subject taught and other subjects, as well as with learners' common knowledge.
	C+	Strong classification. Very low or limited integration. Boundaries between subject taught and other subjects, and learners' everyday knowledge exist, though not very explicitly.
	C- -	Very weak classification. Connections between what is taught and other subjects, and learners' daily life experiences exist explicitly, which demonstrate a certain degree of integration.
	C-	Weak classification. Connections are established between the discipline taught and other disciplines (and learners' common knowledge) but to a very moderate level.
Curriculum tiers (Core and Extended)	C+	Strong classification. Boundary between core and extended tiers exists, showing classroom instruction that separates learners or curriculum content into core and extended components.
	C-	Weak classification. Boundary between core and extended is blurred, demonstrating classroom instruction with integration of core and extended. No separation of learners into core and extended takers.

In the preceding table, C demonstrates Classification, where C++ demonstrates very strong classification, in which the boundaries between contents or knowledge are very clear and explicit. Meaning, the subject content and knowledge are isolated finely into traditional subjects, thus demonstrating no integration. C+ denotes strong classification, where the boundary between contents still exists though not very explicitly. C--, on the other hand, shows very weak classification, in which the boundary between contents is extremely blurred. That is, there is a very open relationship between subjects, reflecting an integration between subjects/different disciplines. Lastly, C- demonstrates weak classification or moderate level of integration, where the boundary between contents and knowledge is still blurred. The table below consequently offers a summary of how data was analysed.

Table 3.4: Summary of data analysis

Methods of Analysis	Data	Description
Documents (Content analysis - deductive)	CAP	Read, and re-read the document, identified text that reflected predetermined themes of Stake's model – intended antecedents and intended transactions Five main envisioned changes identified (learner-centred approach, knowledge integration, development of HOTS, teacher and learner roles and tiered curriculum or education accessibility)
	LGCSE Physical Science syllabus Lesson plan book	Read and re-read documents Look for the five envisioned changes (CAP's prescriptions)
Thematic analysis (deductive)	Observations	Audio-recordings of lessons scripted & read Bernstein's (2000) concepts of classification & framing used with regard to control & strength relations Scale ranging from C++ (very strong classification), C+ (strong classification), to C- (weak classification, C- - (very weak classification) used. (Classification had to do with knowledge integration & curriculum tiers) Same scale applied on Framing (Framing concerning selection, sequencing, pacing of lesson events & social relations, dealt with teacher control vs learner control over these elements)

	Interviews	Transcribed, read and used to provide supplementary data to verify both observations and documents.

3.8 Trustworthiness of the study

To be accepted as credible and of quality, qualitative research must score highly on being trustworthy. Trustworthiness is all about establishing how credible, transferable, confirmable and dependable research is. These are the four criteria of trustworthiness proposed by Lincoln and Guba (1985). According to Brink (1993), qualitative researchers avoid the term validity and use terms such as credibility, trustworthiness and truth. Credibility in Moser and Korstjens's (2018) words, determines if the plausible information derived from the original data provided by the participants accurately reflects their initial opinions. In its simple terms, credibility is the degree to which the research findings are credible or rather believable. Conversely, confirmability describes how much the results of qualitative research are unaffected by bias, distortion, or effect of the researcher's own beliefs, presumptions or interests, while transferability describes how broadly or practically the results of qualitative research can be applied to various situations, places or populations (Connelly, 2016). However, dependability, which is linked to reliability in quantitative research, is in Ary's (2010) opinion, the extent to which differences can be tracked or explained. This is due to the fact that qualitative studies anticipate unpredictability since the study context varies, in contrast to quantitative research where strict controls improve dependability (Connelly, 2016).

This being the case, there are several ways of enhancing the quality of one's research in qualitative research studies suggested by literature. For instance, Lincoln and Guba (1999) developed the following strategies that could be used: peer debriefing, triangulation of methods, member checks, persistent observation and prolonged stay in the field, and formalised qualitative methods like analytic induction and grounded theory.

In this study, with regard to persistent observation strategy, each teacher was observed twice, in a single and a double period lessons. These times are believed to be sufficient to allow the researcher and the teacher to get used to each other and to help the teacher to be comfortable in being observed. Besides that, it is indicated in Section 3.5, that data was collected using non participant classroom observations, documents and semi-structured interviews, which is considered a method of triangulation. According to Polit and Beck (2012), triangulation involves the use of more than one option to gather data to study the same phenomenon. As mentioned earlier, Bhandari (2022) maintains that triangulation assists the researcher to intensify the validity and reliability of the findings, through the merging of data from different sources.

Bhandari (2023) further noted that while one can try to minimise observer bias, she or he might not be able to completely get rid of it from his or her study. In this study, triangulation was used to reduce bias during classroom observations. This is because, according to Bhandari (2023), the observer can minimise the likelihood of bias when data from the different methods merge, which increases the validity and reliability of the results. Other than that, during observations an observation schedule was used and adhered to which had clear and precise behaviors to be recorded.

Apart from that, the use of audio recordings of the observed lessons offered chances for consistency checks, as it allowed for numerous opportunities to listen to how the curriculum has been implemented in classrooms. Furthermore, in order to reduce the negative impact that could have been brought about by the observer's presence and to also avoid needless interruptions, which could impair the credibility of the results, all the lessons were observed and recorded from the back of the classroom. Again, an external microphone was utilized, which aided in reducing the background noise in the recordings. Other than this, the instruments that were used for collecting data were carefully designed and submitted for review by the supervisor before they were used. Also, the researcher received valuable feedback, criticisms and suggestions for improvement from the supervisor, other lecturers and colleagues during presentations and discussions as peer debriefing and support.

3.9 Ethical Considerations

According to Ary et al. (2010), the report should specify how informed consent, confidentiality and other ethical issues were handled. These writers make it clear that while using humans in a study, the researcher must respect their rights, dignity, privacy and delicate relationships.

Firstly, formal procedures of contacting the District Education Office for permission to conduct research in schools in Leribe were followed. It was after getting this approval from the education office that the principals of the selected schools were approached for permission and consent to observe classes and interview teachers in those schools (Cohen et al., 2011). Consent was also sought from the Heads of Mathematics and Science departments in the respective schools and from the Chemistry teachers who took part in this study. The Chemistry teachers were assured that they wouldnot be identified in the study by their actual names, but that pseudonyms would be used for both the participants and their schools. The participants were informed that they were at liberty to withdraw from the study at any time without any negative consequences whatsoever. The students as well, were convinced that their identities would be hidden (their faces and real names), and that the data was to be used for academic purposes only. Last but not least, consent was also sought from parents for learners under eighteen years, who are considered minors.

3.10 Conclusion

The chapter provided an overview of the methodology to be used in this research. It commenced by discussing the design of the research, indicating that the study is qualitative in nature, couched in case study design. It further described that the sample of the study were three qualified, purposively selected Chemistry teachers from three conveniently and purposively chosen schools in Leribe. The data collection techniques used, which included document, observation and interview schedules, were also described. Lastly, the chapter offered a full description of how data was analysed, which was through direct documents and thematic analysis. The chapter then discussed the trustworthiness and ethical considerations undertaken by the study.

Chapter Four presents the findings of the study relating to the enacted curriculum, as established by teachers’ classroom observations, interviews, and documents like lesson plans and the Physical Science syllabus.

CHAPTER FOUR: RESULTS

4.0 Introduction

The purpose of this study is to examine alignment between the intended and enacted curricula, with respect to the LGCSE Chemistry. The intended curriculum in this study is depicted by the LGCSE Physical Science syllabus and CAP's prescriptions concerning the intended pedagogy, while the enacted curriculum was investigated through examining classroom practices. This current chapter presents the results of data collected from the CAP document, the LGCSE Physical Science syllabus, teachers' lesson plans, classroom observations and interviews. The collection and analysis of the data were informed by the theoretical framework underpinning the study, which includes Stake's (1967) Countenance model and Bernstein's (2000) classification and framing concepts.

The findings are categorised in terms of the sub-research questions of this study in an attempt to answer the main research question.

Main research question

What is the extent of alignment between the intended and the enacted curricula, with respect to LGCSE Chemistry?

Sub-questions

1. In what ways is the LGCSE Physical Science (Chemistry part) syllabus aligned with CAP prescriptions concerning the intended pedagogy?
2. What is the nature of Chemistry teachers' lesson planning relative to the implementation of CAP prescriptions?
3. How do teachers implement the CAP prescriptions during their classroom instruction in Chemistry lessons?

Section 4.1, which addresses the first research question, presents results from analysis of the LGCSE Physical Science syllabus which is reflective of the intended curriculum. Section 4.2, which concerns the second and third research questions, presents findings concerning data from the teachers' lesson plan books, classroom observations, and interviews where the enacted curriculum is displayed.

4.1 THE INTENDED CURRICULUM - alignment between the LGCSE Physical Science syllabus and Lesotho CAP

This section presents findings regarding the analysis of how the LGCSE Physical Science syllabus, in the Chemistry part, is aligned with CAP regarding the intended pedagogy. The section therefore seeks to answer the first research question: **In what ways is the LGCSE Physical Science syllabus in the Chemistry part aligned with Lesotho Curriculum and Assessment Policy**? As mentioned, CAP advocates at least five main changes which therefore have to be evident in LGCSE syllabi when congruence is existent. The table that follows displays these changes concerning the intended pedagogy as per CAP.

Table 4.1: CAP prescriptions regarding the envisaged changes

Change	Description
1. Education accessibility	CAP aims to make education accessible to all students at both primary and secondary school levels, reflected in tiered curriculum in Physical Science (core and extended tiers).
2. Learner centredness	The Policy framework advocates participatory, activity centered and interactive learner centered methods to teaching.
3. Changed teacher and learners' roles	Advocates a shift from teaching to facilitating learning, (teachers ought to be facilitators), from facts transfer to creation of knowledge by learners (learners ought to be creators of knowledge not receptors).
4. Development of higher order thinking skills (HOTS)	Calls for a change from memorization of information to analysis, synthesis, evaluation and application of information, which are all HOTS.

5. Knowledge integration	The framework advocates a change from categorised knowledge to integrated knowledge.

Derived from MoET (2009)

As indicated in Chapter One (Section 1.1), CAP advocates these aforementioned changes which revolve around instruction as well as assessment. Assessment, however, falls outside the scope of this study which only focuses on the aspect of instruction.

The following table then shows the Grade 9 Chemistry curricular content (Learning Outcomes/ LOs) for the LGCSE Physical Science syllabus. There are seven Grade 9 Chemistry learning outcomes with 48 suggested learning experiences (LEs)

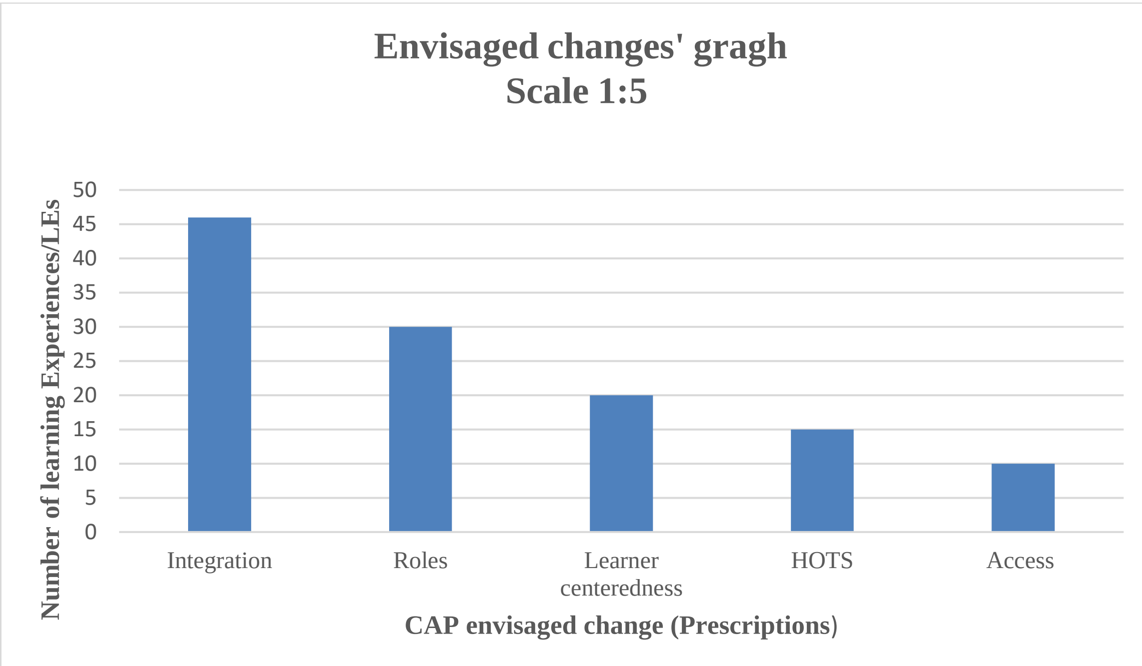
Table 4.2: Grade 9 LGCSE Chemistry learning outcomes and suggested learning experiences

CORE	EXTENDED
<u>1. Investigate properties of group i & vii elements</u> **Learners:** 1.1. Perform activities to investigate chemical and physical properties of alkali metals and halogens 1.2. Perform activities to investigate trends in chemical and physical properties of alkali metals and halogens	1.3. **Teacher and learners** discuss trends in physical properties of alkali metals 1.4. **Learners** perform activities to identify trends in properties of other elements from given data 1.5. **Learners** prepare chlorine gas and identify its physical properties
<u>2. Investigate properties of transition elements</u> 2.1. Teacher and learner discuss chemical properties (variable oxidation state) of transition elements 2.2. Teacher and learner discuss physical properties of transition elements 2.3. Learners explore colours of different compounds of the same transition elements 2.4. Learners research on uses of transition metals	2.5. **Learners** research on application of transition elements and their compounds in catalysis
<u>3. Describe formation of molecules</u> 3.1. Teacher and learners revise formation of ionic compounds 3.2. Teacher and learners revise stability in terms of the noble gases configuration 3.3. Teacher and learners discuss valence electrons and valency of atoms 3.4. Teacher and learners use "dot and cross" diagrams and equations to illustrate formation of molecules 3.5. Teacher and learners discuss lone pairs 3.6. Learners perform activities to illustrate formation of single covalent bonds 3.7. Learners perform activities to investigate volatility, solubility on water and electrical conductivity of molecular substances 3.8. Teacher and learners discuss differences in physical properties between ions and molecular substances 3.9. Teacher and learners discuss the structure of allotropes of carbon (diamond and graphite) 3.10. Learners research on the uses and physical properties (hardness, electrical conductivity and fixed points) of diamond and graphite	3.11. **Learners** perform activities to illustrate formation of double and triple covalent bonds
<u>4. Write balanced chemical equations with state symbols</u>	

4.1. Teacher and learners revise formation of compounds and molecules 4.2. Teacher and learners discuss chemical equations 4.3. Teacher and learners discuss prefixes and subscripts 4.4. With guidance of teacher, learners write: word equations for different reactions, symbolic equations for different reactions, ionic equations for different ionic reactions, balanced symbolic equations, balanced ionic equations, balanced chemical equations with state symbols **<u>5. Demonstrate understanding of chemistry of oxygen</u>** **Teacher and learners:** 5.1. Discuss catalyst and its role in chemical reactions 5.2. Perform an activity to determine percentage of oxygen in atmospheric air 5.3. Review rusting 5.4. Deduce word and symbol equations for rusting 5.5. Perform an experiment to prepare (from hydrogen peroxide) and test oxygen **Learners;** 5.6. Discuss physical properties of oxygen 5.7. Discuss the importance of oxygen: respiration (with reference to diving, mountaineering, oxygen tents), welding, and combustion. 5.8. Discuss economic importance of rust 5.9. Explore different methods of rust prevention **<u>6. Demonstrate understanding of chemistry of air</u> – Teacher and learners:** 6.1. Discuss composition of clean air 6.2. Distinguish between clean and polluted air 6.3. Discuss causes of air pollution 6.4. Discuss sources and adverse effects of air pollutants 6.5 Discuss uses of He, Ne and Ar **<u>7. Demonstrate formation of ammonia and carbon dioxide</u>** **Learners:** 7.1. Research on Haber process, followed by presentations and discussions 7.2. Present their findings **Teacher and Learners:** 7.3. Discuss formation of ammonia, use of ammonia in the manufacture of fertilizers 7.4. Discuss other uses of ammonia 7.5. Discuss formation of carbon dioxide from: combustion of carbon compounds and respiration	5.10. **Learners** discuss galvanizing in terms of the protective oxide layer on zinc **Teacher and Learners:** 6.6. Discuss reasons for the common uses of noble gases 6.7. Discuss fractional distillation of liquefied air 7.6. **Teacher and learners** review uses of transition elements 7.7. **Learners** research on conditions necessary for Haber process

The graph that follows categorises these learning experiences into the five main changes envisaged by CAP, in order to demonstrate which change or changes are more dominant as per the LGCSE Physical Science syllabus in the Chemistry section.

Figure 4.1: Category of LEs in CAP's envisaged changes



From the graph above, it can be observed that the Grade 9 Physical Science syllabus mostly emphasised integration of knowledge more than the rest of the other envisioned changes, followed by changed roles for both learners and teachers and then promotion of learner-centred approaches. The minimally represented change is that of education accessibility in terms of a tiered curriculum, which separates the curriculum content into core and extended, in order to cater for more and less able students in the subject.

Education Accessibility (Tiered curriculum)

A glance at the data presented in Table 4.2 above shows that the content of the LGCSE Chemistry discipline is tiered into both core and extended components. The core learning experiences (LEs) are intended to be taken by all learners, with exception of the extended LEs which are intended for learners with more ability on the subject and who are willing to pursue scientifically inclined careers. For instance, under the topic of Group I and Group VII elements, all learners are to:

Investigate chemical and physical properties of alkali metals and of halogens.

Investigate trends in chemical and physical properties of alkali metals and halogens.

The content learned at the core level includes only the less complex basic concepts of a topic that does not require any critical thinking to understand. However, under this same topic, only learners taking the extended component are to:

Discuss trends in physical properties of alkali metals.

Identify trends in properties of other elements from given data.

Prepare chlorine gas and identify its physical properties.

The content learned under the extended component of the syllabus goes beyond surface learning to a deeper understanding of the periodic table concepts. As highlighted by the learning experiences above, at this level, students are expected to be able to analyse, synthesise and apply what is learned, thus reflecting a deeper understanding of the concepts. Given this, it can therefore be suggested that the LGCSE Physical Science syllabus allows learners with wide range of abilities to benefit from it, with those less able taking only the core component, while those who are more able take both components, even though this is according Figure 4.1, the least emphasised change in the syllabus.

Learner centredness

A look at the learning outcomes from Table 4.2 above shows that the syllabus intends to promote employment of learner-centred approaches in the teaching and learning of Chemistry since some of the LEs place the responsibility of learning on the students and not on the teachers. The examples below demonstrate some of the LEs that reflect this.

Learners perform activities to illustrate formation of single covalent bonds.

Learners perform activities to investigate chemical and physical properties of alkali metals and halogens.

Learners research on the uses and physical properties (hardness, electrical conductivity and fixed points) of diamond and graphite.

The LEs show that the LGCSE syllabus requires students to take a central role in their learning. This demonstrates that during the teaching and learning of Chemistry, it is expected that learner-centred methods be employed.

Teacher and Learner Roles

As demonstrated from Table 4.2 above, some of the work is to be done by the learners themselves. The teacher ought to either guide or discuss with the learners and should not necessarily transmit knowledge to them. Thus, the teacher is expected to facilitate the learning process. This is evident in the following Les:

> *With guidance of the teacher, learners write word equations for different reactions, symbolic equations for different reactions…*
>
> *Teacher and learners discuss physical properties of transition elements.*
>
> *Learners research on Haber process, followed by presentations and discussions.*

It is therefore evident from the above LEs that learners' and teacher's roles ought to change. The teacher ought to facilitate and guide learning, while the learners take full responsibility for their learning, by either writing, using, investigating, researching, and revising. This change is also dominant in the syllabus.

Higher Order Thinking Skills (HOTS)

The cognitive verbs used in the LEs show the extent to which learners will be required to demonstrate their knowledge during assessment (Johnson et al., 2020), as well as guide classroom instruction. Table 4.3 below provides a summary of the cognitive verbs used in LEs found in the Grade 9 Chemistry component, number of those LEs, and the cognitive skills thereof.

Table 4.3: Number of Grade 9 Chemistry LEs, their Cognitive Verbs and Skills

Cognitive Skill	# of Learning Experiences	Verb
Remember	3	Write, review, identity
Understand	32	Discuss, research, review, identify
Apply	4	Use, present, illustrate
Analyse	7	Investigate, explore, test, distinguish

Evaluate	5	Revise, deduce, determine
Synthesise	3	Write, prepare

From this table, it can be seen that lower order thinking skills (Remember, Understand and Apply) account for majority of the total number of the learning outcomes, with more emphasis on Understand cognitive skill. On the other hand, higher order thinking skills comparatively accounted for a lesser portion of the total number of the LEs in the syllabus. These skills include Analyse, Evaluate and Synthesise, with more emphasis put on Analyse, followed by Evaluate. This therefore means that the syllabus promotes the development of HOTS, although to a limited extent.

Knowledge Integration

Bernstein's concept of classification was used to probe the element of knowledge integration in the LGCSE Physical Science syllabus (Chemistry component Learning Outcomes/LOs), with regard to the connection of school knowledge with learners' everyday experiences (inter-discursive relations), and with other school subjects (interdisciplinary relations). The table below summarises the findings**.** The first column presents the respective learning outcomes, while the second and third columns demonstrate the interdisciplinary and inter-discursive relations respectively. As indicated in Chapter 3, C- represents a weak classification, which signals integration, C- - represents a higher level or degree of integration, while C+ on the other hand represents a strong classification, where there is no integration.

Table 4.4: Interdisciplinary and Inter-discursive knowledge relations

LOs	Interdisciplinary Relations	Inter-discursive Relations
1. Investigate properties of group I and group VII elements	C-	C-
2. Investigate properties of transition elements	C-	C-
3. Describe formation of molecules	C-	C-
4. Write balanced chemical equations with state symbols	C-	C-
5. Demonstrate understanding of Chemistry of Oxygen	C--	C- -
6. Demonstrate understanding of Chemistry of air	C--	C- -
7. Describe formation of ammonia and carbon dioxide	C- -	C-

Interdisciplinary knowledge integration

It can be observed from Table 4.4 above, that all learning outcomes in the syllabus are characterised by weak (C-) to very weak (C--) classification. This reflects integration of content from other subjects in all the LOs. Connection regarding other subjects can mostly be made on LOs such as "*Demonstrating understanding of Chemistry of air"*. Here knowledge from subjects such as Geography and Biology could be mostly integrated with Chemistry concepts in this learning outcome. The learning experiences below, taken from the same LO, support this argument.

> *Learners distinguish between clean and polluted air.*
>
> *Learners discuss causes of air pollution.*
>
> *Learners discuss sources and adverse effects of air pollutants.*

These learning experiences were coded C--, which reflects high level of knowledge integration as reference can be made to other subjects like Biology, Agriculture and Geography when teaching and learning them. For instance, with *"causes of air pollution"* learning experience, reference could be made to Biology subject when discussing pollutants such as carbon monoxide, which is poisonous and binds to hemoglobin in the blood. Consequently, with regard to interdisciplinary relations, generally coding all the LOs weak to very weak means the syllabus created a context for integrated instruction. This means that during teaching and learning of LGCSE Chemistry, knowledge from other subjects can be integrated which can also enhance students' understanding of Chemistry concepts.

Inter-discursive relations

Furthermore, when it comes to integration of school knowledge with learners' everyday life experiences, Table 4.4 above indicates that, similar to interdisciplinary relations, the LOs here were classified with values of strength varying from very weak (C--) to weak (C-) classification. The learning experiences that follow reflect very weak classification, and they are taken from the LO "***Demonstrating understanding of Chemistry of oxygen***".

Learners and teacher review rusting.

Learners discuss the importance of oxygen: respiration (with reference to diving, mountaineering, oxygen tents), welding and combustion.

Learners explore different methods of rust prevention.

These learning experiences mostly entail what Raselimo and Thamae (2018) called informal knowledge, which is the knowledge students have from observations as they interact with people and the world around them. For example, with *"rusting"* – which has an everyday Sesotho name of *"mafome"*, – it is what the majority, if not all students, experience and observe mostly in their daily lives. They probably would have noticed old cars and metallic objects around them turn reddish brown when exposed to air and moisture.

On the other hand, some LOs are just coded weakly (C-), which demonstrates low degree of integration of school knowledge and learners' daily life experiences. Those LOs include:

Describe formation of Ammonia and Carbon dioxide.

Investigating properties of group I and VII elements.

Investigating properties of transition elements

When dealing with these LOs, reference can slightly be made to learners' everyday knowledge. For instance, when reacting to the LO *"investigating properties of transition elements"*, under the uses of transition elements, examples like these two can be relevant to their everyday experiences - gold can be used to make dentistry, metals and jewellery, and copper can be used in areas such wiring. As a result, this weak to very weak classifications of the LOs mean that the syllabus encourages inter-disciplinary integration in the Chemistry classroom instruction in Grade 9.

4.2 ENACTED (PERCEIVED AND OPERATIONAL) CURRICULUM IN GRADE 9 CHEMISTRY CLASSROOMS

This section presents the findings from the teachers' lesson plans, their observed lessons teaching Grade 9 Chemistry and follow-up interviews. The findings attempted to answer the second and third research questions, which speak to their planning (antecedents) and classroom instructions (transactions) in LGCSE Chemistry. The findings are categorised into two themes presented by Stake's Countenance model which are Congruence and Contingency. The Congruence is further explained in terms of Antecedents and Transactions as projected from the lesson plans and observed lessons respectively. To explain this theme further, Bernstein's (2000) concepts of classification and framing were also used in order to examine in depth the extent to which individual teachers' planning and instructional practices match with CAP's prescriptions concerning the intended pedagogy. That is, the five main changes envisaged by CAP were extensively examined in lesson plans and classrooms, in terms of power (classification) and control (framing) using the four-point ratings (F- ,F--, F+, F++ and C-, C--, C+, C++) discussed in Chapters 2 and 3. As indicated, they range from very strong to very weak classification and framing.

4.2.1 A case of Ms. Makopoi

A. CONGRUENCE

The process of examining the congruence was done in two stages which included explaining the observed antecedents and the observed transactions.

Observed Antecedents

Table 4.5 that follows offers a synopsis of Ms. Makopoi's lesson plans for the lessons on chemical reactions and balancing chemical equations, in terms of classification and framing. The first column shows the theoretical constructs, while the second and third columns show the coding of the two observed lesson plans respectively with regard to the four-point ratings discussed. Rows two to five on the other hand, demonstrate framing in terms of the four elements of framing – selection, sequence, pacing and social dynamics, while the last two rows show classification in terms of knowledge integration as well as separation of curriculum content into core and extended curriculum tiers.

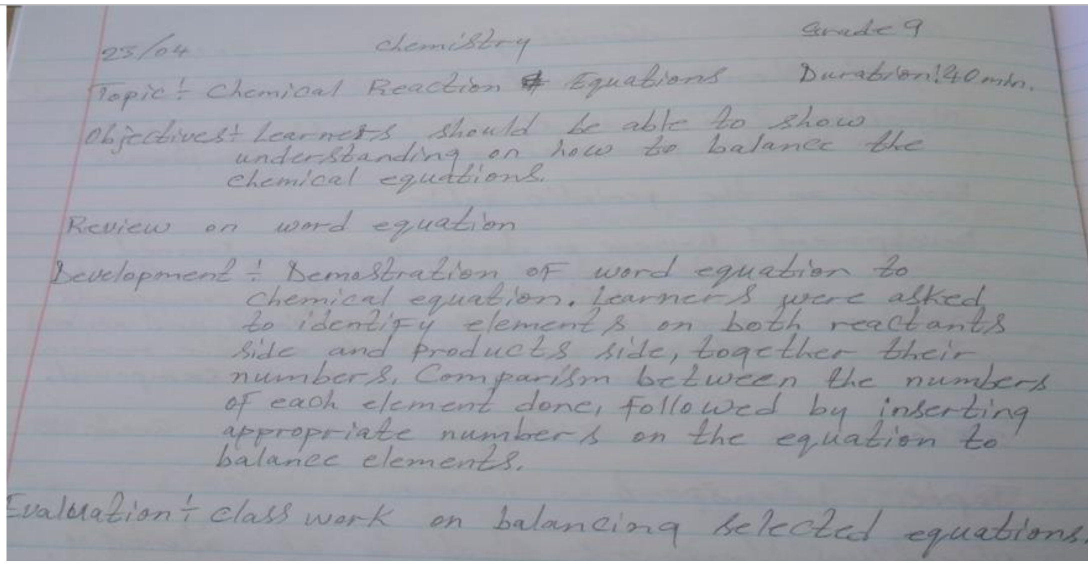
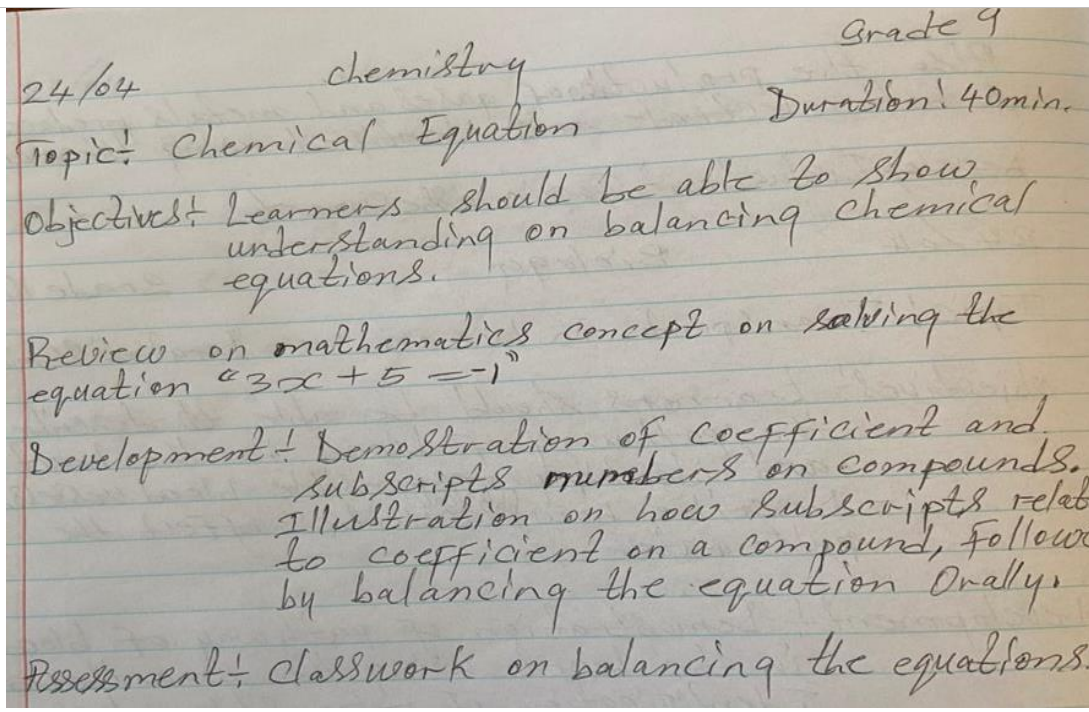
Table 4-5: The classification and framing summary of Ms. Makopoi's lesson plans

Theoretical Construct	Coding (1st lesson)	Coding (2nd lesson)
Selection	F++	F++
Sequence	F++	F++
Pacing	F-	F-
Social interaction	F-	F+
Knowledge Relations:		
Interdisciplinary	C++	C--
Inter-discursive	C++	C++
Separation of Curriculum tiers	C--	C--

Framing

It can be observed from the table that Ms. Makopoi's lesson plans were marked by very strong framing on both the selection of what will happen in class and sequencing. As explained in the previous chapters, the code F++ indicates a very strong framing marking explicit teacher control over the four elements of framing. As it can be seen from Figure 4.2 below which reflects the lesson plan, there are no phrases or sentence which signified that learners would be offered an opportunity to alter the selection (select what activities or knowledge should be learnt) and sequence (the order of activities or concepts learned). On the other hand, both pacing and social interactions on the first lesson plan were coded weak, since the teacher showed an intention to engage learners. This is exemplified by the following quotes: "*learners were asked to identify elements in both reactants side and products side, together (with) their names*" and "*classwork on balancing selected equations*". These learners' input affected the coding of both the pacing and social interactions of the planned lesson. As discussed in the previous chapters, the code F- indicates a weak framing. Similarly, the coding of pacing for the second lesson, classified as weak, was affected by intended learners' interaction in the statement: "*classwork on balancing the equations*", which showed that learners were to be offered some work to do. However, the teacher did not state whether the work would be done individually or as a group work, hence social interaction is coded strong (F+). This is because, while it is not clear how the work would be done, the phrase suggests a possibility of interactions between the teacher and the learners.

Figure 4.2: Ms. Makopoi's lesson plans for the first and second lessons

Lesson plan 1	 25/04 chemistry Grade 9 Topic: Chemical Reaction ~~#~~ Equations Duration: 40 min. Objectives: Learners should be able to show understanding on how to balance the chemical equations. Review on word equation Development: Demonstration of word equation to chemical equation. Learners were asked to identify elements on both reactants side and products side, together their numbers. Comparism between the numbers of each element done, followed by inserting appropriate numbers on the equation to balance elements. Evaluation: class work on balancing selected equations.
Lesson plan 2	 Grade 9 24/04 chemistry Duration: 40min. Topic: Chemical Equation Objectives: Learners should be able to show understanding on balancing chemical equations. Review on mathematics concept on solving the equation "3x + 5 = -1" Development: Demonstration of coefficient and subscripts numbers on compounds. Illustration on how subscripts relate to coefficient on a compound, followed by balancing the equation Orally. Assessment: classwork on balancing the equations.

Classification

On the concept of classification, Ms. Makopoi's lesson plans were categorised by very strong classification on knowledge integration with regard to inter-discursive relations, as well as interdisciplinary relations in the first lesson plan signified by a code C++. Similarly, the inter-discursive relations projected by the second lesson plan were coded by C++, indicating a very strong classification of knowledge integration. On the contrary, with regard to interdisciplinary relations, the second plan showed an integration of mathematical concepts, hence very weakly classified and coded by (C- -).

In this second lesson plan, Ms. Makopoi outlined that demonstration on coefficients and subscripts were going to be done, which therefore showed interdisciplinary relations since both coefficients and subscripts are mathematical concepts. Planning to emphasise more on these concepts when teaching Chemistry brings in the element of integration of Mathematical concepts in the Chemistry lesson. Lastly, when it comes to the separation of curriculum content into core and extended, there was no clear reflection on both plans, on how the teacher planned to differentiate her instruction with regard to these tiers. The teacher was therefore coded at C- -, indicating that the classification was very weak.

Following this is the presentation of Ms. Makopoi's observed lessons transactions.

Observed Transactions

The table below gives a summary of Ms. Makopoi's lessons on balancing chemical equations, as they unfolded during observations.

Table 4-6: The classification and framing summary of Ms. Makopoi's enacted lessons

Theoretical Construct	Coding (1st lesson)	Coding (2nd lesson)
Selection	F++	F++
Sequence	F++	F++
Pacing	F+	F-
Social relations	F+	F-
Knowledge integration		
Inter-discursive	C-	C++
Interdisciplinary	C+	C--
Separation of curriculum tiers	C--	C--

Framing

The lessons were on balancing chemical equations, where teacher control over the choice and order of classroom activities and the knowledge was explicit. This resulted in a very strong framing on both selection and sequence. This is exemplified by the lesson extract below:

Extract 1

Ms. Makopoi: Write it (Katleho) below. Ask them which elements do have on the products side?

Katleho: Which elements do we have on the products side?

Students: Hydrogen (choral response)

Katleho: How many hydrogens do we have on the products side?

Ms. Makopoi: Hydrogen. Katleho, remember to write below hydrogen. How many hydrogens do we have at the product side people?

Students: One (choral response)

Ms. Makopoi: One. How many Chlorines do we have on the product site? Ask them Katleho.

Students: One (choral response)

Ms. Makopoi: Ok. Ask them which side has got more hydrogens, which side has got less hydrogens. Listen to Katleho.

Katleho: Which side has got more reactants…?

It is evident from the extract above that Ms. Makopoi had complete control over the selection and sequence of classroom activities, hence the coding F++ which indicates a very strong framing. Though she attempted to engage learners by asking Katleho to be the teacher of the day, she told the student what to ask, what to write and when to do all these. It can also be observed that the questions asked were close-ended questions that also encouraged a choral response. Apart from this, the pacing of the lesson, as well as social interactions, were strongly framed at F+. This is because a slight engagement of student Katleho in leading the discussion is considered to have slightly impacted on the pacing and interactions between the teacher and the learners.

Unlike the first lesson, which was characterised by strong pacing and social dynamics (F+), the second lesson was marked by weak pacing and social interactions (F-). The reason for this was Ms. Makopoi's attempts in engaging the learners in the beginning of the lesson by asking them to solve the mathematical problem she had on the board. However, although she had four students to solve the equation on the board, they were all quiet as they did that, and received no questions or suggestions from their peers in the classroom. Ms. Makopoi was the only one asking questions, and questions that mostly demanded a yes or no answer, with a prevalent use of "isn't it" (*hakere*). The segment below demonstrates this.

Extract 2

Ms. Makopoi: Ok. (Writing the equation on the board: $3x - 5 = -1$). Who can solve for us this equation? Before you can solve this equation, what is the relationship between this number (3) and x, how do they relate? Er? It is? One at a time please.

Student: It is multiplication.

Ms. Makopoi: Yes, it is multiplication, right? This is the same as 3 multiplied by X. Ok, I want the volunteer to come and solve this equation for us on the board. For a change let's give Relebohile a chance. You are going to teach me the concepts of Math, hakere? And you reason why.

(**Student/Relebohile silently attempts solving the equation)**

Ms. Makopoi: Ok. Any, any, any different suggestion? Who can solve that equation differently from Relebohile please? Please go Limpho, isn't it you are teaching me math. Isn't it, or you are not? Focus, please close the books in front of you. Leseli close the book.

(Student/Limpho solving the equation differently)

Ms. Makopoi: Keep quiet please. Ok, thank you Limpho. A different solving of that equation please. A different suggestion, people, a different suggestion please, a different suggestion, Mosele, Mosele there, she, can you please go to the board and solve that equation. Hurry up please. Leave your jacket behind please. And who else? Er, let me see. Thuto, I have got two pieces of chalk, you can use the other. Mosele may you kindly use this side of the board. Thuto, will you use that side, hurry up people. Thuto, this side please.

(Students/Mosele and Thuto solving the equation differently on the board)

Ms. Makopoi: Thank you people. How come we have got different values of x? er? Mosele, how do you use number line, er, can you emphasise on this number line? Do you see how old I am, even today I do not know how to use the number line. So maybe when Mosele can help out, I can be able to understand. Please Mosele, how do you determine the value of this (x) from the number line? Just tell us what you did.

Student/Mosele: I said negative one minus five.

Ms. Makopoi: Negative one minus five, and it is going to give you? How do you go about it on the number line? You move from negative one?

Student/Mosele: Yes madam.

Ms. Makopoi: How many steps?

Student/Mosele: Five

Ms. Makopoi: You are saying one, two, three, four, five (Pointing on the number line drawn). We start from the next number? (Pointing at negative two). You are saying one, two, three, four, five, ok. Do we all see it? Do we all see it?

Students: Yes madam (choral response).

The excerpt above demonstrates that there was no peer interaction occurring while the four students were solving the mathematical equation on the board. It was only Ms. Makopoi who was doing the talking and asking of questions.

It is also worth noting that in this lesson, the teacher did try to engage learners throughout the lesson, but it was with her asking short and close-ended questions that did not demand critical thinking and reasoning. For instance:

Extract 3

Ms. Makopoi: One, hakere? What is the other element that we have on the product side?

Students: Hydrogen (choral)

Ms. Makopoi: How many hydrogens?

Students: Three (choral response)

Ms. Makopoi: How many hydrogens?

Students: 3 (choral)

Ms. Makopoi: How many hydrogens?

Students: 3 (some said two)

Ms. Makopoi: You seem to be not sure, what is happening, how many hydrogen atoms or elements do we have?

Students: Three (choral)

Ms. Makopoi: Three, hakere? Let's look at the number of nitrogens on the reactant side, is it equal to that number of nitrogen on the product side?

Students: No (choral)

Ms. Makopoi: It is not, hakere?

Students: Yes madam (choral response)

Ms. Makopoi Let's look at the number of hydrogens on the reactant side. Is it equal to the number of hydrogens on the product side?

This indicates that Ms. Makopoi did involve learners through a question and answer method, although questions were one-sided and not ensuring that students had really understood the concept. She therefore appeared to play the role of knowledge transmitter not facilitator, while her learners were passive as opposed to being active and participatory.

Classification

Regarding classification, in both inter-discursive and interdisciplinary relations, the teacher did attempt to address them even though it was to a limited extent. With regard to integration of Chemistry with other school subjects, Ms. Makopoi mentioned in passing in the first lesson that the students did the concepts of subscripts and coefficients in Mathematics. She commented: "*you did these things in Math*" and this was the only spotted time in which she made mention of another subject's concept in that lesson, hence the strong classification (C+). However, in the second lesson, Ms. Makopoi did address the two concepts, and she even made use of the concept of LCM (lowest common multiple) in balancing the equations and so was coded under very weak classification (C++). The segment below illustrates this.

Extract 4

Ms. Makopoi: So, how are we going to make the number of nitrogens on the reactant side to be equal to the number of nitrogens on the product side? Er? That is we are going to look at… what does LCM stands for?

Students: The lowest common multiple (choral response)

Ms. Makopoi: Lowest common multiple, hakere?

Students: Yes madam (choral response)

Ms. Makopi: So, we are going to look at the lowest common multiple between two and one, how are we going to determine those? What is the lowest common multiple, LCM of 2 and 1? Er?

Students: One (choral response)

Ms. Makopoi: Er?

In the first lesson, the teacher was also observed making examples that illustrated relations between Chemistry and learners' daily life experiences, however, none of this was observed in the second lesson. This relation was therefore coded weak classification (C-) in the first lesson and very strong (C++) in the second lesson. The following quote demonstrates that inter-discursive relation in Ms. Makopoi's lesson:

Extract 5

Ms. Makopoi: …before we can balance the equation, we have got two rows in this side and also two in this side, right (hakere)?

Students: Yes madam (choral response)

Ms. Makopoi: Supposing I have something like R500 and I am giving this side R300, this R200, are you going to be satisfied, this row?

Students: No madam (choral response)

Ms. Makopoi: Why…?

Students: Because you gave us little money compared to these ones (one learner shouting)

Ms. Makopoi: …just like in chemical equations, we are going to balance the equations…we are going to make sure that the number of elements in the reactants side are equal to the number of elements in the products side.

The extract above shows Ms. Makopoi making a familiar example of money shared unequally between groups of people to help students understand the concept of balancing, hence this was weakly classified. Lastly, classification was very weak (C- -), regarding the tiered curriculum, where differentiation has to be made in relation to core and extended curriculum components. The boundary was blurred between the two tiers as learners were taught both the core and extended material together. Therefore, no exceptions were made concerning extended learners. In her response to the interview question on how she was teaching core and extended components in her class, Ms. Makopoi responded:

Extract 6

> **Ms. Makopoi**: *I, I teach a kid everything, whether it says extended or core. His or her content will be one determining. I expose them, I go, throughout, I do not say core end here. I do it form this grade throughout to Grade 11, then the learner decides for him or herself. But sometimes we still spot them to say, no, as much as this one is timid, but is capable.*

As indicated in the extract above, Ms. Makopoi does not differentiate her instruction with regard to learners' ability in the Chemistry discipline. She speaks of exposure in order for the learners to gauge themselves.

B. CONTINGENCY

Table 4.7 below offers the summary of Ms. Makopoi's lesson plans and their contents, as well as her lesson observations in order to unveil coherence between them.

Table 4.7: Summary of coherence of Ms. Makopoi's lesson plans and her classroom instructions

Lesson plan	Classroom instruction
Lesson plans outlined the lesson objective and topic.	During the lessons the topics were stated and not the objectives.
There was one sentence per lesson plan that stated what will be reviewed first before lesson development – introduction.	As stated in the plans, the lessons started with review of materials previously done, and with connection to learners' real life experiences in another lesson.
Then there was lessons development in a form of brief summaries of what is expected to transpire.	Lesson presentations followed in accordance with the plans, with Ms. Makopoi doing most of the talking like explaining and asking questions, which were mostly closed and encouraged choral responses.
Lastly, the lesson plans outlined using one sentence each, an evaluation or assessment – conclusion.	Lessons concluded with exercises, like it was stated in the lesson plans.

Ms. Makopoi's lesson plans were not very detailed but had some basic components, and as can be seen from the table above, there was, to some degree, logical coherence between her plans and what was observed in the lessons. That is, Ms. Makopoi's observed antecedent and transactions appear to have contingency to some extent.

4.2.2. A case of Ms. Tlalane

A. CONGRUENCE

Observed Antecedents

The table that follows offers a summary of Ms. Tlalane's lesson plan analysis on *lone and bonding pairs* lesson. It is also important to note that Ms. Tlalane did not have a lesson plan for the first observed lesson.

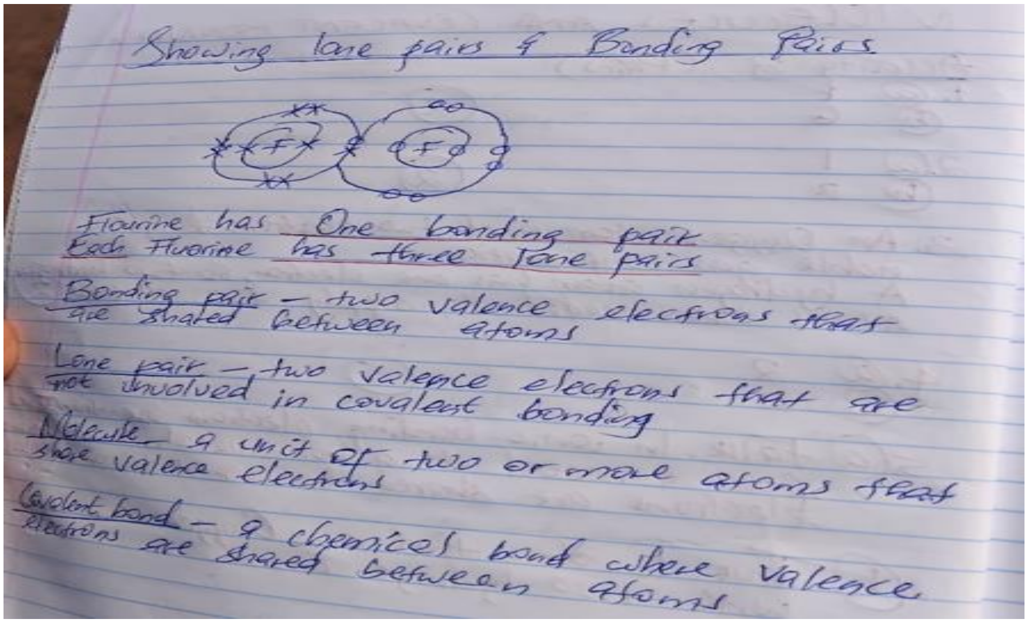
Table 4.8: The classification and framing summary of Ms. Tlalane's lesson plan

Theoretical Construct	Coding
Selection	F++
Sequence	F^0
Pacing	F^0
Social interactions	F^0
Knowledge Integration	
Inter-discursive	C++
Interdisciplinary	C++
Separation of curriculum tiers	C--

Framing

As described earlier, some components of a lesson plan are basic (Ralebese, 2018), which include objective, teaching method, materials, introduction, development, conclusion and evaluation of the lesson. None of these components were present in what Ms. Tlalane called a lesson plan. Figure 4.3 below demonstrates this.

Figure 4.3: Ms. Tlalane's lesson plan for the second lesson



Showing lone pairs & Bonding Pairs

Fluorine has One bonding pair
Each Fluorine has three lone pairs

Bonding pair – two valence electrons that are shared between atoms

Lone pair – two valence electrons that are not involved in covalent bonding

Molecule – a unit of two or more atoms that share valence electrons

Covalent bond – a chemical bond where valence electrons are shared between atoms

It can be observed from Figure 4.3 above that Ms. Tlalane's lesson plan looks more like short notes which just described the key points to be dealt with in class, and less like a lesson plan. As a result, this made it challenging for the researcher to code the planned sequence, pacing, and social relations hence the coding F^0. As described in Chapter 3, the coding F^0 indicates that framing could not be done or construct(s) are not observable. Nevertheless, selection of knowledge to be transmitted in class was framed very strong, because the picture showed the key concepts that Ms. Tlalane intended to deal with in class, which were wholly selected by her. No evidence is given in the plan showing that learners would be given the opportunity to alter that selection.

Classification

With regard to knowledge relations of this lesson plan, that is, inter-discursive and interdisciplinary relations, they were both very strongly classified (F++) since it is evident from the plan that there are no concepts included from other disciplines or from learners' daily life experiences. Similarly, separation of curriculum content in terms of core and extended was also classified very strong, because from the plan the researcher did not say which content was for core learners, and which one was for extended learners. The boundaries between the two tiers were blurred.

The section that follows presents the results on Ms Tlalane's classroom practice on the topics *covalent bonding* (first lesson) and, *lone and bonding pairs* (second lesson).

Observed Transactions

The table below gives a summary of Ms. Tlalane's lessons on *covalent bonding* (first lesson) and *lone and bonding pairs* (second lesson), as they unfolded during observations.

Table 4.9: The classification and framing summary of Ms. Tlalane's enacted lessons

Theoretical Construct	Coding (1st lesson)	Coding (2nd lesson)
Selection	F++	F++
Sequence	F++	F++
Pacing	F-	F-
Social interaction	F-	F-
Knowledge relation		
Inter-discursive	C++	C++
Interdisciplinary	C++	C++
Separation of curriculum tiers	C--	C--

Framing

Ms. Tlalane's lessons had very strong framing when it came to selection of knowledge and lesson activities, as well as the sequence. The reason for this is that the teacher determined what knowledge was transmitted, the activities done, and the order of teaching them. Ms. Tlalane did most of the talking, thus playing the role of knowledge transmitter, as she explicitly chose the knowledge and activities to be done. She even asked questions that demanded recall of what had been discussed, or that demanded repetition of what she just said. In some instances, she even answered the questions herself. All this is exemplified in the segment below.

Extract 7

Ms. Tlalane: …so these six electrons are called the bonding pairs. Why do you think they are called bonding pairs? Rethabile? I think I heard your voice. Nts'ebo?

Student Nts'ebo: Madam I think it's two valence electrons that are shared between atoms.

Ms. Tlalane: The two valence electrons that are being shared between atoms. She is saying bonding pairs are the two valence electrons that are being shared between atoms. What can another person say? Another definition? So Nts'ebo says, er, bonding pairs (pointing to bonding pairs in nitrogen molecule), this is one bonding pair, so two valence electrons are being shared. Any other definition of a bonding pair? So that means a bonding pair, we refer to the electrons that are taking part to form a bond, electrons that are taking part to form a bond. The ones which are involved in taking the what? That are involved in formation of a bond, just like we have illustrated. We said for a nitrogen molecule we have formed a triple bond, so that means for that triple bond that is formed, it is formed because of the bonding pairs. So for us to say it's a pair, we mean two, so that is why Nts'ebo said when we talk of a bonding pair, we have two valence electrons that are being shared and then in this case we have a three, which form a triple bond. That is, each and every time, when we form a covalent bond, those electrons which are involved in formation of a bond are called the bonding pairs, so when is it is one it is called a bonding pair, when they are two it's a double bond, when they are three, it's a triple bond. We have a single bond, a double bond and a triple bond. That is, when two electrons are shared we have a single bond, when we have four electrons that are shared, double bond, six electrons that are being shared, triple bond. Are we together?

Students: Yes madam (choral response)

Ms. Tlalane: Or I am speaking Greek? Ok. Let us make an example, maybe of, what do we have? Where we have, er, a single bond, a single bond, one, a single bond. A single bond, we can have an example of maybe, a chlorine atom, chlorine is in which group?

From the above extract, it can be seen that the teacher does most of the talking, while in the succeeding extract she appears to encourage choral responses, used cued elicitation and closed questions.

Extract 8

Ms. Tlalane: A single bond, we can have an example of maybe a chlorine molecule, chlorine is in which group?

Students: Group 7 (choral response)

Ms. Tlalane: Group 7, so we have a chlorine atom and a chlorine atom. How many electrons in the first shell? Mm…you no longer know how to speak (translated) (drew the chlorine atoms on the board and fill in the electrons). Er?

Students: 8 (choral response)

Ms. Tlalane: They are eight, so now we have ten, and then the last shell?

Students: 7 (choral response)

Ms. Tlalane: We have seven, so we have seven electrons, so how many electrons does, er…chlorine need to become stable?

Students: One (choral response)

(The lesson continued with Ms. Tlalane dominating the discussion. The lesson transcript is attached to the appendices section)

The first and second lessons of Ms. Tlalane were weakly framed in terms of pacing, because, even though Ms. Tlalane attempted to engage learners, particularly by giving them a group exercise that impacted on the lesson pacing, her control over the pacing was somehow explicit. Take for example the following quotes: "*ten minutes you should be done*" and "*talk to the person next to you about it, in just a second. Isn't a second a short time?*" This could affect participation and activity-centred approach envisaged by CAP. Nevertheless, these given activities on both lessons did promote social relationships between the learners, and learners and the teacher. Therefore social relations were weakly framed in both lessons. Extract 9 below illustrates this.

Extract 9

Ms. Tlalane: …in our textbooks, page 213. Where are the books (translated)? So we have activity two, activity two, which reads as follows "*discuss the formation of water molecule*", so it's in pairs… (Learners sat in larger groups due to absence of books)

NB: The teacher walked around the class, after some moments to ensure that students were doing what she requested them to do. She then moved around and marked students in different groups when they called her.

The extract above shows that learners had control over social interactions between themselves and the teacher.

Classification

With respect to classification, lack or absence of integration of knowledge from other disciplines prevailed in all the observed lessons of Ms. Tlalane. Similarly, there was absence of integration of knowledge with learners' everyday experiences in Ms. Tlalane's lessons, not even during the introduction of the lesson. She was therefore coded at very strong classification (C++). When asked how she approaches the idea of integrating concepts from other subjects, as well as from learners' real life, Ms. Tlalane, confessed that she often forgets about these relations, although she is aware of them.

Furthermore, Ms. Tlalane taught her learners the same content, and so there was no differentiation with respect to core and extended curriculum components, hence the very weak classification code

(C- -). In her response to the question on how she is dealing with the issue of core and extended in her class, Ms. Tlalane responded:

> *We teach them all in one class, same content, until Grade 11 where a learner will then choose whether to sit for extended or core, depending on their performances* (translated).

According to Ms. Tlalane, she never divides students into core and extended as prescribed by CAP and the LGCSE syllabus, but rather teaches all students the same content.

B. CONTINGENCY

The subsequent table gives a summary of the content of Ms. Tlalane's lesson plan and her lesson observations, to demonstrate contingency between them.

Table 4.10: Summary of coherence of Ms. Tlalane's lesson plan and her classroom instructions

Lesson plans	Classroom instruction
First lesson plan was unavailable. Second lesson plan was written in a note-like format, without essential elements of a lesson plan, e.g. topic, objective, introduction, lesson development and conclusion. The plan only gave definitions of concepts to be dealt with in class, e.g. Molecule, lone and bonding pairs	Lessons kicked off strongly with recaps on contents from previous lessons, though this was not stated in the plan/note. The topics were mentioned but objectives were not mentioned during the lessons, as they were also not mentioned in the plan. The lessons development, though not clearly described in the plan, also went well with prevalent use of teacher initiation-learner response (IR) structure. Initiations in the form of explanation (lecturing), demonstrations and questioning. The concepts dealt with in the second lesson were the ones outlined in the plan. Lessons' conclusions put emphasis on concepts taught and exercise from their textbooks. This was also not outlined in the plan.

As indicated in the table above, Ms. Tlalane did not have a lesson plan for the first observed lesson and the lesson plan for the second observed lesson did not have the basic components of a lesson plan. However, her observed transactions appeared coherent with the content of that plan, because the definitions given in the plan were the ones dealt with in the class. As a result, it can be argued that there was contingency between her observed antecedent and observed transactions, at least to some extent, for the second lesson.

4.2.3 A case of Ms. Agnes

A. CONGRUENCE

Observed Antecedents

Table 4.11 below presents a summary of Ms. Agnes' lesson plans' analysis on covalent bonding and allotropes of carbon, with regard to Classification and Framing concepts.

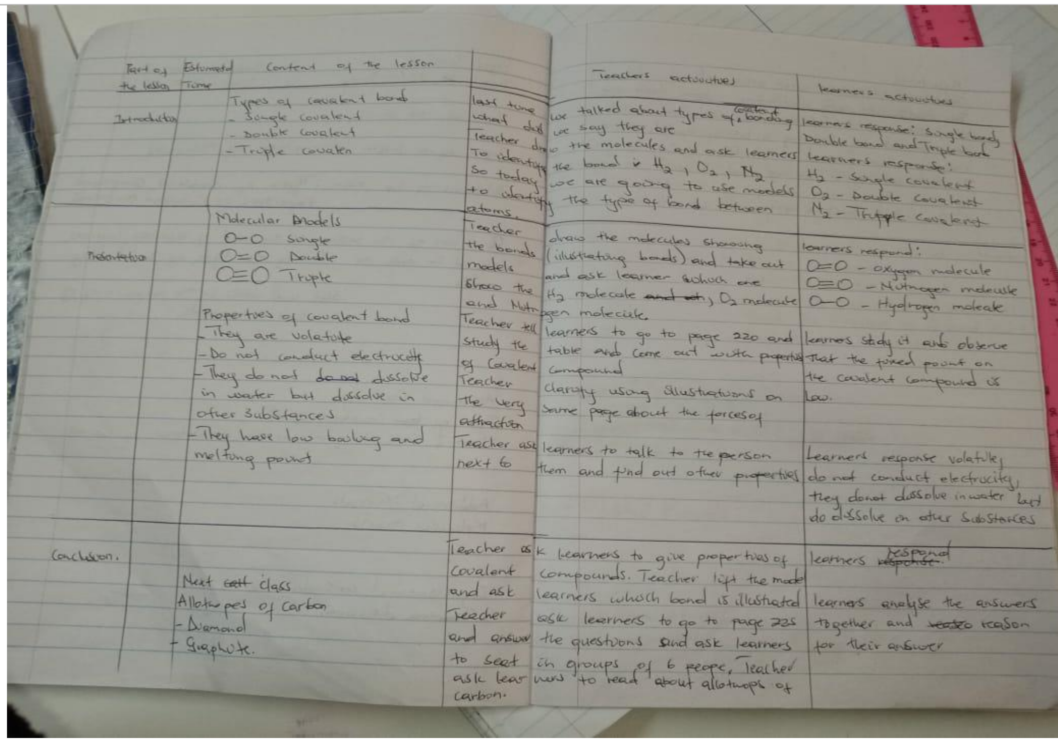
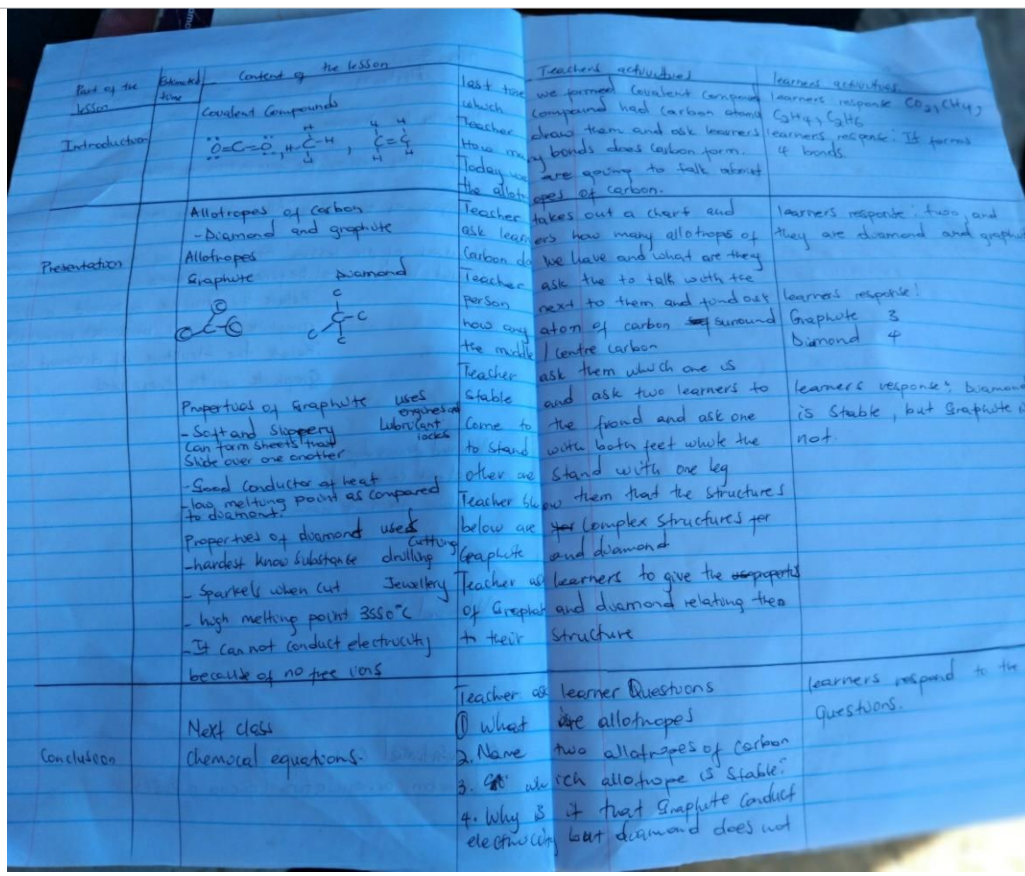
Table 4.11: The classification and framing summary of Ms. Agnes's lesson plans

Theoretical Construct	Coding (1st lesson)	Coding (2nd lesson)
Selection	F++	F++
Sequence	F++	F++
Pacing	F-	F-
Social dynamics	F-	F-
Knowledge relations		
Inter-discursive	C++	C++
Interdisciplinary	C++	C++
Separation of curriculum tiers	C--	C--

Framing

From the lesson plans, Ms. Agnes's control over the selection and sequence of the knowledge and lesson activities was explicit, with no statements that reflected teacher's intentions that learners would somehow be offered a chance to alter them. The pacing and social interactions were coded weakly (F-), in both lesson plans. This is because it was observed from the plans that Ms. Agnes aimed to ask learners to "*talk to the person next to them and find out other properties, and to sit in groups of six and go to page 225 and answer the questions*" in first lesson. In the second lesson, she planned to ask learners to discuss with their neighbours the center carbons in graphite and diamond. She planned to further ask three learners to proceed to the front of the class to demonstrate stability. These can therefore affect both the tempo and social dynamics. Below is the figure for Ms. Agnes's lesson plans.

Figure 4.4: Ms. Agnes's lesson plans for the first and second lessons

Lesson Plan 1	
Lesson Plan 2	

Classification

From the above plans, Ms. Agnes does not indicate how she intended to integrate what she taught to learners' everyday life as well as to other school subjects, hence very weak classification (C- -) for both interdisciplinary and inter-discursive relations. Lastly, it was again not stated as to how she planned on dealing with the core and extended learners during classroom instruction. There appeared to be no clear distinction of the two tiers, so this was coded very weak (C- -).

The subsequent section then presents the analysis of Ms. Agnes's classroom transactions.

Observed Transactions

Table 4.12 below gives a summary of Ms. Agnes's lessons as they unfolded during observations.

Table 4.12: The classification and framing summary of Ms. Agnes's enacted lessons

Theoretical Construct	Coding (1st lesson)	Coding (2nd lesson)
Selection	F++	F++
Sequence	F++	F++
Pacing	F-	F-
Social interactions	F-	F-
Knowledge relations		
Inter-discursive relations	C++	C-
Interdisciplinary relations	C++	C++
Separation of curriculum tiers	C--	C--

Framing

As illustrated by the table above, Ms. Agnes's lessons were characterised by very strong selection and sequence framing, as she controlled what knowledge and activities should be done, and in which sequence. Generally, her lessons were dominated by lecturing, which was fused with question and answer method. Ms. Agnes was the only one mostly asking questions, which she sometimes answered herself, or those that demanded choral yes or no responses, or even short recall answers. Ms. Agnes also constantly used cued elicitations so that learners finished her sentences, with prevalent use of 'right' (*hakere*). This resulted in a very strong framing (F++) on both selection and sequence. Below is Ms. Agnes's lessons extract from the first lesson followed by that from the second lesson, for illustration.

Extract 10

Ms. Agnes: So, I want you guys to tell me where we observed single bond. In which molecules, which molecules did we observe single bond? The molecules, yes?

Student: Water.

Ms. Agnes: He is saying water. We had water, let's form water, what happens when we form water? We have "H" right? We have "H", and then we have "O" and then we have "H", is that so? That is, we are going to have this and this and this (demonstrating with a structure of water molecule). And then finally we are going to have what? Er? "O, H, H" and we are going to have the lone pairs. How many lone pairs we are going to have for oxygen?

Students: Two (choral response)

Ms. Agnes: We are going to have two lone pairs, hakere? This is the first pair and this is the second? (Pointing to lone pairs on oxygen atom in water molecule)

Students: Pair (choral response)

Ms Agnes: So, it says that, we are having what here? We are having "H" and we are having this, this is the type of bond that we have. Another one? The double covalent bond? Molecule? Any molecule? Yes?

Student: Carbon dioxide

Ms. Agnes: Carbon dioxide, CO_2, what is this? (Referring to CO_2)

Another extract from Ms. Agnes on allotropes:

Ms. Agnes: …Ok, so the first one that we have is that it is what? It is soft and, and slippery. So, I told you guys to go to page 222, when you are looking at this structure on page 222, you see that graphite forms what, different layers, do you see the different layers, we see those different layers, right (hakere)?

Students: Yes madam (choral response)

Ms. Agnes: What causes those different layers? Is that property of being slippery (translated). And then let's compare it with a diamond. How many people know a diamond? We all know a diamond right?

Students: Yes madam (choral response), No madam (fewer choral voices)

Ms. Agnes: Ok, it doesn't matter, for those who do not know a diamond, you can go to page 221, and see a diamond ring there, 221. Do we see the diamond?

Students: Yes madam (choral response)

Ms. Agnes: I did not say talk to anyone next to you. I only said you go to page 221. That is the, the diamond. What property does the diamond have? What property does the diamond have? What property does the diamond have? Yes?

Student: Is very hard

Ms. Agnes: Er?

Students: Is very hard (choral response)

Ms. Agnes: Diamond as compared to the graphite is very hard, right? (hakere)

Students: Yes madam (choral response)

Ms. Agnes: In fact, it is said to be what? Er, it is said to be the hardest substance on earth. Diamond is very hard and strong. Another property? Yes? Hey guys.

Students: It is shiny (one learner shouting)

Ms. Agnes: She is saying that when you look at the diamond you see that it is what? It is shiny. Most of the time it sparkles, right (hakere)? Most people love diamond because it can …..

Students: Sparkles (choral response).

In these lessons, the teacher decided on the knowledge and activities to be done. For instance, she said "*I did not say talk to anyone next to you. I only said you go to page 221*". This hampers learner-centredness which ought to be participatory and activity-centred. Therefore, pacing of the lessons was weakly framed (F-). The reasons for this is that she did ask them, once in the second lesson, to talk to their neighbours about the definition of allotropes, while in the first lesson the learners were requested to do a small activity. This therefore slightly impacted on the lesson pacing and also the social dynamics of the lesson, which was then framed weakly too.

Classification

Regarding the interdisciplinary relations (classification of knowledge between the Chemistry discipline and other school disciplines) the classification was coded very strong (C++). Nevertheless, in relation to inter-discursive relation, reference was made to learners' daily life, with uses of graphite (pencil lead and small batteries) and diamond (jewellery) in the second lesson, and not at all in the first lesson, hence the classification was coded very strong (C++) for the first lesson and weak (C-) in the second lesson. Furthermore, in relation to core and extended tiers, classification was very weak (C- -) because the boundary between the two tiers was blurred during classroom instruction, as all learners did the same materials/content. The interviews revealed that this is done in Grade 9 and 10, and in Grade 11 learners are taught separately, depending on their abilities in Chemistry or Physical Science as a whole. The extract below demonstrates this.

Extract 11

Researcher: *Physical Science, like Mathematics separates learners according to their abilities in those subjects, some take core while others take extended. How do you deal with this issue in your class?*

Ms. Agnes: *We section them in Grade 11. We use Grade 10 performance to section them, or assess them early in Grade 11, then section them with regard to that assessment.*

As observed in the above extract, Ms. Agnes separates students into core and extended as prescribed by CAP and LGCSE only in Grade 11 and not in the earlier grades.

B. CONTINGENCY

The succeeding table below gives a résumé of the contingency between Ms. Agnes' lesson plans and her classroom observations.

Table 4.13: Summary of coherence of Ms. Agnes's lesson plans and her classroom instructions

Lesson plans	Classroom instruction
The lesson plans indicated the topic, subtopics, objectives, assumed knowledge, additional materials and methods.	Topics were mentioned in class, while the objectives were not. The plans indicated the method to be used as group discussion in lessons, and that was not really the case. Ms. Agnes used both lecturing and question and answer methods in her lessons.
Introduction sections were well outlined in the plans, with their content and planned teacher and learners' activities.	Lessons were both introduced in accordance with the corresponding plans, with review of materials done in earlier lessons.
Lesson presentation sections were clearly outlined, with their planned content and the teacher and learners' activities.	Transactions of both lessons went accordingly, except the methods used in those lessons were not group discussion as stated in the plans.
Likewise, conclusion section was well shown in both the plans with its content as well as the teacher and learners' activities	Conclusions were also carried out as per the plans. Learners were asked questions concerning materials just done, and an exercise on another lesson.

As indicated in the table above, Ms. Agnes's lesson plans were comprehensive and had most of the components said to be basic for a lesson plan. Most importantly, there was contingency, at least to some degree, between the plans and the observed transactions. The lessons were, to a certain degree, logically coherent with the planning.

4.3 Conclusion

The chapter presented the findings from document analysis of the LGCSE Physical Science syllabus in the Chemistry section. It then included individual teachers' narratives that provided insight into how Chemistry teachers plan and carry out their instructions with regard to CAP's prescriptions concerning the intended pedagogy.

The next chapter discusses the findings in view of the research questions, literature review and theoretical framework. It will further highlight the limitations of the study and provided the recommendations. Lastly, there will be a conclusion and suggestions for further studies.

CHAPTER FIVE: DISCUSSION

5.0 Introduction

This study examined alignment between the intended curriculum, CAP prescriptions concerning intended pedagogy, and the enacted curriculum, which are the lesson planning and practices in Chemistry lessons. The focus was on the extent of agreement between CAP and the LGCSE Chemistry with regard to that which was intended to happen and that which really transpired, in terms of observed antecedents and transactions. The intended curriculum was investigated through analysis of the curriculum materials, while the enacted curriculum was investigated through examining teachers' lesson plan books, as well as classroom practices in Chemistry lessons.

This qualitative study, which employed a case study design, attempted to answer the following research question: *What is the extent of alignment between the intended and the enacted curricula, with respect to LGCSE Chemistry?* Responding to the main was facilitated by the following subsidiary questions:

1. In what ways is the LGCSE Physical Science (Chemistry part) syllabus aligned with CAP prescriptions concerning the intended pedagogy?
2. What is the nature of Chemistry teachers' lesson planning relative to the implementation of CAP prescriptions?
3. How do teachers implement the CAP prescriptions during their classroom instruction in Chemistry lessons?

In order to answer these questions, data was collected in three schools in Leribe through document analysis of teachers' lesson plan books, the LGCSE Physical Science syllabus in the Chemistry part, classroom observations and structured interviews. Stake's (1967) contingency congruence model was used in the research to guide the collection and analysis of data, and was supplemented by Bernstein's (2000) concepts of classification and framing for an in-depth analysis of both the plans and classroom instructions. This chapter basically discusses the findings in view of the research questions, literature review and the theoretical frameworks.

5.1 Congruence on observed antecedents

RQ (research question) 1: In what ways is the LGCSE Physical Science (Chemistry part) syllabus aligned with CAP prescriptions concerning the intended pedagogy?

Based on the analysis, it was found that there is alignment, in some ways, between CAP prescriptions concerning the intended pedagogy and the LGCSE Physical Science syllabus in the Chemistry section. The quotations in Section One of the previous chapter (c.f. 4.1), show that the syllabus intended to address the issues of education accessibility in terms of core and extended curriculum components, employment of learner-centred approaches, and the roles of teachers as facilitators and learners as constructors of their knowledge. The section also shows that the syllabus – through the LEs – intended to somewhat promote development of HOTS, as well as create the context for integrated instruction.

This finding bears resemblance to the study published by Raselimo and Thamae (2018) on the LGCSE Sesotho and Geography syllabi to ensure compliance with CAP. Similar to this study, their analysis discovered alignment between CAP and these LGCSE syllabi in certain areas. However, Raselimo and Thamae (2018) examined alignment with CAP in terms of the aims of secondary education outlined in CAP versus the two syllabi aims. The present study, on the other hand, examined alignment of CAP and the LGCSE syllabus with respect to the five main changes envisaged by CAP relative to the recommended pedagogy, versus the curriculum content or learning outcomes (learning experiences) in the Chemistry part of the Physical Science syllabus. This was done because it was suspected that the secondary aims of CAP and the aims of the syllabus may be aligned but there may be discrepancy between the intended pedagogy and the curriculum content in the syllabi, yet that is what is really taught in classrooms.

The idea that the syllabi are derived from the curriculum policies and that the syllabus is a subset of the curriculum and not the curriculum itself (Musingafi et al., 2015) may account for the seeming alignment between the CAP and the LGCSE Physical Science syllabus in the Chemistry component. This echoes Letsie’s (2019) claim that CAP also serves to direct the LGCSE programme’s execution, which implies that CAP is responsible for the creation of the LGCSE. Given that teachers use the syllabus as a source of direction for their lessons (Musingafi et al., 2015), the apparent congruence between CAP and the Physical Science syllabus in Chemistry, raises the possibility of an alignment between CAP and classroom instruction. In other words, it is likely that instruction will be in line with CAP if the syllabus does.

The section that follows discusses issues concerning lesson planning, as an antecedent before classroom transactions.

RQ2: What is the nature of Chemistry teachers' lesson planning relative to the implementation of CAP prescriptions?

It was found that Chemistry teachers' lesson planning does not heed CAP prescriptions concerning the intended pedagogy. Even though some teachers' lesson plans did not clearly outline learners' and teachers' activities, it was however evident from their plans that the teacher planned to dominate the instruction. This was supported by an explicit teacher control over the selection of content, order and pace of lesson activities shown in teachers' lesson plans, with no indication whatsoever of how the learners will be offered opportunities to alter that. CAP prescribed that the teachers have to facilitate learning while learners construct their own knowledge and evaluate it. However, it the lesson plans demonstrated that learners' activities and involvement were planned to revolve around answering teachers' questions which had already anticipated answers. The teacher stated the expected students' answers in the plans. Lastly, there was no evidence in the plans regarding how the teachers intended to draw content from other subjects, from learners' daily life, as well as how they planned to differentiate their instruction with regard to core and extended components, and stimulate development of HOTS.

Tompong and Jailani (2019) contend that creation of lesson plans by teachers ought to be based on content standards, CAP in this context, set by the government. This means that teachers' lesson plans should be in accordance with CAP and, as mentioned already, that was not really the case with Chemistry teachers' lesson planning. This finding corroborates research conducted by Lukum (2015) which indicated that teachers' lesson plans still do not adhere to the standards. However, on the contrary, a study by Tompong and Jailani (2019) revealed that teachers' lesson plans are in accordance with the standards. This study demonstrated that the teachers received training which made it easy for them to plan their instruction. This is different with teachers in this present study, since there is enough evidence from the literature suggesting that they did not get adequate training concerning CAP (Selepe, 2016; Letsie, 2019; Ralebese, 2018; Moleko 2020).

Consequently, a plausible explanation for the finding could be absence of continuous in-service training by the ministry, as well as too many classes to prepare for by some teachers like Ms Agnes in School C. These two factors can make teachers not to plan at all, or make plans which do not meet the category of a good lesson plan, and which do not heed the required standards. This therefore poses the unlikeliness of the Chemistry classroom instruction exhibiting CAP prescriptions when they are already missing in lesson plans. That is because instruction follows planning and teachers also use lesson plans as guide for their instruction (Musingafi et al., 2015).

5.2 Congruence on observed transactions

The section discusses the interpretation of the findings of the study concerning the third research question which focused on how CAP prescriptions were implemented in Chemistry lessons. In fact, it aimed to investigate how Chemistry teachers translated the intended pedagogy guidelines (intended transactions) in their lessons, which are regarded as observed or enacted transactions by Stake (1967). As highlighted in Chapter Two, the enacted curriculum was examined for congruence and contingency at two levels: the antecedents and transactions.

RQ3: How do teachers implement the CAP prescriptions during their classroom instruction in Chemistry lessons?

Overall, teachers' implementation of CAP prescriptions in Chemistry lessons is incongruous to the envisaged pedagogy. As indicated, the policy promotes learner-centred approaches to teaching and learning, changed roles for both teachers and learners, development of HOTS, integrated instruction and a tiered curriculum in Chemistry, as well as in Physics and Mathematics. However, the findings revealed that Chemistry lessons were mostly teacher-dominated with the teachers controlling the content, order, tempo and focus of instruction. This resulted in teacher-centred approaches to instruction, which opposed the recommended pedagogy, that ought to be learner-centred, with learners taking full responsibility of their learning, and teachers only facilitating learning. Teachers were found to be the only ones initiating all the discussions during instruction, while learners only spoke when asked, and their responses were prevalently brief. This arose from the type of questions (closed) and elicitation (cued) used. Learners constantly replied to the teachers by chorus, which was a common way of responding to teachers, prompted by widespread utilization of closed questions and cued elicitations. Closed questions appeared to be primarily meant to elicit engagement from students, and their prevalence inhibited critical thinking.

Likewise, cued elicitations hindered students from engaging in higher order and more creative thinking.

These findings mimic those by Rahman (2014) who reported frequent utilization of cued elicitation, closed questions and repetition, where the teachers unthinkingly repeated themselves and in some instances answered their own questions. Similar to the present study, Rahman recorded that the constant employment of closed questions and cued elicitations caused learners to reply in a chorus, or in short responses of one or two words. Nonetheless, Rahman (2014) is not the only study that reported discrepancy between the implemented and the intended curricula, but also Albadi et al. (2019) who claimed that teachers continued to teach using outdated methods, since they handled the majority of the work, and learner-centred approaches were not employed. Likewise, Qhobela and Moru (2009), and Moleko (2020) recorded that Physics lessons in Lesotho are dominated by teacher-centred approaches, and then Raselimo (2010) concluded that this is a prevalent aspect of classroom teaching and learning in Lesotho.

As revealed, the use of cued elicitations, closed questions, choral response prominence, and teacher dominance or initiation in the form of questions that are subsequently followed by answers from pupils suggest a high degree of teacher control as being one key feature of Chemistry classrooms, where teacher-centred methods are emphasised and students are primarily passive, reacting only to teacher initiations which are in a manner of explanation, demonstrations and questions. In a nutshell, the envisaged learner-centred approaches which are activity-centred and participatory were not really evidenced in Chemistry lessons. Again, teachers taught and did not facilitate learning, while learners too did not take full responsibilities of their learning by constructing their knowledge, analysing, synthesising and evaluating it as envisioned. This can therefore be explained in terms of large classroom size in some schools, teachers' old ways of teaching, which is mostly lecturing and learners' lack of background knowledge. Overcrowding makes it challenging for students to interact well with one another, materials and their teacher. This can therefore lead to a number of problems which include among others, the seating arrangement that hinders the envisaged learner centered approach (Matobako & Heqoa, 2018).

Lack of stimulation through development of higher order thinking skills

Furthermore, the findings in this study showed that during the learning and teaching of Chemistry, teachers were observed not to incorporate strategies that could stimulate creative or higher order thinking skills in learners, evidenced mostly by the type of questions and elicitations. This contradicts CAP prescriptions concerning the acquisition of cognitive skills, especially when higher order cognitive skills are said to be a necessity for learners in this century (Seotsanyana, 2018). Nevertheless, several other studies demonstrate that normally the low alignment and misalignment often found in alignment studies are due to cognitive skills (Liu & Fulmer, 2008; Seitz, 2017; Matthews & Kyi, 2019). Johnsons et al. (2020) opined that there appears to be a particular problem with alignment of cognitive skills between the intended and enacted curriculum.

There are several possible explanations for this. Firstly, the seemingly lacking activation of HOTS in Chemistry lessons may be due to teachers' teaching methods, which are mostly lecturing that goes along with teacher questions (closed) and learners' responses that are often succinct and choral. According to Rahman (2014), the widespread usage of closed questions shows that teachers did not give their learners a chance to speak up and voice their opinions, hence, were unlikely to raise their level of thinking. This is because closed questions are low level questions which do not help promote higher level of thinking. Insufficient or lack of resources, is another factor which could cause teachers not to effectively teach or stimulate development of HOTS, as they help teachers to easily express concepts and make learning easy and interesting. Lastly students' background knowledge. Without sufficient prior knowledge, it can be challenging for teachers to build on or teach some concepts or skills. This may therefore mean that Chemistry lessons focus more on content mastery or acquisition and less on higher order skills development.

Education accessibility: tiered curriculum

The findings revealed that teachers did not deliver their classroom instruction in a manner that separated learners in terms of their abilities, which is with respect to core and extended components takers. Learners were taught the same way and the same content, which included the extended component. However, the curriculum demands that the learners who are more capable take both the core and the extended components while those who are less capable take only the core curriculum component.

A similar finding is documented in Botswana by Koosimile (2005) who reported that Physics teachers gave the extended component a "*higher priority and status*" than the core curriculum component. Even though giving the extended component higher priority by offering it to all learners has the likelihood of preparing learners for external examinations, and may also give them deeper conceptualization of some concepts of the subject, it also has the possibility to academically discourage the core students. This is because it could be too challenging for their strengths or abilities. As a result, core students might lose interest on the subject and even cease to give it their best, even though the curriculum intended to make Chemistry, as well as Physics, more accessible and accommodating to learners of different abilities.

A plausible explanation for teachers to be teaching all the learners same content despite their abilities is that teachers seem to teach for examinations. According to the interview data, there seems to be a gap between what students ought to be taught and what they are assessed on in the final examinations. This therefore, caused teachers not to align their instruction with what is intended in terms of teaching in mixed ability classes, but rather align their instruction with what is assessed, resulting in a policy-practice gap. This is in agreement with Ralebese's (2018) findings who argued that in her experience, teachers are accustomed to forcing students to acquire information and skills solely to pass examinations rather than required to meet curriculum goals. Therefore, lessons often omit skills and materials that the teacher believes would not be examined, and for that reason, what is tested is then used to inform instruction (Rahman, 2014).

Knowledge integration - Interdisciplinary relations

According to the analysis, only one teacher attempt edto draw knowledge from another academic discipline, Mathematics, when dealing with the topic she was teaching. According to CAP, interdisciplinary approach is to be adopted in higher grades of basic education where the subjects' boundaries gradually emerged (MoET, 2009). The other two teachers did not attempt to integrate concepts from other subjects during the teaching and learning of Chemistry. A similar finding was recorded by Ralebese (2018), where teachers in her study taught each learning area without proof of extracting concepts from other learning areas and this contradicted the envisioned integration. The difference with Ralebese's study is that she was focusing on primary school teachers while this study focused on secondary school teachers, and particularly in the teaching and learning of Chemistry.

Though this interdisciplinary approach prescribed in CAP has benefits for educational development, Raselimo and Mahao (2015) maintain that it has a possibility to support segregated or compartmentalised instruction in schools. This was found in the majority of the observed Chemistry lessons, as teachers were observed to teach only Chemistry content without integrating it with concepts from other disciplines. A plausible explanation for this could be the arrangement of school subjects into distinct subjects, particularly Chemistry and Physics found in one syllabus. The non-continuous organization of the learning outcomes of both disciplines in the syllabus could supposedly encourage teachers to work within a certain discipline. This is because they might find it challenging to draw knowledge from the other section of the other discipline in the syllabus (Raselimo and Thamae, 2018), which means it can be argued that integration of concepts from other subjects in Chemistry classes is still to be realised.

Inter-discursive relations

Ingrained in the concept of integration is the goal of responding to the growing life issues of learners by taking into account their day-to-day experiences and connecting learning with school life, community life and lives of individual learners (MoET, 2009). There was an attempt to incorporate learners' everyday experiences with the concepts that were being taught in classrooms. However, this was to a very limited extent. As indicated in the previous chapter, it was witnessed in one instance with two of the teachers, and not at all in another. Nevertheless, it was interesting to note that Chemistry teachers' instructional practices are somewhat analogous to the envisioned integration (interdiscursive relation), though it is to be noted that this was to a very light degree.

That being the case, it can therefore be concluded that the finding in this study appears to support the claim made in country profiles documented by Vriije Universiteit in Amsterdam (cited in Chilsholm and Layendecker, 2008), that teachers' educational methods are believed to miss real life applications, rendering instruction largely theoretical. This conclusion is made because this integration was witnessed in only one instance in both teachers and this demonstrates lack of consistency. There seemed to be no consistency in this marginally implemented CAP prescription, even though there was an attempt to enact it. This could suggest that Chemistry teachers do not often relate learners' daily life to their instructions, yet this was a chance.

5.3 Contingency between observed antecedents and observed transactions

A lesson plan is said to be congruent (with standard) if the teachers draw lesson plans in accordance with CAP, and it is said to have contingency with transactions if the teachers do in class that which they planned in the lesson plans. The results of the analysis then revealed that Chemistry teachers did not prepare lesson plans in accordance with CAP prescriptions concerning recommended pedagogy. However, it was noted that these antecedents were somewhat consistent with their learning implementation in classrooms (transactions component). That is, there is a match between planning and learning implementation in Chemistry lessons, though that is not in accordance with CAP recommendations.

Contrary to this finding, Tompong and Jailani (2019) found that several aspects of the learning process were not carried out in line with the learning plan, while Dewantara I Putu (2017) on the other hand found consistent results to that of this study. The author discovered that everything the lecturer had prepared appeared to have gone according to plan. Tompong and Jailani (2019) then explained that the disparity between planning and implementation arises from the fact that teachers find it challenging to carry out prepared lesson plans because they feel overburdened by the task of teaching mathematics due to their lack of foundation in mathematics education. That is, Mathematics is not within their area of specialty. Conversely, teachers in the current study had a Chemistry educational background, which can then explain the contingency of their planning with their implementation of learning. Overall, it can be concluded that even though the lesson plans lacked important CAP prescriptions concerning recommended pedagogy, Chemistry teachers do allow the plans to help them with the implementation of the learning process.

5.4 Conclusion

When examining the intended and the enacted curricula in terms of both antecedents and transactions, the teachers' lesson planning as well as classroom practices generally show lack of congruence between what is stipulated in CAP and how they actually plan and instruct, with respect to the envisioned pedagogy. In general, the Chemistry lessons were not conducted in an interactive, participatory and activity-centred manner espoused in CAP. Teachers did not attempt to promote the development of higher order thinking skills in learners as closed questions and cued elicitations were highly emphasised. Chemistry teachers did not even assume the role of facilitators in classrooms but knowledge transmitters. Though they did attempt to integrate learners' daily life experiences with school life, and with knowledge from another subject, Mathematics, it was to a very limited degree which showed lack of congruence and consistency. Lastly, the teachers' lesson plans and the implementation of learning did however appear to be coherent.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

The chapter presents the conclusion drawn from the study. It further outlines the study's limitations and makes recommendations in light of them.

5.1 Concluding Remarks

The study aimed to examine the congruency between the intended and the enacted curriculum in relation to the LGCSE Chemistry. In this study, the intended curriculum referred to CAP prescriptions concerning the intended pedagogy while the enacted curriculum referred to the LGCSE Chemistry teachers' planning and classroom practices. The following main research question guided the study"

What is the extent of alignment between the intended and the enacted curricula, with respect to LGCSE Chemistry?

In order to address this question, the following questions were proposed:

1. In what ways is the LGCSE Physical Science (Chemistry part) syllabus aligned with CAP prescriptions concerning the intended pedagogy?
2. What is the nature of Chemistry teachers' lesson planning relative to the implementation of CAP prescriptions?
3. How do teachers implement the CAP prescriptions during their classroom instruction in Chemistry lessons?

By using Stake's model to investigate these questions, with the help of Bernstein's concepts of classification and framing, the study's objective was fully met. The alignment between CAP prescriptions and LGCSE Chemistry teachers' lesson planning and implementation of learning was successfully examined, as well as alignment with the Physical Science syllabus in the Chemistry component. The study established that even though there is significant alignment between CAP prescriptions and the LGCSE Physical Science syllabus in the Chemistry section, there is a huge misalignment between CAP prescriptions or recommendations with regard to the intended pedagogy, and the Chemistry teachers' planning and classroom practices.

The Lesotho Curriculum and Assessment Policy has proposed clear guidelines for classroom instruction which the findings in this study indicated the majority were not evident during the lesson planning as well as in implementation of learning in the schools where observations were done. Consequently, employing Stake (1967) congruence-contingency model and Bernstein's (2000) concepts of classification and framing, the study found that although the antecedents (lesson plans) and transactions (implementation of learning) were somewhat contingent, the intents (CAP) and observations (planning and implementation) were not congruent. However, it is worth noting that even though the lesson planning and the learning implementation appeared to be logically coherent, it is not in relation to CAP prescriptions. According to the study findings, teachers' planning and practices are incongruent with the policy prescriptions because of the seemingly inadequate in-service training, students' educational background, large classroom size, and the teacher and exam driven instructions. As a result, the study supports other previous studies on policy-practice link, confirming that curriculum changes or reforms are not normally transferred to classrooms but rather remain on paper (Ralebese, 2018; Rahman, 2014).

Teachers were found to mostly use teacher-centred as opposed to learner-centred approaches. They appeared to assume knowledge transmitter roles while the learners were mostly passive and appeared to be recipients of knowledge transmitted to them. It was further witnessed that teachers did not ask questions that encourage critical thinking nor provide an environment that simulates higher order cognitive skills development. Rather, cued elicitation, choral responses and closed questions are being emphasised in Chemistry lessons in the selected schools. Lastly, it was found that, at least at this level or grade, teachers do not consider individual learners' differences in terms of their abilities with regard to core and extended curriculum tiers when teaching. The learners are taught the same way and the same content. However, it was noted that the aspect of knowledge integration was observed in Chemistry lessons, though it was to a very limited degree.

5.2 Limitations

This study has its limitations in spite of its contributions of providing useful insights into how curriculum developers' intentions are translated to classroom practices in LGCSE Chemistry, and for providing suggestions for both MoET and teachers. Based on the study findings which showed that teachers are not implementing CAP prescriptions as effectively as they should, teachers might utilize the information to reflect how they accomplish CAP requirements. Thus, it is possible to see the study's findings as a chance for growth. Therefore, teachers can use them to develop better practices that are in line with the intended pedagogy. Secondly, the study has implications for teacher educators' future professional development and assessment of pre-service and in-service teacher programmes. Most importantly, the study was carried out primarily as part of the curriculum development's evaluation phase because LGCSE was already in effect when the study began. As a result, it authentically advances the field of curriculum studies by providing insightful and practical information on how Chemistry is taught in relation to the intended curriculum. Lastly, before making changes to the Lesotho educational system, policymakers and curriculum designers might take into account some of the concerns brought up by the study regarding the practices of teachers today.

So in spite of the contributions outlined, the limitations of the study included the fact that it is a qualitative study, as a result the researcher cannot make statistical inferences. Secondly, the sample size was too small and limited to Chemistry lessons hence conclusive claims that teachers' practices are incongruent to the policy prescriptions cannot be made. This is because, the study was designed to look at classroom practices and lesson planning for only three teachers at only three schools in one district of the country. As a result, due to the scope of the study, comparisons were made only on the three teachers in those schools. A lot more may be discovered from a larger sample. It would be interesting to therefore explore teachers' practices in a wider context in order to come to a conclusion that is much more general. Furthermore, the inclusion of the examination of the alignment of the third element, the assessed curriculum, may be essential since teachers in this study stated that there seemed to be a mismatch between what they ought to teach (intended curriculum) and what learners are asked in their external examinations (assessed curriculum). According to them, this is reflected more in the core-component question paper.

5.3 Recommendations

Considering that there is a seemingly remarkable gap between what is intended and what is done, some recommendations can be made that could support future efforts to improve implementation of the LGCSE curriculum, with regard to the guidelines of CAP.

- Firstly, it is evident that teachers need on-going in-service training, as part of continuous professional development. Therefore, regular workshops could be held which include theoretical as well as practical components, where teachers could be offered ample opportunities to try out the recommended instructional approaches during the training. This is essential as teachers seem to still need further in-depth information on what is expected of them as reflected by the misalignment. Furthermore, teachers themselves could form communities in their schools where they can discuss and assist one another in understanding the policy prescriptions.

- Secondly, to promote successful implementation of learning, schools need to be better equipped with necessary resources like computers, laboratory equipment, internet and books. This is because these resources will promote effective and efficient implementation of CAP recommendations, as CAP advocates interactive and participatory learner-centred approaches.
- Thirdly, the Examinations Council of Lesotho and the National Curriculum Development Centre should ensure that there is alignment between what teachers are to teach learners (intended curriculum) and what learners are asked in exams (assessed curriculum). This will help ensure that teachers align the enacted curriculum with the intended, and not only with the assessed curriculum which was found to be the case, as teachers taught to prepare learners for exams. This sidelined acquisition of the required skills and attitudes.

5.4 Conclusion

Even though there was a significant alignment observed between CAP prescriptions and the LGCSE Physical Science syllabus in the Chemistry component, Chemistry teachers' planning and implementation of learning were mostly incongruent with CAP. This study also supports other studies around the globe confirming that curriculum policies normally remain on paper since they hardly get translated into classrooms.

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APPENDICES

Appendix 1: Lesson plan schedule

School name……………………………………Grade……………………………Teacher's

Name……………………………………….......Topic………………………………………

Subtopic……………………………………....Number of students………………………..

KEY ISSUES	COMMENTS
1. Nature of the learning outcome(s)	
2. Nature of the Instructional objective(s)	
3. Nature of the Introduction	
4. Instructional Materials to be employed ➢ Effective in achieving curriculum goals, learning and teaching	
5. Instructional Methods / Strategies to be used ➢ Learner centered? ➢ Promote stimulation of HOTS (how?)	

6. How the teacher intends to cater for students' different abilities - in terms of core and extended components	
7. Roles – teacher's and learners' activities ➢ How teacher intents to facilitates learning? ➢ How learners will take responsibilities of their learning?	
8. Integration of concepts to real life – holistic teaching	
9. Integration of concepts from different or other disciplines	

Informed by: Ralebese, 2018; Rahman, 2014; Ntoi, 2007; Stake, 1967 model

Appendix 2: Classroom Observation schedule

School name: ……………………..Grade: ………… Teacher's Name………………………...

Topic: ……………………………………………… Number of students ……………………

Subtopic: ………………………………………………………………………………..

KEY POINTS	COMMENTS
1. Classroom arrangement and organization: ➢ Does it promote conducive learning? ➢ Does it facilitate leaner centeredness?	
2. Instructional materials/aids used	
3. Instructional methods used ➢ Learner centered?	
4. Teacher's and learners' activities - How teacher facilitates learning ➢ Does she/he engage learners actively in the learning, to take control of their learning? ➢ How and to what extend?	

5. How does the teacher stimulate or activate development of higher order thinking skills (HOTS)? ➢ Questioning techniques ➢ Group or individual work ➢ Encourage questioning, elaboration and explanation	
6. Integration of what is taught with learners' everyday life - Interdiscursive integration	
7. Integration of what is taught with knowledge from other subjects - Interdisciplinary knowledge integration	
8. How does the teacher deals with the core and extended student – differentiation	
9. Other classroom/lesson events which impacted the lesson	

Appendix 3: Interview Questions

School name………………………… Teacher's name……………………......Grade…….

1. When and where did you study for teaching? Your subject majors, please?
2. For how long have you been teaching secondary chemistry – Experience prior the reform and experience in the reform?
3. With regard to lesson planning, is it always possible to put to practice everything you said in your lesson plan book?
   a) What could be the reasons hindering that (in a case where it's not always possible)?
4. How do you see your role in the new curriculum (LGCSE)? Has it changed in relation to the past (COSC)?
5. What informed the selection of the Instructional Methods and Materials you used in your lesson?
6. How far do you think you employ learner centered strategies in Chemistry lessons?

   a) In a case where it's not possible, what could be the reasons for that?

7. How do you approach the idea of integrating concepts from other subjects, as well as from learners' real life?
8. Physical Science, like Mathematics separates learners according to their abilities in those subjects, some take core while others take extended, how do you deal with this issue in your class?
9. Lastly, did you receive any training concerning the LGCSE curriculum?
   a) In your view, did the training provide you with the necessary information concerning CAP's underlying concepts?
   b) Do you receive any educational support to help you teach the LGCSE curriculum?

Appendix 4: Letter to the Schools

Lisemeng I

Hlotse

Leribe 300

The Principal

…….. High School

P.O. Box

Leribe 300

Dear Sir, Madam,

"Evaluating the Alignment between the Intended and Enacted Curricula with respect to LGCSE Chemistry"

This letter serves as a humble requisition to conduct a research in your school, under the afore-mentioned topic. I am a Mosotho lady aged 34, currently pursuing a Master's degree in Chemistry Education at National University of Lesotho, under the supervision Dr Machekhane Mamohato.

If my sincere request be accepted, I would like to observe at least **one** of your Chemistry teachers in grade 9 and maximum of three lessons each will be greatly appreciated.

Thanking you in advance!

Yours Faithfully

………………..

Konosoang Letsie (63823960)

Appendix 5: Letter from National University of Lesotho to District Education Office

The National University of Lesotho

Telephone: +26659782147
+266 22213476

P.O. Roma 180,
Lesotho.
Africa.

11 April 2024

FACULTY OF EDUCATION
SCIENCE EDUCATION DEPARTMENT

Education Officer
Ministry of Education and Training
Leribe 300
Lesotho

RE: Request to grant permission to MSc.Ed student to obtain relevant information from schools for research purposes

This serves to confirm that Ms. Konosoang Letsie is a Master of Science Education (MSc.Ed) student in the Department of Science Education, at the National University of Lesotho. She needs to obtain research data from some schools in the Leribe district. The topic of her research is: "*Examining the alignment between the intended and enacted curricula with respect to LGCSE Chemistry: A case of two schools in Leribe*".

On behalf of the student, I humbly request that you offer her the permission she needs to collect the relevant data for the research she wishes to engage in. The Department of Science Education already appreciates your anticipated assistance in this regard.

Sincerely

Makomosela Qhobela (PhD)
HOD – Science Education

SCIENCE EDUCATION
11 APR 2024
NATIONAL UNIVERSITY OF LESOTHO

Appendix 6: Letter from District Education Manager to School Principals

MINISTRY OF EDUCATION AND TRAINING LESOTHO

MoET

Quality Education our Commitment

LERIBE DISTRICT

12 April 2024

The Principals

Post-Primary Schools

Leribe District

Dear Principals

RE: PERMISSION TO CONDUCT RESEARCH STUDY

Permission is granted to Ms Konosoang Letsie to collect research data at your school on the title: **EXAMINING THE ALIGNMENT BETWEEN THE INTENDED AND ENACTED CURRICULA WITH RESPECT TO LGCSE CHEMISTRY: A CASE OF TWO SCHOOLS IN LERIBE DISTRICT.**

You are kindly requested to provide her with the information she may require and your usual cooperation is highly appreciated.

Yours faithfully

'Mampaqa Hlojeng (Dr)

District Education Inspector - Leribe

MINISTRY OF EDUCATION & TRAINING
EDUCATION OFFICE
12 APR 2024
P.O. BOX 12, LERIBE 300
TEL: 2240 0210 / 2240 1360
FAX: 2240 0022

Appendix 7: Principal's Consent form

Dear Principal

Please fill in the slip below, which indicates your willingness to allow your school to participate in my research study called: *"Examining Alignment between the Intended and Enacted Curricula with Respect to LGCSE Chemistry": A case of two schools in Leribe"*.

I ____ the principal of

____

Agree that research be conducted in my school.

Sign____________________________ Date _______________________________________

Appendix 8: Head of Science and Mathematics Department's Consent Form

Dear Sir/Madam

Please fill in the slip below, which indicates your willingness to allow your teachers to participate in my research study called *"Examining the Alignment between the Intended and Enacted Curriculum with respect to LGCSE Chemistry: A case of three schools in Leribe"*.

I ____ the Head of Science and Mathematics department, agree that research be conducted with teachers under this department.

Signature _______________________________________ Date _________________________

Appendix 9: Teachers' Consent Form

Dear Teacher,

Please fill in the slip below, which indicates your willingness to participate in my research study called: *"Examining Alignment between the Intended and Enacted Curricula with Respect to LGCSE Chemistry: A case of two schools in Leribe"*.

I ____ give my consent for the following;

To be audio recorded during lesson observation and interview

I understand that the audio recordings will be used for this research purpose only.

I understand also, that my name and information will be kept safe and confidential, then destroyed after the study.

I understand that I do not have to answer any question if I do not want to, and can withdraw when I wish.

Sign____________________________ Date ______________________________________

Appendix 10: Parent Consent Form

Motsoali (Moholisi) ea khabane,

Ke kopa otlatse pampiri ena, ele sesupo sa ho nlumellla ho ba teng ka sehlopheng sa ngoana oa hao nakong ea boithuto ba hae. Ngoana etlaba karolo ea boithuto bona bo bitsoang *"Examining Alignment between the Intended and Enacted Curriculum with respect to LGCSE Chemistry: A case of two schools in Leribe"*.

Nna ____ke fana ka tumelllo ea hore;

Ngoana ekaba karolo ea khatiso ea sehlopha sena.

Kea utloisisa hore khatiso etlo sebelisoa lebakeng la boithuto feela.

Kea utloisisa hape hore, mabitso le lifahleho tsa bana li ke ke tsa phatlalatsoa, 'me ngoana a ke ke a ba kotsing efe kapa efe ka lebaka la hoba karolo ea boithuto bona.

Litaba tsena li tla behoa ka hlokolosi 'me li tla sengoa kapa ho lahluoa hang ha boithuto bo phethetsoe.

Motekeno (Sign) ____________________________ Letsatsi (Date) ______________________

Appendix 11: Learners' Consent Form

Moithuti ea khabane,

Ke kopa otlatse pampiri ena, ele sesupo sa ho nlumellla ho ba teng ka sehlopheng sa hao. Ke moithuti le nna, ha u tekena mona u bontsha hore u ananela kopo eaka.

Nna ____ke fana ka tumelllo ea hore;

Ho nkuoe khatiso ea sehlopha saka. Kea utloisisa hore khatiso ejoalo etlo sebetsa lebakeng la boithuto feela.

Kea utloisisa hape hore, ha hona kotsi efe kapa efe enka oelang ho eona ka ho ba karolo ea boithuto bona.

Motekeno (Sign) ____________________________ Letsatsi (Date) _______________________