

UNIVERSITY OF EDUCATION, WINNEBA



GENERAL SCIENCE TEACHERS' PERCEPTIONS, INSTRUCTIONAL PRACTICES, AND CHALLENGES IN IMPLEMENTING THE COMMON CORE PROGRAMME (CCP) CURRICULUM IN SELECTED DISTRICTS OF THE VOLTA REGION, GHANA



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A thesis submitted to the school of graduate studies in partial fulfilment of the requirement for the award of the degree of Master of Philosophy (Integrated Science Education)

**DEPARTMENT OF INTEGRATED SCIENCE EDUCATION,
FACULTY OF SCIENCE EDUCATION**

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DECLARATION

Student's Declaration

I, Awudi Prosper Seddy , declare that this thesis, with the exception of quotations and references contained in published works which have been identified and duly acknowledged, is entirely my own work, and it has not been submitted either in part or whole for another degree elsewhere.

SIGNATURE:

DATE:

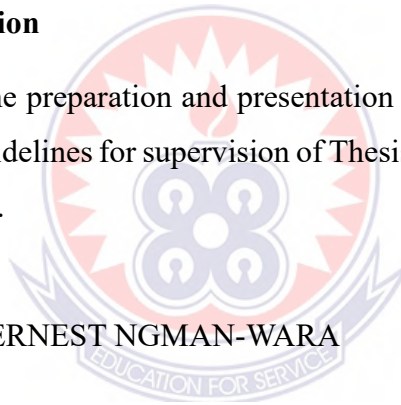
Supervisors' Declaration

I hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of Thesis as laid down by the University of Education, Winneba.

SUPERVISOR: DR. ERNEST NGMAN-WARA

SIGNATURE:

DATE:



DEDICATION

This work is dedicated to my lovely children Elsie Fafali Awudi and Caleb Dgidula Awudi.



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I thank the Almighty God for His guidance, protection, and strength throughout this postgraduate journey. His grace has been my sustenance.

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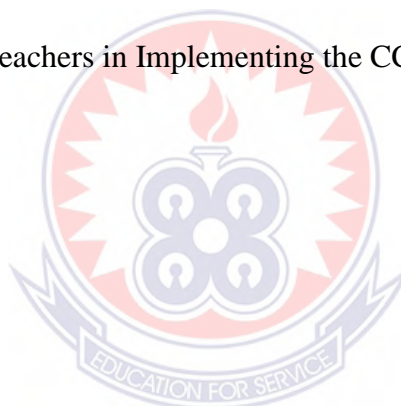
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ABSTRACT

This study examined General Science teachers' perceptions of the Common Core Programme (CCP) curriculum and the instructional practices used in its implementation in Senior High Schools within five districts of the Volta Region of Ghana. It also analysed the relationship between teachers' years of teaching experience and their perceptions and instructional practices, as well as the challenges influencing effective implementation of the CCP General Science curriculum. A concurrent triangulation mixed-methods design was adopted. A census sampling technique was used to select all 104 General Science teachers teaching Form One in public Senior High Schools within the selected districts. Quantitative data were collected using a structured questionnaire and analysed with descriptive statistics Spearman's rank-order correlation. Qualitative data were obtained through semi-structured interviews with ten teachers, two from each district, and classroom observations conducted in five schools, one per district. These qualitative data were analysed thematically. The findings revealed that teachers generally held positive perceptions of the CCP curriculum and demonstrated strong understanding of its competency-based objectives. Instructional practices showed moderate to high alignment with learner-centred approaches, particularly inquiry-based activities and the use of real-life contexts. However, continuous assessment and ICT-supported instruction were implemented less consistently across schools. Correlation analysis showed weak but statistically significant relationships between teachers' years of teaching experience and both their perceptions and instructional practices, indicating that teaching experience contributes modestly to curriculum engagement but does not strongly determine classroom implementation. Major challenges identified included inadequate teaching and learning resources, large class sizes, curriculum overload, limited time for practical activities, and insufficient CCP-specific professional development. The study concludes that although teachers demonstrate positive perceptions of the CCP curriculum, structural and systemic constraints continue to limit effective classroom implementation. Addressing resource gaps, strengthening continuous professional development, and reducing class size pressures are essential for achieving the intended outcomes of the CCP General Science curriculum.

CHAPTER ONE

INTRODUCTION

1.0 Overview

This chapter presents the background to the study, statement of the problem, purpose of the study, and objectives of the study. It also includes research questions, significance of the study, delimitations, limitations, and the organization of the study.

1.1 Background to the Study

Curriculum reform serves as a vital mechanism for improving educational quality and driving national development. In Ghana, recent educational reforms have been shaped by the National Pre-Tertiary Education Curriculum Framework (NPTECF) and the Education Strategic Plan (ESP) 2018–2030, both of which aim to reorient the pre-tertiary system toward competency-based, standards-driven learning. These frameworks emphasize the systematic development of core skills such as critical thinking, problem-solving, collaboration, communication, digital literacy, and responsible citizenship, which are necessary for learners to thrive in the twenty-first century (MoE, 2019). The Common Core Programme (CCP) curriculum was introduced to operationalize this vision for Basic 7 to Basic 9, including the first year of Senior High School (SHS 1). Science, as a key subject area, plays an essential role in achieving this goal by fostering scientific literacy and preparing students to apply scientific reasoning in authentic contexts (NaCCA, 2022). The CCP Science curriculum focuses on equipping learners with the ability to inquire, reason with evidence, solve real-world problems, and apply scientific knowledge to daily life situations. It emphasizes practical work, inquiry-based teaching, and assessment for learning, ensuring that pedagogy, instructional tasks, and evaluation methods are aligned with performance standards. The success of the reform relies heavily on how teachers

interpret its objectives, adjust their pedagogical practices, and assess competencies in the classroom (NaCCA, 2022).

Research globally and in Ghana highlights teachers as the most critical factor influencing whether curriculum reforms lead to actual improvements in learning outcomes. Successful implementation depends on teachers' understanding of the reform, their access to sustained professional development, supportive leadership, and the availability of adequate teaching and learning resources (Fullan, 2016; Ntumi, 2023). However, studies conducted in Ghana reveal uneven levels of teacher preparedness for implementing standards-based curricula. Apau (2021) reports that many teachers struggle to adapt to the required pedagogical shifts. Agbofa and Mensah (2023) further note concerns about the increased demands of performance-based assessment and persistent gaps in training and resources. The Ministry of Education has attempted to address these issues through initiatives such as Professional Learning Communities (PLCs), the Continuous Professional Development (CPD) framework developed by the National Teaching Council, and the provision of instructional resource packs (NTC, 2021; Dampson, 2021). Despite these efforts, the depth and consistency of support vary significantly across different regions and schools external factors such as community involvement and socio-economic conditions play a crucial role in curriculum implementation (Amoako, 2020). A well-structured curriculum reform requires a supportive environment that encourages collaboration among educators, administrators, and stakeholders to foster a conducive teaching and learning atmosphere.

1.2 Problem Statement

The introduction of the Common Core Programme (CCP) represents a significant reform in Ghana's education system, with a deliberate shift from rote memorisation towards competency development, inquiry, and higher order thinking skills. This

reform places new demands on classroom instruction, assessment practices, and teacher professionalism, particularly in science education. Despite the clarity of the policy objectives, empirical studies indicate that the translation of the CCP from policy to classroom practice remains uneven and problematic. Existing research points to gaps in teacher preparedness for inquiry-based pedagogy, limited access to laboratories and instructional materials, persistent difficulties in designing and assessing performance aligned tasks, and excessive teacher workloads that constrain reflective planning and collaborative learning (Apau, 2021; Ntumi, 2023; Agbofa & Mensah, 2023).

These challenges are especially critical in the teaching of General Science at the Senior High School level, where the CCP requires teachers to integrate inquiry, problem solving, and continuous assessment within contexts characterised by large class sizes, diverse learner readiness, and constrained infrastructure. Although the Ministry of Education has introduced curriculum frameworks, teacher guides, and in service training programmes to support implementation (MoE, 2019), evidence suggests that policy provision alone does not guarantee effective classroom enactment. What remains insufficiently understood is how General Science teachers interpret the CCP, adapt its requirements to their teaching contexts, and respond to the practical constraints they encounter in everyday instruction, particularly at the regional and district levels.

In the Volta Region, the five adjoining districts of Akatsi South, Akatsi North, Ketu North, South Tongu, and Keta collectively supervise twenty Senior High Schools that are fully implementing the CCP. However, there is a noticeable absence of empirical, context specific evidence on teachers' perceptions, instructional practices, and implementation challenges within these districts. This lack of localised data limits the ability of the Ghana Education Service, district education directorates, and curriculum policymakers to identify district specific needs, design targeted professional development interventions, and allocate resources effectively. Consequently, the

absence of empirical insight into how General Science teachers in these districts experience and implement the CCP constitutes a critical knowledge gap.

This study is therefore necessary to generate context grounded evidence on the perceptions, instructional practices, and challenges of General Science teachers implementing the CCP in selected districts of the Volta Region. Addressing this gap is essential for informing policy refinement, improving instructional support, and ensuring that the intended outcomes of the CCP in science education are meaningfully realised.

1.3 Purpose of the Study

The purpose of this study was to explore the perceptions, instructional practices, and challenges of general science teachers implementing the general science component of the CCP curriculum in SHS 1 across five districts of the Volta Region.

1.4 Objectives of the Study

This study sought to:

1. Determine the perceptions of general science teachers regarding the Common Core Programme curriculum in Senior High Schools in five districts of the Volta Region. .
2. Examine the Instructional Practices used by general science teachers in implementing the Common Core Programme curriculum in Senior High Schools in five districts of the Volta Region.
3. To examine the relationship between teachers' years of teaching experience and their perceptions and instructional practices regarding the implementation of the Common Core Programme curriculum.

4. Identify the challenges general science teachers face in implementing the Common Core Programme curriculum in Senior High Schools in five districts of the Volta Region.

1.5 Research Questions

1. What are the perceptions of general science teachers regarding the CCP curriculum in SHSs in five districts of the Volta Region?
2. What instructional practices are used by general science teachers in implementing the CCP curriculum in SHSs in five districts of the Volta Region?
3. What relationship exists between teachers' years of teaching experience and their perceptions and instructional practices regarding the CCP curriculum?
4. What challenges do general science teachers face in implementing the CCP curriculum in SHSs in five districts of the Volta Region?

1.6 Null Hypothesis (H₀):

There is no statistically significant relationship between teachers' years of teaching experience, their perceptions and instructional practices in implementing the CCP General Science curriculum.

1.7 Significance of the Study

This study holds practical and policy relevance for stakeholders involved in curriculum reform and science education delivery in Ghana. By generating context-specific empirical data from five districts in the Volta Region, the findings will provide the National Council for Curriculum and Assessment (NaCCA), the Ghana Education Service (GES), and district directorates with a clearer understanding of the extent to which the CCP is being implemented as intended in General Science classrooms.

For teachers and school leaders, the study offers valuable insights into effective instructional practices, strategies for integrating inquiry-based learning, and approaches

to continuous assessment that align with CCP standards. The identification of resource-related constraints and pedagogical challenges would support school heads and district officials in planning targeted interventions such as mentoring, coaching, and Professional Learning Communities (PLCs).

Importantly, by examining how teachers' years of teaching influences teachers' perceptions and classroom practices, the study would inform decisions on teacher deployment and professional development. District training units and policymakers can use this evidence to allocate training resources more efficiently and tailor capacity-building initiatives to teacher needs.

Furthermore, linking general science teachers' perceptions of the CCP to their observed classroom instructional practices strengthens the credibility of the findings and provides practical direction for improving instructional fidelity. The study contributes to the broader national goal of enhancing competency-based science education and supports efforts to align classroom realities with the Ministry of Education's competency-driven vision (MoE, 2019; NaCCA, 2022).

The findings would help ensure that the objectives of the CCP are fully realised by identifying what is working well, what remains constrained, and what must be strengthened to promote meaningful learning in science across diverse school contexts.

1.8 Delimitations

This study is delimited to general science teachers in Senior High School One (SHS 1) who are currently implementing the Common Core Programme (CCP) curriculum in five selected districts of the Volta Region. The focus is limited to teachers' perceptions, classroom instructional practices, and the challenges they encounter in the teaching of General Science. The scope of the study is restricted to the current phase of curriculum

implementation and does not extend to evaluating its long-term impact on standardized examinations or external measures of student performance.

1.9 Limitations

This study has certain limitations. It relies primarily on self-reported data from teachers, which may introduce response bias because participants could present their instructional practices more positively than what actually occurs. The limited number of classroom observations also restricts the ability to capture the full range of teaching behaviours across different times and lesson types. This produced a time-bound snapshot rather than a comprehensive representation of CCP implementation.

School timetables and examination schedules reduced opportunities to observe science practical lessons. This limited exposure to hands-on activities may influence the depth of insights gathered regarding the practical components of the CCP Science curriculum. The perspectives of district education officials, head teachers and students were not included. Excluding these key stakeholders narrowed the scope of the analysis and reduced the ability to understand systemic influences on implementation.

These factors imply that the findings should be interpreted with caution and considered most applicable to schools with similar characteristics within the Volta Region.

1.10 Organization of the Study

The study is organized into five chapters. Chapter One provides an introduction, outlining the background of the study, problem statement, purpose, objectives, research questions, significance, scope, delimitations, limitations, and organization of the work. Chapter Two presents a comprehensive review of literature on curriculum implementation, teachers' perceptions of reform, science pedagogy under competency-based systems, and the theoretical and conceptual frameworks guiding the study. Chapter Three details the methodology, including the research design, population,

sampling strategies, instruments, data collection procedures, data analysis, and ethical considerations. Chapter Four presents the results of the study alongside analysis and discussion. Finally, Chapter Five summarizes the findings, draws conclusions, and offers recommendations for policy and practice, as well as directions for future research.



CHAPTER TWO

LITERATURE REVIEW

2.0 Overview

This chapter presents a comprehensive review of existing literature relevant to the implementation of the Common Core Programme (CCP) curriculum in Senior High School science classrooms. The review was undertaken to examine the experiences, instructional practices, and challenges faced by general science teachers, to identify gaps in previous research, and to inform the design and execution of this study.

The literature review is structured under the following key headings: the theoretical framework guiding the study, teachers' perceptions of curriculum reforms, instructional practices in science education, the use of learner-centred and competency-based approaches in science classrooms, challenges affecting curriculum implementation, and the alignment of the CCP with national educational goals. Each section critically evaluates previous findings, highlighting areas where this study contributes new insights, particularly in the context of the Volta Region of Ghana.

By reviewing both local and international scholarship, this chapter establishes a conceptual and empirical foundation for understanding the dynamics of CCP implementation, providing the necessary context for analysing how general science teachers perceive, apply, and encounter barriers in delivering the curriculum.

2.1 Theoretical framework for Curriculum Implementation

This study was anchored in Fullan's Theory of Educational Change, which provides a coherent lens for examining the interaction between teacher-level factors, institutional support systems, and contextual conditions that shape curriculum implementation (Fullan, 2016). The theory is particularly relevant to competency-based reforms such as Ghana's Common Core Programme (CCP), where successful implementation

depends on teachers' understanding, acceptance, and practical enactment of curriculum intentions.

Guided by Fullan's theory, the focus of this study is to examine how General Science teachers' background characteristics and perceptions of the CCP influence their instructional practices, and how these practices collectively determine the quality of CCP implementation, within the moderating influence of contextual and institutional factors. The study therefore concentrates on implementation as a dynamic process shaped by both human agency and organisational conditions, rather than as a simple outcome of policy provision.

Fullan positions teachers as the central agents of educational change, arguing that reforms succeed or fail based on how teachers interpret and act on policy directives. In line with this perspective, the study conceptualises teacher years of teaching experience, and exposure to CCP-related training, as foundational variables. These characteristics are expected to influence teachers' perceptions of the CCP, particularly their clarity of understanding of curriculum goals, beliefs about competency-based learning, and confidence in assessment practices.

Teachers' perceptions are theorised to have a direct influence on instructional practices. When teachers clearly understand reform goals and value competency-based approaches, they are more likely to adopt inquiry-based teaching, practical activities, learner-centred strategies, and continuous assessment methods consistent with the CCP. Conversely, unclear understanding or weak commitment may result in partial or superficial implementation.

Instructional practices are positioned as the proximal determinant of the quality of CCP implementation in General Science. According to Fullan, implementation quality depends not on policy intent but on what teachers routinely do in classrooms. Thus,

effective instructional practices serve as the mechanism through which reform intentions are translated into learning experiences.

Fullan's assertion that change begins with teacher understanding and capacity, progresses through classroom practice, and culminates in sustained reform outcomes. However, Fullan also emphasises that this pathway does not operate in isolation.

Consistent with Fullan's emphasis on context, the study incorporates moderating factors that influence the strength and effectiveness of the relationships among the core variables. These include capacity building initiatives such as continuous professional development, mentoring, and Professional Learning Communities, leadership support, availability of teaching and learning resources, and broader school and community contexts.

These factors are theorised to moderate, rather than directly determine, implementation quality. For instance, strong leadership and sustained professional development can enhance the positive influence of teacher perceptions on instructional practices, while inadequate resources or weak institutional support can constrain effective implementation even when teachers are motivated and knowledgeable. This aligns with Fullan's argument that capacity building and supportive contexts are essential for sustaining change beyond the initial implementation phase.

Fullan's stages of change further inform the study's logic. The initiation stage corresponds to teachers' exposure to CCP training and policy communication. The implementation stage is reflected in teachers' instructional practices and day-to-day classroom decisions. The institutionalisation stage is represented by the consistency and quality of CCP implementation over time. Weaknesses at earlier stages, such as unclear goals or limited capacity building, are likely to disrupt later stages, resulting in uneven or fragile implementation (Fullan, 2016).

Applying Fullan's theory to the Volta Region context allows the study to examine not only whether the CCP is being implemented, but how and why implementation varies across schools and districts. By focusing on teacher perceptions, instructional practices, and contextual influences, the study responds directly to Fullan's assertion that meaningful reform requires coherence, capacity, and shared ownership. This theoretical framing therefore provides a clear and defensible basis for analysing the factors that enable or constrain effective CCP implementation in General Science.

2.2 The Common Core Programme (CCP) Curriculum

Curriculum reform is widely recognised as a central strategy for enhancing the quality of education and ensuring that education systems respond effectively to the changing needs of society. In Ghana, recent reforms have been driven by the National Council for Curriculum and Assessment (NaCCA) in collaboration with the Ghana Education Service (GES). These reforms have focused on developing a standards-based, competency-oriented curriculum at the pre-tertiary level (NaCCA, 2020). In line with this agenda, the Common Core Programme (CCP) curriculum was introduced in 2020 to provide a coherent foundation for learners from Basic 7 to Basic 10, covering the final two years of junior high school and the first year of senior high school (NaCCA, 2022).

The CCP represents a deliberate shift from rote memorisation and examination-focused instruction to a competency-based education (CBE) framework. This model emphasises not only the acquisition of knowledge but also the development of skills, perceptions and values necessary for learners to thrive in the twenty-first century. The core competencies promoted include critical thinking, problem-solving, creativity, collaboration, communication, digital literacy and responsible citizenship. These competencies align with international educational frameworks such as the UNESCO Education 2030 Agenda and Sustainable Development Goal 4, which promote

inclusive, equitable and high-quality education and lifelong learning opportunities for all (UNESCO, 2020).

The CCP integrates these competencies across nine interconnected learning areas: Mathematics, Science, Computing, Languages (English, Ghanaian Languages, French and Arabic), Career Technology, Social Studies, Religious and Moral Education, Physical and Health Education and Creative Arts and Design (MoE, 2019). Within this structure, General Science plays a central role in fostering scientific literacy and equipping learners with the ability to investigate, analyse and solve real-world problems. Inquiry-based and problem-driven pedagogies are emphasised, shifting the teacher's role from a transmitter of knowledge to a facilitator of learning (Llewellyn, 2019). This is expected to strengthen progression into science, technology, engineering and mathematics (STEM) fields.

Assessment practices under the CCP are designed to support learning rather than merely evaluate outcomes. Continuous assessment strategies including portfolios, project work and performance-based tasks are used alongside summative examinations to provide a more comprehensive picture of learner achievement (NaCCA, 2022). This marks a major departure from Ghana's traditional reliance on standardised examinations and reflects international best practices that highlight formative assessment as a driver of improved learning outcomes (Black & Wiliam, 2018).

Nonetheless, the CCP has encountered notable implementation challenges. Studies report gaps in teacher preparation, shortages of instructional resources and infrastructural constraints, particularly in science education (Apau, 2021; Agbofa & Mensah, 2023). Many schools lack adequately resourced laboratories, and overcrowded classrooms reduce opportunities for practical and inquiry-based pedagogy. According to Ntumi (2023), entrenched traditions of teacher-centred instruction have also made it

difficult for some educators to fully embrace the learner-centred approaches promoted by the CCP. Inequitable resource distribution between urban and rural schools further exacerbates disparities, with rural learners often disadvantaged in terms of access to facilities and learning aids (Owusu & Boateng, 2022).

While these challenges are well documented in the national context, their extent may be shaped by local school conditions, leadership practices and resource availability. It is therefore possible that some of these issues may be more or less pronounced in the study area. An empirical investigation is required to determine how they manifest within General Science classrooms in the selected districts of the Volta Region.

International experiences provide valuable lessons for Ghana's ongoing reform process. Countries such as Finland, Singapore, and Canada have successfully implemented competency-based curricula by investing heavily in teacher professional development, upgrading infrastructure, and ensuring sustained stakeholder engagement (Sahlberg, 2015; Ng, 2020; Campbell et al., 2021). These cases demonstrate that systemic reform requires long-term commitment, community sensitisation, and the alignment of policy aspirations with classroom realities.

In the Ghanaian context, the success of the CCP depends heavily on the capacity and commitment of teachers, especially in science education. Teachers must not only understand the objectives of the reform but also possess the pedagogical and technological skills needed to implement it effectively. Their perceptions of the CCP and their ability to enact its principles in the classroom will ultimately determine whether the curriculum fulfils its goal of preparing learners for participation in a rapidly evolving, knowledge-driven world. Investigating how general science teachers perceive and implement the CCP is therefore critical to identifying gaps and opportunities for strengthening curriculum delivery.

2.3 The Common Core Programme (CCP) General Science Curriculum

The General Science component of the Common Core Programme (CCP) was developed to equip learners with scientific knowledge, skills, values, and attitudes required for meaningful engagement with everyday life and informed decision-making. Designed by the National Council for Curriculum and Assessment under the policy direction of the Ministry of Education, the curriculum operationalises Ghana's shift towards a competency-based, standards-driven pre-tertiary education system (NaCCA, 2022; MoE, 2019). At the Senior High School level, particularly SHS 1, General Science serves as a foundational subject aimed at strengthening scientific literacy while preparing learners to apply scientific reasoning to real-world contexts.

The General Science CCP curriculum is structured to move beyond the transmission of factual knowledge towards the development of core scientific competencies. Its objectives emphasise learners' ability to inquire scientifically, reason with evidence, solve problems creatively, and apply scientific understanding to personal, social, and environmental issues. These objectives are closely aligned with the broader competencies embedded in the CCP framework, including critical thinking, problem-solving, collaboration, communication, creativity, and digital literacy. Rather than prioritising syllabus coverage, the curriculum focuses on what learners are able to demonstrate through performance, reflection, and application of knowledge, reflecting international trends in contemporary science education (NaCCA, 2022).

To achieve these objectives, the curriculum promotes instructional approaches grounded in inquiry-based and learner-centred pedagogy. Teachers are expected to engage learners in hands-on activities, guided investigations, collaborative tasks, and problem-solving exercises that encourage active participation in the learning process. Practical work and real-life contexts are central to lesson delivery, with the teacher assuming the role of a facilitator who supports learners in constructing meaning rather

than merely transmitting information. This pedagogical shift aligns with evidence from science education research, which indicates that inquiry-oriented instruction enhances conceptual understanding and learner engagement when effectively implemented (Llewellyn, 2019). However, the successful adoption of these methods depends heavily on teachers' pedagogical competence, availability of instructional resources, manageable class sizes, and adequate preparation time, conditions that are not uniformly present across Ghanaian schools (Apau, 2021; Ntumi, 2023).

Assessment within the CCP General Science curriculum is designed to support learning as an ongoing process rather than serve solely as a mechanism for grading. The curriculum adopts a continuous assessment approach that integrates formative and summative methods to capture learners' progress across knowledge, skills, and attitudes. Assessment modes include practical activities, project work, portfolios, performance-based tasks, quizzes, observations, and end-of-term examinations. Teachers are expected to provide regular feedback and use assessment evidence to inform instruction and support learner improvement. This approach reflects international best practices that recognise formative assessment as a key driver of improved learning outcomes in science education (Black & Wiliam, 2018). Despite its pedagogical value, studies suggest that many teachers experience difficulty designing valid performance tasks and aligning assessments with performance standards, particularly in science subjects that require practical evaluation (Agbofa & Mensah, 2023).

The CCP General Science curriculum differs markedly from the former Integrated Science curriculum in both orientation and implementation. The Integrated Science curriculum was largely content-driven, examination-focused, and teacher-centred, with emphasis placed on syllabus completion and preparation for high-stakes terminal examinations. Instruction under the former system relied heavily on lectures and note-

taking, while assessment was dominated by written tests that prioritised recall of information. In contrast, the CCP General Science curriculum is learner-centred, competency-based, and standards-driven. It places greater emphasis on depth of understanding, inquiry, practical engagement, and the integration of assessment into everyday teaching and learning activities. Teachers are required to design learning experiences that promote critical thinking, collaboration, and the application of scientific knowledge to authentic situations, rather than focusing narrowly on examination performance (NaCCA, 2022).

While these changes align with global reforms in science education, they also require substantial shifts in teachers' beliefs, instructional routines, and assessment practices. Teachers trained under the Integrated Science system may therefore encounter challenges adapting to the expectations of the CCP, particularly in contexts characterised by limited professional development opportunities, inadequate teaching and learning resources, and infrastructural constraints. As a result, the effectiveness of the CCP General Science curriculum ultimately depends on how teachers perceive its objectives, interpret its pedagogical demands, and negotiate contextual challenges within their schools. Examining these dimensions is therefore essential for understanding the realities of CCP implementation in General Science classrooms in the selected districts of the Volta Region.

2.4 Teachers' Perceptions of Curriculum Reforms

Teachers remain the primary drivers of change in curriculum reform. Their perceptions significantly influence their level of commitment, the instructional practice they adopt, and the likelihood that reforms will improve learning outcomes (Guskey 2002; Hargreaves & Fullan 2012). Positive perceptions tend to encourage teacher ownership, motivation and innovation in teaching. Negative perceptions, however, often result in resistance, minimal compliance or disengagement from reform efforts (Richardson

1990; Penuel et al. 2007). Understanding how teachers perceive the Common Core Programme is therefore essential for evaluating its prospects of successful and sustainable implementation.

Teachers form their perceptions from several interrelated factors including the quality of professional development, access to resources, institutional support, workload pressures and cultural norms surrounding teaching and learning. According to Ertmer and Ottenbreit-Leftwich (2010), teachers' beliefs about teaching act as interpretive filters through which they understand and adopt curriculum innovations. Where these beliefs align with reform intentions, teachers are more willing to adjust their practice. Where there is misalignment, reforms may appear externally imposed and therefore difficult to embrace.

Historically, learner-centred and inquiry-based strategies were introduced into Ghana's science curriculum during the 1987 education reform. Despite this, teacher-centred pedagogy has remained dominant in many schools. The CCP again promotes interactive learning through guided inquiry, experimentation, problem solving, and collaboration in authentic contexts (Darling-Hammond et al. 2020). These strategies are designed to help learners construct scientific understanding actively. Yet the continued prominence of lecture-based instruction suggests that pedagogical change has not kept pace with policy change. Many teachers, having been trained and socialised in traditional methods, consider aspects of the CCP demanding unless accompanied by intensive mentoring, modelling and continuous professional support.

Empirical studies on CCP implementation reflect these mixed perceptions. Some teachers value the curriculum's focus on twenty-first century competencies and recognise its potential benefits for learners (Owusu 2022). Others express concerns about the ambitious scope of the curriculum, inadequacies in teacher preparation and

unclear communication regarding expectations (Mensah & Adjei 2021). Apau (2021) reports that overcrowded classrooms, limited science equipment and reduced contact hours hinder the use of inquiry-based methods. Aboagye and Yawson (2021) similarly note that teachers struggle to manage continuous assessment requirements effectively. These findings demonstrate the persistent gap between reform intentions and what teachers can realistically achieve in the classroom.

In the Volta Region, particularly in districts such as Akatsi South, Akatsi North, Ketu North, South Tongu and Keta, infrastructural challenges further shape teacher perceptions (Laryea 2023). Many schools lack functional laboratories, ICT tools and updated learning materials (Hamisu & Zibreal 2023). Large class sizes also limit opportunities for practical work and collaborative learning (Hamisu & Zibreal 2023). Understanding teachers' perceptions in such specific contexts is essential because their acceptance or rejection of reform plays a decisive role in the success of learner-centred teaching.

Improving teacher perceptions requires targeted interventions that address both psychological and practical aspects of reform. Teachers need to be actively engaged in curriculum development activities, including piloting and feedback, to enhance their sense of ownership (Spillane et al. 2002). Regular, subject-focused professional development organised through Professional Learning Communities promotes collaborative learning and provides ongoing support (Hargreaves and Fullan 2012; Dampson 2021). Equitable distribution of science resources and ICT infrastructure is necessary to align curricular expectations with classroom conditions (O'Sullivan 2006). Clear communication about curriculum goals and assessment procedures also supports better instructional planning (Kennedy 2016). Recognition and incentive systems can further encourage teachers who adopt innovative practices and contribute actively to reform.

Teachers' perceptions are therefore pivotal to the successful delivery of the CCP. Although many teachers appreciate the vision of developing competent learners who can thrive in a knowledge-driven society, resource shortages, persistent traditional instructional cultures and limited support continue to affect the level of enthusiasm and implementation fidelity. Strengthening leadership support, ensuring continuous professional learning and fostering meaningful teacher participation in reform processes will be essential. When teachers accept and lead learner-centred pedagogies with confidence, the goals of the CCP in improving science learning outcomes become more achievable in Ghanaian schools.

2.5 Instructional Practices in Competency-Based Science Education

Instructional practices are a decisive factor in the achievement of science education goals, as they shape how learners engage with, comprehend, and apply scientific knowledge. The Common Core Programme (CCP) is grounded in a competency-based and learner-centred philosophy that places emphasis on inquiry, collaboration, creativity, problem-solving, and critical thinking (NaCCA, 2022). This approach departs from traditional teacher-dominated pedagogies and encourages students to actively construct meaning, linking scientific principles to real-life contexts. Research highlights that such pedagogical practices foster scientific literacy and better equip learners to tackle contemporary challenges such as environmental degradation, public health crises, and technological innovation (Bybee, 2014; Black & Wiliam, 2018).

In Ghana, these strategies carry particular significance given the nation's ambition to strengthen STEM education and its commitment to Sustainable Development Goal 4 (SDG 4), which emphasises inclusive and equitable quality education (UNESCO, 2020). The extent to which these pedagogies can be embedded within classrooms depends largely on teachers' professional competence, the adequacy of resources, and the institutional structures that support innovation. This section reviews key

instructional approaches relevant to the CCP General Science curriculum, including inquiry-based learning, problem-based learning, the 5E instructional model, cooperative learning, and technology-enhanced instruction, while also highlighting barriers that affect their implementation.

2.5.1 Inquiry-Based Learning

Inquiry-based learning positions learners at the centre of the learning process by encouraging them to ask questions, design investigations, collect evidence, and make reasoned conclusions (Pedaste et al., 2015). This method fosters deeper conceptual understanding by engaging students with scientific processes rather than treating them as passive recipients of information (Llewellyn, 2019). Within the CCP framework, inquiry-based approaches are explicitly embedded, requiring teachers to structure lessons around local problems and community-based investigations (NaCCA, 2022). For example, themes such as health or environmental conservation can be taught by guiding students to investigate related challenges in their communities and propose evidence-informed solutions. Studies consistently demonstrate that inquiry learning promotes curiosity, critical thinking, and long-term retention of scientific knowledge (Capps & Crawford, 2013; Furtak et al., 2019).

However, the effective application of inquiry-based science is contingent on enabling conditions. Access to laboratories, experimental materials, and sufficient instructional time are essential for meaningful inquiry activities (Abd-El-Khalick et al., 2004). Teachers also require specialised training to facilitate open-ended learning rather than defaulting to direct instruction. In Ghana, constraints such as poorly resourced laboratories and large class sizes hinder teachers from fully realising inquiry-based pedagogies (Owusu & Boateng, 2022).

2.5.2 Problem-Based Learning

Problem-based learning (PBL) aligns strongly with competency-based education because it introduces learners to complex real-world issues that require interdisciplinary thinking, collaboration, and creative solutions (Savery, 2015). Unlike traditional methods that focus on memorisation, PBL challenges students to apply scientific concepts to practical situations, thereby strengthening conceptual transfer and problem-solving ability (Ertmer & Simons, 2006). For instance, a PBL activity on water purification might integrate knowledge of chemistry, biology, and environmental science while also cultivating teamwork and innovation.

Nevertheless, implementing PBL effectively requires teachers to act as facilitators who guide the learning process without dictating outcomes (Barrows, 2002). Ghanaian teachers face barriers such as limited training, large class sizes, and resource shortages, which restrict their ability to employ PBL consistently (Mensah & Adjei, 2021). Sustained professional development and administrative support are therefore critical to make this pedagogy viable.

2.5.3 The 5E Instructional Model

The 5E model (Engage, Explore, Explain, Elaborate, Evaluate) provides a structured framework that aligns closely with the CCP's competency-driven philosophy (Bybee, 2014). It enables teachers to capture students' interest, promote hands-on exploration, facilitate conceptual explanation, extend knowledge application, and assess learning holistically. Evidence shows that this model increases student motivation, deepens comprehension, and enhances retention of scientific concepts (Trowbridge et al., 2020).

While its structured cycle is pedagogically powerful, practical challenges arise in Ghanaian classrooms where lesson time is constrained and student numbers are high. Teachers often struggle to manage all phases of the cycle effectively, particularly the

exploration and elaboration stages, without sufficient time and resources (Bybee et al., 2006). Successful application therefore requires deliberate lesson planning and integration of assessment across the phases.

2.5.4 Cooperative Learning

Cooperative learning strategies, such as group investigations, peer teaching, and think-pair-share, reflect the collaborative nature of scientific inquiry. They encourage students to work interdependently, thereby developing communication, leadership, and social responsibility (Gillies, 2016). Research demonstrates that cooperative learning enhances engagement and achievement, especially in diverse classrooms (Slavin, 2015).

Within the CCP, cooperative approaches help learners to develop interpersonal and teamwork skills needed in contemporary scientific and technological fields (NaCCA, 2022). Yet practical difficulties exist. Large class sizes often result in uneven participation, challenges in group management, and difficulties in fairly assessing individual contributions (Kagan & Kagan, 2009). Teachers can address these challenges by assigning clear roles, monitoring group dynamics closely, and using rubrics that capture both individual and group outcomes.

2.5.5 Technology-Enhanced Instruction

Digital technologies offer transformative potential for science education by providing simulations, virtual laboratories, and interactive platforms that allow learners to explore concepts beyond the limitations of physical resources (Hegarty, 2017). Empirical evidence indicates that technology-enhanced instruction improves student engagement and conceptual understanding (Chen et al., 2018). International examples, including Singapore and Canada, demonstrate how technology has been mainstreamed into STEM education to foster creativity and innovation (Ng, 2020; Campbell et al., 2021).

In Ghana, however, systemic issues such as inadequate ICT infrastructure, unreliable electricity, and limited teacher training hinder widespread adoption (Tondeur et al., 2017). Emerging initiatives, including blended learning approaches that combine face-to-face and digital elements, show promise for supporting CCP delivery, but scaling these innovations requires substantial investment and policy alignment.

2.6 Challenges in Implementing the CCP Curriculum

The implementation of Ghana's Common Core Programme (CCP) curriculum has faced multiple challenges that limit its capacity to achieve the intended transformation of pre-tertiary education. The CCP was introduced to replace the examination-driven, content-heavy approach with a competency-based framework that emphasises critical thinking, collaboration, creativity, and applied problem-solving (NaCCA, 2022). While its design is progressive and aligns with global educational reforms, the realities of implementation have been fraught with systemic, institutional, and classroom-level obstacles. Literature on curriculum reforms in Sub-Saharan Africa suggests that such difficulties are not unique to Ghana but rather reflect a regional pattern in which ambitious policy innovations collide with entrenched structural barriers (Akyeampong, 2018; UNESCO, 2017). This section reviews the main challenges undermining the implementation of the CCP in Ghana, with a particular focus on science education

2.6.1 Teacher Preparation and Professional Development

The success of any curriculum reform depends on teachers, who act as the mediators between policy intentions and classroom realities (Fullan, 2016). In Ghana, a significant barrier to CCP implementation has been the inadequate preparation of teachers to deliver competency-based education. Unlike traditional lecture-centred approaches, competency-based education requires teachers to adopt new roles as facilitators of inquiry, designers of experiential learning, and assessors of skills rather than rote

knowledge (Schleicher, 2018). However, evidence indicates that many Ghanaian teachers were insufficiently trained prior to the rollout of the CCP.

Mensah and Adjei (2021) report that several teachers were not even aware of the curriculum reform until its official launch, resulting in misinterpretation of its goals and uneven implementation across schools. The professional development sessions that have been conducted are often generic and focus on broad pedagogical principles rather than subject-specific applications, particularly in science education where inquiry-based teaching is crucial (Dampson, 2021). The National Teaching Council's Continuous Professional Development (CPD) framework is intended to address these gaps, but its coverage has been inconsistent and dependent on district-level funding and capacity (NTC, 2021).

The lack of sustained, iterative professional learning opportunities undermines teacher confidence and competence. Teachers often struggle to design inquiry-based lessons, manage group activities effectively, and conduct formative assessments. These findings mirror broader trends across Africa, where curriculum reforms frequently falter because insufficient investment is made in building teacher capacity (O'Sullivan, 2006). This perspective assumes that when teachers receive relevant and continuous professional development together with the necessary support systems, they are more likely to adopt and sustain learner-centred approaches required under the CCP.

2.6.2 Resource Constrains

Competency-based education in science is resource-intensive, requiring well-equipped laboratories, updated textbooks and access to digital technologies for visualisation and simulation (Abd-El-Khalick et al., 2004). Yet many Ghanaian schools, particularly in rural districts, struggle with severe shortages of essential teaching and learning resources. Owusu and Boateng (2022) note that in several schools laboratories are

poorly maintained or non-existent, compelling teachers to rely on theoretical explanations rather than engaging learners in practical investigations.

Distribution of CCP-aligned textbooks and teaching aids has also been inconsistent, with some schools receiving incomplete or outdated materials (NaCCA, 2021). The integration of ICT, which is central to both the CCP and the national agenda for digital literacy, is further constrained by inadequate infrastructure, unreliable power supply and weak internet connectivity (Boadi & Antwi, 2021). These limitations not only undermine technology-enhanced teaching but also deepen inequalities between urban and rural schools. As Asamoah and Frimpong (2022) argue, without sufficient resource provision, even well-prepared teachers will struggle to implement the experiential, learner-centred pedagogies envisioned under the CCP.

In relation to the study area, it is assumed that these resource constraints significantly influence how general science teachers perceive and implement the CCP in the Volta Region. The five districts under investigation Akatsi South, Akatsi North, Ketu North, South Tongu and Keta contain schools that experience challenges in accessing laboratories, ICT tools and updated instructional materials. In such contexts, teachers often default to teacher-centred approaches because they lack the means to conduct practical and inquiry-based lessons (Owusu & Boateng, 2022). Their perceptions of the CCP are therefore expected to reflect both their professional preparation and the availability of essential resources within their schools. Understanding how these contextual realities shape classroom implementation is essential for designing targeted support that promotes equitable delivery of competency-based science education in the region.

2.6.3 Class Sizes and Teacher Workload

Large class sizes are a pervasive challenge in Ghanaian education and present a major obstacle to the effective implementation of the CCP. Pedagogical strategies such as group work, project-based learning, and continuous assessment require manageable student numbers to ensure active participation and individualised support (Darling-Hammond et al., 2020). Adusei (2022) highlights that many Ghanaian general science teachers handle classes of over 60 students, making laboratory experiments chaotic and unsafe while rendering individualised feedback nearly impossible.

Moreover, the CCP places additional demands on teachers by requiring detailed lesson planning, differentiated instruction, and continuous assessment. Without administrative support, additional staffing, or adjustments to workload expectations, teachers may perceive the reform as unmanageable. This perception often results in superficial compliance, where teachers cover the required topics but fail to fully adopt the student-centred philosophy of the CCP (Apau, 2021). Similar findings in other low- and middle-income countries suggest that high pupil–teacher ratios consistently undermine the effectiveness of curriculum reforms (Moses & Wambua, 2019).

2.6.4 Assessment Challenges

The CCP represents a radical departure from Ghana’s examination-centred system by emphasising continuous and formative assessment (NaCCA, 2022). However, this shift has proven difficult to implement in practice. Many teachers lack the training needed to design and administer alternative assessment methods such as portfolios, project-based tasks, and peer evaluations (Osei, 2021).

Time pressures and heavy workloads further discourage rigorous application of continuous assessment, resulting in a reversion to summative testing practices (Frimpong, 2022). The absence of clear, standardised guidelines for competency-based

assessment has created inconsistencies across schools. Compounding this issue is the misalignment between the CCP's competency focus and the national high-stakes examination system, which continues to prioritise recall of factual knowledge. This tension undermines teachers' willingness to invest in formative evaluation, as they remain accountable for students' performance in traditional examinations.

2.6.5 Teacher Resistance and Attitudinal Barriers

Curriculum reforms often require shifts not only in instructional practice but also in deeply held teacher beliefs (Fullan, 2016). Some Ghanaian teachers express resistance to the CCP because it challenges familiar pedagogical routines. Interactive, student-centred approaches are often perceived as time-consuming and less efficient than traditional lectures, especially in resource-constrained environments. Aboagye and Yawson (2021) observe that teacher resistance frequently stems from concerns about increased workload, insufficient support, and doubts about the practicality of competency-based education in Ghana's context.

Beyond teachers, resistance is also shaped by community perceptions. In some rural communities, parents and stakeholders worry that the CCP undermines academic rigour, especially because its methods appear less exam-oriented. Asare (2021) notes that misconceptions about competency-based education have limited community buy-in, weakening support for teachers attempting to implement the reform.

2.6.6 Policy Inconsistencies and Funding Constraints

Policy coherence and sustainable financing are critical to the success of any large-scale reform. However, the CCP rollout has been affected by fragmented directives, bureaucratic delays, and limited financial resources (Gyan, 2022). Frequent shifts in political priorities disrupt implementation timelines, while inadequate funding prevents

schools from upgrading facilities, acquiring instructional resources, and supporting teacher training.

Amponsah (2022) highlights that economically disadvantaged schools are particularly vulnerable, as they rely heavily on government allocations that are often insufficient. Furthermore, the absence of systematic monitoring and evaluation mechanisms has made it difficult to assess progress or refine implementation strategies (Acheampong & Boateng, 2022). Without consistent policy frameworks and adequate financial commitment, the reform risks losing momentum before becoming institutionalised.

2.6.7 Language and Cultural Barriers

Language and cultural relevance present additional challenges to the CCP. While the curriculum promotes multilingual competencies including English, French, and Ghanaian languages students with limited proficiency, particularly in English, often struggle to engage with science and mathematics where technical terminology is essential (Osei & Agyemang, 2021).

Although the CCP aspires to contextualise learning, some researchers argue that it insufficiently incorporates indigenous knowledge systems and local cultural practices, making it less meaningful to students (Nsiah & Ofori, 2022). When learners perceive science as abstract or disconnected from their lived experiences, motivation and engagement decline, undermining the core aims of competency-based education.

2.7 Conceptual Framework

Conceptual Framework of CCP Curriculum (General Science) Implementation

Figure 1

Conceptual Framework of CCP Curriculum Implementation in General Science

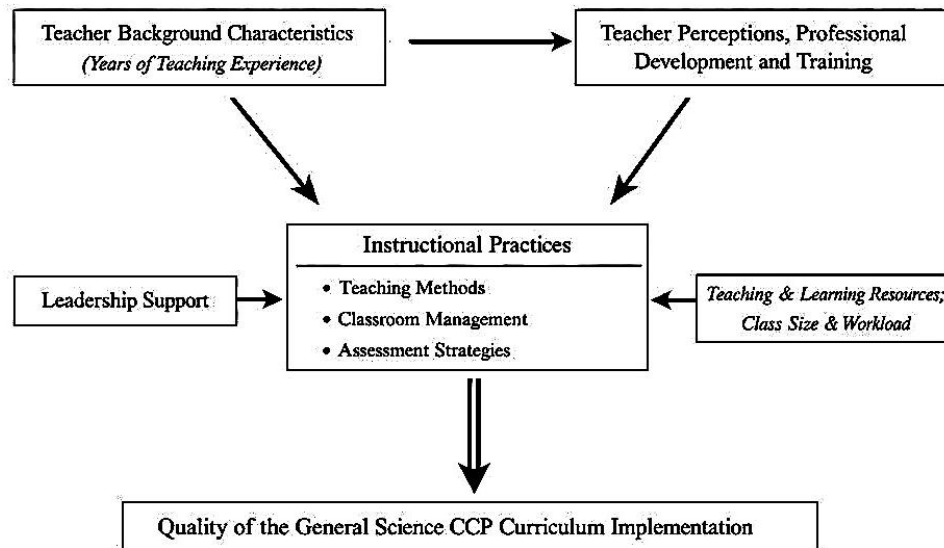


Figure 1 presents the conceptual framework guiding this study on the implementation of the General Science Common Core Programme (CCP) curriculum. The framework was informed by Fullan's Theory of Educational Change, which emphasises that sustainable curriculum reform emerges from the interaction between individual teacher perception and instructional practices used in implementing the curriculum.

At the centre of the framework is a structured implementation pathway. The model begins with Teacher Background Characteristics, operationalised in this study as years of teaching experience. Teaching experience is conceptualised as a professional attribute that may shape teachers' interpretations of curriculum reform, their interpretive frameworks, and their readiness to engage with pedagogical change.

Teacher background is associated with Teachers' Perceptions of the CCP Curriculum, reflecting the assumption that professional experience may influence how teachers

interpret the goals, structure, and competency-based orientation of the CCP. Perceptions in this study refer to teachers' understanding of the curriculum objectives, their beliefs about its relevance, and their confidence in its implementation.

The framework further proposes that teachers' perceptions are associated with Instructional Practices. This relationship reflects the well-established premise in educational research that teacher cognition informs classroom behaviour. Teachers who demonstrate stronger alignment with the principles of the CCP are expected to engage more consistently in learner-centred, inquiry-oriented, and competency-based instructional strategies.

Instructional practices are then linked to quality of CCP Implementation in General Science. In this study, implementation quality refers to the overall depth, coherence, and fidelity with which the curriculum is enacted in classroom settings.

The framework incorporates a set of Moderating Contextual Factors, including professional development and training, leadership support, teaching and learning resources, class size and workload, and the assessment system. These factors are conceptualised as moderators rather than independent predictors. They are not assumed to operate in isolation; instead, they condition the strength and effectiveness of the relationships within the central pathway.

Specifically, contextual conditions may strengthen or weaken the association between teachers' perceptions and their instructional practices and the translation of instructional practices into high-quality curriculum implementation.

For example, positive perceptions may not translate into effective classroom practice where professional development is inadequate or resources are limited. Conversely, strong instructional leadership and adequate teaching materials may enhance the alignment between teacher beliefs, classroom practice, and curriculum outcomes.

The framework conceptualises CCP implementation as a dynamic and context-sensitive process. Teacher background characteristics are associated with perceptions; perceptions are linked to instructional practices; instructional practices are associated with implementation quality; and institutional conditions moderate these relationships. This structure reflects both the empirical findings of the study and Fullan's argument that meaningful educational change depends simultaneously on teacher agency and systemic support.

2.8 Summary

This chapter has provided a critical review of literature relevant to the implementation of Ghana's Common Core Programme (CCP) curriculum, with a particular emphasis on science education. The review began by outlining the rationale, objectives, and structure of the CCP, which represents a deliberate attempt to move Ghana's education system away from rote memorisation and examination-driven practices towards a competency-based model. The CCP is designed to cultivate learners' ability to think critically, solve problems creatively, collaborate effectively, and apply knowledge in authentic contexts, while also building capacities in digital literacy and responsible citizenship (NaCCA, 2022). These objectives reflect wider global education reform agendas that emphasise preparing young people to thrive in a knowledge-intensive, technologically driven, and interconnected world. Within this vision, science education plays a particularly crucial role in equipping learners with both conceptual understanding and practical skills needed to address societal challenges.

The theoretical framework guiding this study, Fullan's Theory of Educational Change, situates teachers at the centre of reform processes. Fullan (2016) underscores that the success of curriculum reforms depends not only on well-crafted policy frameworks but also on the perceptions, capacities, and agency of teachers who enact them in classrooms. According to this theory, change is a multifaceted process that requires

moral purpose, professional capacity, strong leadership, and systemic coherence. This framework is particularly relevant in Ghana, where discrepancies between national education policy and classroom realities remain pronounced.

The review further examined teachers' perceptions of curriculum reforms, which emerged as a critical determinant of successful implementation. Teachers' beliefs and perceptions shape their level of commitment, willingness to innovate, and interpretation of new policy directives. Positive perceptions foster ownership and sustained engagement, while negative perceptions can result in resistance, superficial compliance, or outright rejection of reforms (Guskey, 2002). Factors influencing perceptions include the quality of professional development, clarity of curriculum objectives, adequacy of instructional resources, workload demands, and the level of institutional support available (Aboagye & Yawson, 2021; Owusu & Boateng, 2022). In Ghana, studies reveal mixed perceptions of the CCP: while some teachers appreciate its emphasis on learner-centred approaches and 21st-century skills, others raise concerns about increased workloads, inadequate preparation, and limited resource availability.

Instructional practices central to competency-based science education were also reviewed. Approaches such as inquiry-based learning, problem-based learning, the 5E instructional model, cooperative learning, and technology-enhanced instruction all embody the learner-centred philosophy underpinning the CCP. These strategies have been shown internationally to enhance student engagement, foster critical thinking, and improve conceptual understanding. However, their success is highly dependent on teacher competence, sufficient instructional time, manageable class sizes, and access to resources such as laboratories, experiment kits, and ICT infrastructure. In many Ghanaian schools, especially in rural districts, these conditions are not yet in place, limiting the full realisation of learner-centred pedagogy.

A significant body of literature highlights systemic and contextual challenges constraining the effective delivery of the CCP. These include insufficient teacher preparation, limited professional development, shortages of teaching and learning resources, overcrowded classrooms, and the persistence of summative examination systems. Further difficulties arise from teacher resistance to change, policy inconsistencies, inadequate funding, and inequities in resource allocation between urban and rural schools. Cultural and linguistic barriers also weaken the curriculum's relevance, as many students struggle with English as the medium of instruction while finding limited connection between curriculum content and their lived realities (Nsiah & Ofori, 2022). Unless these challenges are systematically addressed, the CCP risks becoming a policy ideal rather than a transformative practice in classrooms.

Professional development was identified as a pivotal mechanism for addressing these obstacles. Sustained, subject-specific training equips teachers with the skills and confidence to deliver inquiry-based lessons, integrate technology, and implement competency-based assessment methods. Collaborative structures such as professional learning communities and mentorship schemes further enhance teacher motivation and support the diffusion of innovative practices. Yet, research shows that current professional development efforts in Ghana are often fragmented, generic, and lacking in sustained follow-up (Mensah & Adjei, 2021).

Institutional and resource support were also emphasised as essential to reform success. Effective CCP implementation requires strong school leadership, coherent policy directives, equitable distribution of resources, and adequate funding. Laboratories, ICT facilities, updated teaching materials, and supportive monitoring mechanisms are foundational to sustaining science education reforms. Without these systemic supports, even motivated and well-trained teachers are constrained in their ability to deliver meaningful learner-centred instruction.

The chapter also incorporated comparative perspectives from countries such as Finland, Singapore, Canada, and Rwanda. These international cases illustrate how sustained teacher training, the integration of technology, localisation of curriculum content, and comprehensive assessment reforms have strengthened CBC implementation. While Ghana's socio-economic realities differ, the experiences of these countries provide valuable lessons: Finland highlights the importance of strong teacher preparation and professional autonomy; Singapore demonstrates the power of technology and formative assessment; Canada shows the benefits of localising curricula by integrating indigenous knowledge; and Rwanda illustrates that competency-based reforms are possible in resource-constrained contexts when supported by strong policy commitment and innovative approaches.

In conclusion, the literature reviewed in this chapter highlights the interdependence of teacher perceptions, instructional practices, professional development, institutional support, and resource availability in shaping the success of Ghana's CCP. Although the curriculum has the potential to transform science education by promoting inquiry, creativity, and applied learning, its impact ultimately depends on how effectively teachers interpret and implement it within classrooms. The challenges identified ranging from inadequate preparation and resources to systemic and cultural barriers provide a critical backdrop for the present study. These insights lay the foundation for investigating how general science teachers in selected districts of the Volta Region perceive, interpret, and enact the CCP, as well as the challenges they face. The next chapter details the research methodology employed in this study, including the design, population, sampling procedures, data collection instruments, and ethical considerations.

Instructional practices are critical to the success of the CCP General Science curriculum because they determine how effectively students acquire and apply competencies.

Strategies such as inquiry-based learning, problem-based learning, the 5E instructional model, cooperative learning, and technology-enhanced instruction embody the shift toward learner-centred education. Evidence suggests that these approaches improve scientific literacy, critical thinking, and problem-solving skills, which are central to twenty-first-century education.

Yet, in Ghana, the translation of these practices into everyday teaching remains hindered by structural, institutional, and cultural barriers. Without adequate training, resources, and alignment of assessment systems, the strategies risk remaining aspirational ideals rather than transformative realities. Addressing these barriers through investment in teacher capacity, equitable resource distribution, and supportive leadership is essential if the CCP is to achieve its intended outcomes and contribute meaningfully to national and global educational goals.



CHAPTER THREE

METHODOLOGY

3.0 Overview

This chapter presents the methodological framework employed to examine general science teachers' perceptions, instructional practices, and challenges in implementing the General Science component of the Common Core Programme (CCP) in selected districts of the Volta Region of Ghana. It begins with a discussion of the philosophical paradigm underpinning the study, followed by the research approach and design. The chapter then outlines the population, sampling strategies, instruments for data collection, and procedures for ensuring validity and reliability. It further describes the processes of data collection and analysis before concluding with the ethical considerations that guided the conduct of the research.

3.1 Study Area

The study was carried out in the Volta Region of Ghana, located in the south-eastern part of the country. The region shares boundaries with the Greater Accra Region to the west, Oti Region to the north, the Republic of Togo to the east and the Gulf of Guinea to the south. It is characterised by a mixture of rural and peri-urban settlements, cultural diversity and varying levels of socio-economic development. Educational infrastructure differs widely across the region, which makes it a suitable context for investigating differences in curriculum implementation.

Five adjoining districts were selected for this study: Akatsi South, Akatsi North, Ketu North, South Tongu and Keta. These districts collectively host several public Senior High Schools responsible for implementing the Common Core Programme (CCP) at the SHS 1 level. Their proximity and diversity in resources provide a useful basis for exploring how contextual conditions and institutional capacities influence teachers' perceptions and instructional practices.

Akatsi South District is located along the Accra to Aflao highway and combines agrarian life with growing educational development. The district hosts the Akatsi College of Education, a major institution for training basic school teachers in Ghana. The presence of this facility creates a favourable environment for professional collaboration and continuous learning among teachers in neighbouring schools. Despite this, Senior High Schools in the district still face resource and infrastructure challenges that influence the delivery of practical science instruction.

Akatsi North District, which shares similar geographical and socio-economic features with Akatsi South, also relies heavily on agriculture. Although it benefits indirectly from its proximity to the College of Education, schools in this district generally operate with fewer facilities and teaching resources. Differences in teacher deployment and school infrastructure between Akatsi North and its southern counterpart make the comparison valuable for this study.

Ketu North Municipal lies closer to the eastern border with Togo and encompasses a mixture of peri-urban and rural communities. The municipality has several basic and secondary education institutions and has also benefited from ICT-capacity initiatives in recent years. However, regular constraints such as limited internet connectivity, inadequately equipped science laboratories and teacher shortages continue to affect the effective implementation of inquiry-based science instruction.

South Tongu District is predominantly rural, with fishing and crop cultivation as the main economic activities. Its rural nature results in limited access to educational infrastructure, including laboratories and digital tools required for science teaching. Such constraints increase pressure on teachers and limit opportunities for practical engagement in science lessons.

Keta Municipal, located along the coast, hosts a comparatively larger concentration of educational institutions including Keta Senior High Technical School, one of the well-known second-cycle schools in the region. Although it has a stronger school presence, geographical constraints such as coastal erosion and settlement patterns place limitations on infrastructure expansion. Variations in school resources, class sizes and access to teaching materials remain visible across schools within the municipality.

3.2 Research Paradigm

A research paradigm provides the philosophical foundation for inquiry, shaping assumptions about knowledge, reality, and how phenomena should be investigated (Creswell & Plano Clark, 2018). Paradigms guide the formulation of research questions, the selection of methods, and the interpretation of findings (Kivunja & Kuyini, 2017).

This study adopted the pragmatist paradigm, which is particularly suitable for educational research that addresses complex, context-dependent issues such as curriculum implementation. Pragmatism emphasises practical solutions and the integration of multiple perspectives. It does not privilege one methodological tradition over another but instead values approaches that generate useful and actionable knowledge (Morgan, 2007; Tashakkori & Teddlie, 2010).

The pragmatist paradigm was appropriate because the implementation of a competency-based curriculum such as the CCP involves multiple interrelated factors, including teacher perceptions, classroom practices, and systemic challenges, which cannot be adequately captured through a single methodological lens. Pragmatism enabled the study to combine numerical data and narrative accounts, thereby offering a comprehensive understanding of the phenomenon under investigation.

3.3 Research Approach

The study employed a mixed-method approach, integrating both quantitative and qualitative techniques. Mixed-methods research involves systematically collecting, analysing, and integrating numerical and textual data to generate a deeper and broader understanding of the research problem (Creswell & Plano Clark, 2018).

This approach was particularly appropriate for the present study. Quantitative data provided measurable evidence of teachers' perceptions, practices, and challenges, while qualitative data captured rich, contextual insights into classroom realities. The two strands complemented one another, with qualitative findings elaborating on and explaining the patterns observed in the quantitative results. This integration ensured a holistic analysis, maximising the strengths of each strand while offsetting their limitations (Bryman, 2021).

3.4 Research Design

A research design refers to the overall strategy adopted to integrate the components of a study in a coherent and logical manner to ensure that the research objectives are effectively achieved (Cohen, Manion & Morrison 2018). This study adopted a concurrent triangulation mixed methods design, which involves collecting quantitative and qualitative data simultaneously and assigning equal priority to both strands (Creswell & Creswell 2018). The two datasets are analysed separately and later merged during interpretation to provide a more comprehensive understanding of the phenomenon under investigation (Creswell & Plano Clark 2017).

This design was selected because it offers several advantages. It allows for the combination of the breadth of quantitative data with the depth of qualitative insights, resulting in a comprehensive and contextualised understanding of teachers' perceptions and instructional practices. It also enhances the validity and credibility of findings

through triangulation, where evidence from one dataset is used to confirm or explain results from the other. The design further supports the generation of rich and tentative explanations of complex educational issues such as curriculum implementation in diverse school environments.

Koskey and Stewart (2013) acknowledge that concurrent triangulation improves efficiency by reducing the time required for research execution, although it provides limited flexibility for iterative learning between the two methods. To address this limitation in the present study, careful planning and piloting of instruments were undertaken before full data collection. Additionally, deliberate integration procedures were applied during interpretation to ensure meaningful comparison and convergence of results from both data strands.

The concurrent triangulation design enabled this study to capture multiple perspectives from teachers, validate key findings through cross-verification, and present a balanced picture of CCP implementation within the study area.

3.4 Population

Population refers to the entire group of individuals who possess characteristics relevant to a particular study (Cohen, Manion & Morrison, 2018). In this study, the population comprised all General Science teachers in public Senior High Schools (SHSs) in the Volta Region of Ghana. These teachers are responsible for delivering the Common Core Programme (CCP) General Science curriculum and therefore constitute the key agents through whom curriculum reform is translated into classroom practice.

3.4.1 Target Population

The target population for the study consisted of General Science teachers in public SHSs who were actively engaged in teaching the CCP curriculum. This group was selected because they are directly involved in implementing competency-based

instruction in science and are therefore best positioned to provide informed insights into teachers' perceptions, instructional practices, and challenges associated with CCP implementation.

3.4.2 Accessible Population

The accessible population comprised 104 General Science teachers teaching Form One classes in 20 public SHSs across five districts in the Volta Region, namely Akatsi South, Akatsi North, Ketu North, South Tongu, and Keta. These teachers were accessible to the researcher and were selected because the CCP had been rolled out at the Form One level during the study period, making them the most actively involved in the delivery of the General Science CCP curriculum.

The distribution of the accessible population across the five districts is presented in Table 1.

Table 1: *Distribution of Form One General Science Teachers Across Selected Districts*

District	No. of SHSs	Teachers
1. Akatsi South	2	10
2. Akatsi North	1	5
3. Ketu North	4	19
4. South Tongu	4	21
5. Keta	9	49
Total	20	104

Field data (2025)

The five districts were purposively selected to capture variation in school size, resource availability, and local educational contexts within the southern zone of the Volta Region, thereby enabling a more contextualised examination of CCP implementation.

3.5 Sampling Procedure and Sample Size

The study employed a mixed-methods approach, combining quantitative and qualitative techniques to obtain a comprehensive understanding of General Science teachers' perceptions, instructional practices, and challenges in implementing the Common Core Programme (CCP). Accordingly, different sampling strategies were applied to the survey, interview, and classroom observation components of the study.

For the quantitative component, a census sampling strategy was adopted. Although the total number of General Science teachers across the Volta Region was larger, the accessible population was limited to 104 Form One General Science teachers in selected districts who were directly involved in the implementation of the CCP. Given the manageable size of this population and its direct relevance to the research objectives, the inclusion of all accessible teachers was considered appropriate. This approach minimised sampling error within the study area and strengthened the internal validity of the quantitative findings.

A multistage sampling procedure guided participant selection. In the first stage, five districts (Akatsi South, Akatsi North, Ketu North, South Tongu, and Keta) were purposively selected based on their full participation in CCP implementation at the Senior High School level and administrative feasibility. In the second stage, all public Senior High Schools within the selected districts were included to ensure variation in institutional contexts such as school size, leadership structures, and resource availability. In the final stage, all Form One General Science teachers in the selected schools were included in the survey, resulting in a total of 104 respondents. This approach is consistent with methodological guidance that supports census sampling when the population is small and closely aligned with the research focus.

For the qualitative component, purposive sampling was used. From the surveyed teachers, two General Science teachers from each district were selected to participate in semi-structured interviews, yielding a total of ten interview participants. Selection was based on teaching experience and willingness to participate, with the aim of obtaining rich and varied perspectives on CCP implementation. The interview data were intended to provide depth and explanatory insight rather than statistical representation.

In addition, classroom observation was used to complement the survey and interview data. One General Science lesson was observed in one purposively selected Senior High School in each district, resulting in a total of five classroom observations. Schools and lessons were selected based on teacher availability and active engagement with the CCP curriculum. The observations focused on instructional practices, learner engagement, and the use of inquiry-based and assessment-for-learning strategies promoted under the CCP. The purpose of the observations was to triangulate findings from the questionnaire and interviews and to provide contextual, practice-based evidence of classroom implementation, rather than to generalise instructional practices across all schools.

The combined use of census sampling for the survey, purposive sampling for interviews, and targeted classroom observations enabled methodological triangulation and enhanced the credibility of the study. While the findings are not intended for statistical generalisation beyond the selected districts, they offer robust, context-specific insights into how General Science teachers perceive, enact, and experience challenges in implementing the CCP curriculum.

3.6 Data Collection Instruments

Three data collection instruments were employed in this study, namely a structured questionnaire (Appendix A), a semi-structured interview guide (Appendix B), and a classroom observation checklist (Appendix C). The use of multiple instruments was intended to support methodological triangulation by capturing complementary quantitative and qualitative evidence on teachers' perceptions, instructional practices, and challenges associated with implementing the Common Core Programme (CCP).

The structured questionnaire served as the primary quantitative instrument. It consisted of twenty items organised into three domains aligned with the study objectives: teachers' perceptions of the CCP (seven items), instructional practices in General Science teaching (seven items), and challenges related to CCP implementation (six items). All items were presented as declarative statements measured on a five-point Likert-type scale, allowing respondents to indicate their level of agreement with each statement. The response options ranged from strongly disagree (scored as 1) to strongly agree (scored as 5). Numerical weighting of responses facilitated statistical analysis, enabling comparison of responses across districts and the identification of patterns and trends in teachers' experiences with the CCP. This format ensured efficiency in data collection while allowing for systematic quantification of perceptions and reported practices.

The semi-structured interview guide was designed to generate in-depth qualitative insights into teachers' professional experiences with CCP implementation. The interview questions explored participants' understanding of the curriculum, instructional decision-making, assessment practices, and contextual challenges encountered in General Science teaching. The semi-structured format allowed for consistency across interviews while providing flexibility for probing and clarification,

thereby enabling participants to elaborate on issues emerging from the questionnaire data.

The classroom observation checklist was used to obtain field-based evidence of instructional practices under the CCP. The checklist comprised thirteen indicators organised around key aspects of classroom practice, including lesson planning and delivery, use of instructional resources, learner engagement, assessment practices, and observable implementation constraints. One General Science lesson was observed in one purposively selected Senior High School in each district, resulting in a total of five classroom observations. The observations enabled the researcher to document the practical enactment of competency-based instruction and to compare observed classroom practices with teachers' self-reported data from the questionnaire and interviews, thereby enhancing the credibility of the findings.

Collectively, the questionnaire, interview guide, and observation checklist provided a comprehensive account of CCP implementation by integrating quantifiable trends, teachers' reflective accounts, and direct classroom evidence. This combination of instruments is consistent with the mixed-methods design underpinning the study and strengthened the robustness and interpretive depth of the findings.

3.7 Validity of the Instruments

Validity refers to the extent to which a data collection instrument accurately measures the constructs it is intended to measure (Cohen, Manion & Morrison, 2018). In this study, content validity and face validity were prioritised to ensure that the instruments accurately reflected the objectives of the study and the pedagogical expectations of the Common Core Programme (CCP) General Science curriculum.

Content validity was established through a systematic alignment of all questionnaire items, interview questions, and observation indicators with the study variables and the

learning competencies specified in the CCP General Science curriculum. Each item was mapped to one or more aspects of teachers' perceptions, instructional practices, or implementation challenges to ensure comprehensive coverage of the constructs under investigation. This process helped to confirm that the instruments captured the full scope of curriculum implementation without introducing irrelevant or extraneous content.

Face validity was established through expert review to ensure clarity, appropriateness, and contextual relevance of the instruments. The draft instruments were reviewed by science education specialists and experienced Senior High School teachers who were familiar with the CCP curriculum. The reviewers examined the wording, sequencing, and interpretability of items, as well as their relevance to real classroom and curriculum implementation contexts. Feedback from the reviewers informed revisions aimed at improving clarity, reducing ambiguity, and ensuring that the instruments were suitable for the target respondents.

In addition, a pilot study was conducted involving a small group of General Science teachers from public Senior High Schools outside the selected study districts. The purpose of the pilot test was to assess item clarity, relevance, and overall usability of the instruments under conditions similar to the main study. Feedback from pilot participants revealed that some questionnaire items were initially too broad or contained technical terminology that could lead to varied interpretation. These items were subsequently rephrased for precision, simplified where necessary, and repositioned under more appropriate thematic domains. The pilot testing process therefore contributed to refining the instruments and enhancing the accuracy and interpretability of responses.

Methodological triangulation further strengthened validity. Data were collected using questionnaires, interviews, and classroom observations, allowing for cross-verification of findings from different sources. Convergence of evidence across these methods increased confidence that the instruments captured teachers' actual experiences and practices related to CCP implementation, rather than relying on a single source of data (Yin, 2018).

3.8 Reliability of the Instruments

Reliability refers to the extent to which a measurement instrument yields stable and consistent results when applied under similar conditions (Bryman, 2021). For the quantitative component of the study, internal consistency reliability of the questionnaire was assessed using Cronbach's alpha coefficient. A minimum threshold of 0.70 was adopted as the criterion for acceptable reliability, in line with established methodological recommendations (Tavakol & Dennick, 2011).

The reliability analysis produced satisfactory results across all questionnaire scales. The teachers' perceptions scale, consisting of seven items, yielded a Cronbach's alpha coefficient of 0.81. The instructional practices scale, also comprising seven items, recorded an alpha value of 0.78, while the implementation challenges scale, with six items, achieved an alpha coefficient of 0.83. These values indicate good internal consistency and confirm that items within each scale measured coherent underlying constructs. The results suggest that the questionnaire was reliable for assessing General Science teachers' experiences with CCP implementation.

For the qualitative components of the study, reliability was addressed through the concept of trustworthiness, encompassing credibility, dependability, and confirmability (Lincoln & Guba, 1985). Credibility was enhanced through careful interviewing procedures, including the use of follow-up probing questions to clarify responses and

ensure accurate representation of participants' views. Classroom observations further strengthened credibility by providing direct evidence of instructional practices, allowing comparison between reported and observed behaviours.

Dependability was promoted by the use of a semi-structured interview guide and a structured classroom observation checklist. These instruments ensured consistency in the topics explored and the aspects of classroom practice examined across schools and districts, while still allowing flexibility to capture context-specific insights. Detailed field notes and interview records were maintained to provide a clear audit trail of the data collection process.

Confirmability was supported through peer review procedures. Colleagues with expertise in science education examined selected interview transcripts and observation notes to assess the plausibility of interpretations and reduce researcher bias. The use of multiple data sources and methods further strengthened confirmability by allowing patterns and themes to be corroborated across questionnaires, interviews, and classroom observations.

The combination of statistically verified internal consistency for the questionnaire and systematically applied trustworthiness strategies for the qualitative data enhanced the reliability and credibility of the study findings.

3.9 Data Collection Procedure

Data collection was conducted over a two-week period, which was considered adequate for engaging participants while minimising disruption to school activities. Prior to data collection, an introductory (Appendix E) letter was obtained from the Head of the Department of Integrated Science Education, University of Education, Winneba. This letter was presented to the District Directors of the Ghana Education Service (GES) in the five selected districts to seek formal permission to conduct the study. Upon

approval, copies of the authorisation were submitted to the heads of the participating Senior High Schools, after which Heads of Science Departments were formally notified and engaged to facilitate access to teachers.

For the quantitative phase, the structured questionnaire was administered electronically. In schools where Heads of Science Departments were available, they assisted in sharing the questionnaire link through existing Form One General Science teachers' WhatsApp platforms. In schools where departmental heads were unavailable, designated teachers voluntarily assisted with distribution. Participation was strictly voluntary. Teachers were provided with information about the purpose of the study, assured of confidentiality and anonymity, and informed of their right to decline or withdraw at any stage without penalty. Respondents were given up to five days to complete the questionnaire independently using their mobile devices.

Consistent with the concurrent triangulation mixed-methods design, quantitative and qualitative data were collected within the same period, following a clearly defined sequence. After the questionnaire phase, arrangements were made with Heads of Departments to schedule classroom observations and interviews at times convenient to the schools. One General Science lesson was observed in one purposively selected Senior High School in each district, resulting in five classroom observations in total. Observations focused on lesson delivery, learner engagement, use of instructional resources, assessment practices, and alignment with CCP pedagogical recommendations. Conducting observations prior to interviews allowed for the capture of authentic instructional practices without influence from subsequent reflective discussions.

Following the observation phase, semi-structured interviews were conducted with a purposively selected subset of teachers, in line with the sampling strategy outlined

earlier. Specifically, two General Science teachers from each district participated in the interviews, yielding a total of ten interviewees. In districts where the observed teacher met the selection criteria and consented, that teacher was included among the interview participants. In cases where the observed teacher was unavailable or did not meet the selection criteria, another eligible teacher from the district was interviewed. This approach ensured consistency with the stated interview sample size while maintaining flexibility within school contexts.

All interviews were conducted on school premises at mutually agreed times. Written informed consent was obtained prior to each interview, and participants' permission was sought for audio recording. Interviews were audio-recorded to ensure accurate capture of responses and later transcribed verbatim. Field notes were also taken during and after interviews to document non-verbal cues and contextual details that enriched interpretation.

This systematic approach enhanced the credibility and depth of the data collected on General Science teachers' perceptions, instructional practices, and challenges in implementing the CCP curriculum.

3.10 Data Analysis

The study adopted a concurrent triangulation mixed-methods design in which quantitative and qualitative data were analysed independently and integrated at the interpretation stage. This approach enabled corroboration across data sources and enhanced the credibility and explanatory depth of the findings regarding teachers' perceptions, instructional practices, and contextual constraints in CCP implementation.

Quantitative data obtained from the structured questionnaire were coded and entered into SPSS Version 26 for analysis. Preliminary data screening was conducted to check for missing values, coding inconsistencies, and entry errors before statistical procedures

were applied. Descriptive statistics, including frequencies and percentages, were used to summarise teachers' demographic characteristics. Means and standard deviations were computed to examine central tendencies and variability in teachers' perceptions, instructional practices, and reported challenges.

Composite mean scores were calculated for the perception and instructional practice constructs using the SPSS MEAN function. This method preserved the original five-point Likert scale metric while reducing item-level measurement error. Prior to computing composite scores, internal consistency reliability was assessed using Cronbach's alpha to confirm that items within each construct measured a coherent underlying dimension.

For interpretive consistency, mean values were categorised as follows: 1.00–2.49 represented low levels, 2.50–3.49 indicated moderate levels, and 3.50–5.00 reflected high levels of perception, practice, or challenge.

Years of teaching experience was measured in ordered categorical bands 0–3 years, 4–7 years, 8–15 years, and 16 years and above. These categories were coded sequentially and treated as an ordinal variable during analysis. The categorisation reflected progressive stages of professional experience, ranging from early-career to highly experienced teachers. Because the variable was ordinal and the intervals between categories were not equal, Spearman's rank-order correlation was used to examine the association between years of teaching experience and teachers' perception and instructional practice. Although years of teaching experience was categorised into four ordered bands, the correlation analysis assessed the overall monotonic relationship between increasing experience and composite perception and instructional practice scores, rather than testing differences between discrete experience groups.

Spearman's rho was selected because it does not require interval-level measurement or the assumption of normal distribution. Statistical significance was evaluated at the 0.05 level using a two-tailed test. The strength of the correlations was interpreted using conventional guidelines in which coefficients of .10–.29 indicate weak relationships, .30–.49 indicate moderate relationships, and .50 or higher indicate strong relationships.

Qualitative data obtained from semi structured interviews and classroom observations were analysed thematically using the six-phase framework developed by Virginia Braun and Victoria Clarke. The analysis involved iterative familiarisation with interview transcripts and observation notes, generation of initial codes, identification of potential themes, review and refinement of thematic patterns, and the final definition and naming of themes for interpretation and reporting. Coding was conducted inductively while remaining theoretically informed by the educational change framework proposed by Michael Fullan.

Observation data were compared with interview responses to examine consistencies between teachers' reported instructional practices and those observed in classroom settings. This comparison enabled triangulation of data sources and provided deeper insight into how contextual conditions influenced classroom implementation of the Common Core Programme (CCP).

Integration of quantitative and qualitative findings occurred during the interpretation stage through a side-by-side comparison of statistical results and qualitative themes. Convergent findings strengthened the credibility of the results, while areas of divergence provided insight into contextual factors shaping curriculum implementation. This integrative approach ensured that statistical relationships were interpreted within the broader institutional and classroom realities influencing the enactment of the CCP.

3.11 Ethical Considerations

This study adhered to established ethical standards to protect the rights, dignity and welfare of all participants throughout the research process. Ethical principles guided all phases of the study, from design through data collection, analysis and dissemination.

Prior to commencing data collection, ethical approval and an introductory letter were obtained from the Department of Integrated Science Education, University of Education, Winneba. This approval letter was submitted to the District Directors of the Ghana Education Service (GES) in the selected districts and subsequently to the heads of the participating schools to secure institutional permission and facilitate access to participants.

Informed consent was sought from all participating teachers. The purpose, objectives and procedures of the research were clearly explained to them, including assurances of voluntary participation, the right to decline participation, and freedom to withdraw at any stage without any negative consequences. Participants provided written consent before completing questionnaires, interviews or classroom observations.

Confidentiality and anonymity were strictly maintained. Personal identifiers were excluded from the dataset. Pseudonyms and unique codes were assigned to questionnaires, interview transcripts and observation records to protect participant identity. Data were stored securely, with digital files password-protected and physical documents kept in a locked drawer accessible only to the researcher.

Interviews and observations were arranged at convenient times to avoid disruption to teaching schedules. The researcher remained non-intrusive during observations and ensured a respectful and professional relationship with participants. No information that could compromise a teacher's professional standing was shared with third parties.

Trustworthiness in qualitative data collection was upheld by maintaining fidelity to participants' views, avoiding misinterpretation, and ensuring that findings accurately reflected their experiences. Academic integrity was maintained by analysing and reporting all data objectively, without fabrication or misrepresentation.

The implementation of these ethical safeguards ensured that the study was conducted responsibly and respectfully, and that the resulting findings are credible, trustworthy and ethically sound.



CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Overview

This chapter presents the results of the data collected from General science teachers in five districts within the Volta Region of Ghana: Akatsi South, Akatsi North, Keta, Ketu North and South Tongu. The purpose of the study was to examine teachers' perceptions, instructional practices and challenges in implementing the Common Core Programme (CCP) General Science curriculum.

A total of 104 teachers participated in the study. Quantitative data from questionnaires were analysed using descriptive statistics including frequencies, percentages, means and standard deviations. Qualitative data from interviews and classroom observations were analysed thematically to capture deeper insights into delivery contexts. The findings are integrated to highlight convergences and divergences that offer a comprehensive understanding of CCP implementation across the study districts.

4.2 Demographic Characteristics of Respondents

Understanding the demographic characteristics of respondents is important, as these factors can influence teachers' perceptions, classroom practices and their response to curriculum reforms. This section presents the gender, age, and teaching experience of the general science teachers who participated in the study.

Table 2: *Gender Distribution of Respondents*

Gender	Frequency (f)	Percentage (%)
Male	81	77.9
Female	23	22.1
Total	104	100.0

Source: Field Data (2025)

As shown in Table 2, a majority of respondents were male (77.9 %). The relatively low representation of females (22.1 %) indicates that science teaching at the SHS level in the selected districts is male-dominated.

Table 3: *Age Distribution of Respondents*

Age Group (Years)	Frequency (f)	Percentage (%)
18–24	1	1.0
25–34	59	56.7
35–44	38	36.5
45–54	5	4.8
55+	1	1.0
Total	104	100.0

Source: Field Data (2025)

Table 3 shows that most teachers were between 25 and 34 years (56.7 %), followed by those aged 35 to 44 years (36.5 %). This suggests that the science teaching workforce in the study area is relatively young and likely in the early to mid-stages of their careers, a factor which may support openness to pedagogical innovation under the CCP.

Table 4: *Academic Qualifications of Respondents (N = 104)*

Qualification	Frequency (f)	Percentage (%)
Diploma	4	3.8
Bachelor's Degree	83	79.8
Master's Degree	17	16.3
Total	104	100.0

Source: Field Data (2025)

Table 4 shows that the majority of general science teachers involved in this study hold a Bachelor's degree (79.8 %), while 16.3% possess a Master's degree. Only 3.8 % are Diploma holders. This distribution indicates that the teaching workforce in the selected

districts is largely academically qualified to deliver the Common Core Programme (CCP) curriculum at the Senior High School level.

The dominance of Bachelor's and Master's degree holders suggests that most teachers have undergone substantial professional preparation, which can enhance their capability to interpret curriculum demands, facilitate competency-based learning, and support students' scientific understanding. This aligns with literature highlighting the importance of strong academic preparation in strengthening instructional effectiveness and curriculum implementation capacity within science education settings.

Table 5: *Years of Teaching Experience*

Years of Experience	Frequency (f)	Percentage (%)
0–3 years	4	3.8
4–7 years	41	39.4
8–15 years	46	44.2
16+ years	13	12.5
Total	104	100.0

Source: Field Data (2025)

Table 5 reveals that most respondents have between 4 and 15 years of teaching experience (83.6 %), suggesting a predominantly mid-career teacher cohort. Such experience may enhance stability and pedagogical confidence in implementing competency-based teaching. The small proportion of novice teachers (3.8 %) and those above 16 years (12.5 %) provide balance through adaptability and institutional knowledge respectively.

4.3 Presentation of Results based on Research Questions

This section presents a detailed results based on the research questions, focusing on general science teachers' perceptions, instructional practices, and challenges in implementing the Common Core Programme (CCP) curriculum

4.3.1 Research Question One: What are the perceptions of general science teachers regarding the Common Core Programme curriculum in Senior High Schools in five districts of the Volta Region?

This section presents the findings on teachers' perceptions of the Common Core Programme (CCP) curriculum. The analysis integrates quantitative results from 104 teachers with qualitative insights from interviews to provide a coherent interpretation of how teachers view the goals and practicality of the CCP in science classrooms.

Table 6: *Teachers' Perceptions of the CCP Curriculum*

Item	Perception Indicator	Mean (M)	SD	Interpretation
1	I have a good understanding of the objectives of the CCP curriculum	4.03	1.17	High
2	The CCP encourages critical thinking and problem-solving	3.97	1.24	High
3	The CCP promotes collaboration, creativity and communication	3.95	1.07	High
4	I feel confident implementing the CCP in my classroom	3.82	1.17	High
5	Students are responding positively to CCP science lessons	3.62	1.13	High
6	The curriculum content is more detailed than previous curricula	3.59	1.33	High
7	The CCP aligns well with national educational goals	3.59	1.33	High
Overall Mean (OM)/SD		3.80	1.21	

Source: Field Data (2025)

Table 6 presents teachers' responses to seven perception items measured on a five-point Likert scale. Mean scores ranged from 3.59 to 4.03, with an overall mean of 3.80 (SD = 1.21).

The highest mean score was recorded for teachers' understanding of the objectives of the CCP curriculum (Item 1: $M = 4.03$, $SD = 1.17$). High mean scores were also recorded for items indicating that the CCP encourages critical thinking and problem-solving (Item 2: $M = 3.97$, $SD = 1.24$) and promotes collaboration, creativity, and communication (Item 3: $M = 3.95$, $SD = 1.07$). These results indicate strong agreement among teachers regarding the intended pedagogical orientation of the CCP.

Item 4 and Item 5 recorded mean scores of 3.82 ($SD = 1.17$) and 3.62 ($SD = 1.13$), respectively. The lowest mean scores were recorded for items assessing perceptions of curriculum content depth and alignment with national educational goals (Items 6 and 7), both with mean values of 3.59 ($SD = 1.33$).

Theme 1: Understanding of CCP Objectives

Interview responses from teachers across the five districts reflected a shared understanding of the objectives of the CCP curriculum. Teachers described awareness of the curriculum's emphasis on critical thinking and learner engagement.

“The CCP focuses more on helping students think through problems instead of just memorizing facts.”

(Teacher, District B)

“We are expected to guide learners to discover ideas themselves during lessons.”

(Teacher, District D)

These responses correspond with the high mean score recorded for understanding CCP objectives.

Theme 2: Perceptions of the CCP's Learner-Centred Orientation

Teachers interviewed from different districts reported positive views about the learner-centred and inquiry-based orientation of the CCP. This reflects the high mean scores recorded for items related to critical thinking, collaboration, creativity, and communication.

“The curriculum encourages group work and discussions during science lessons.”

(Teacher, District A)

“Students are supposed to work together and share ideas more than before.”

(Teacher, District E)

These qualitative responses align with the quantitative findings on teachers’ endorsement of the curriculum’s pedagogical focus.

Theme 3: Perceptions Related to Classroom Implementation

Interview data also reflected variation in teachers’ reported confidence in implementing the CCP and in students’ responses to the curriculum. Teachers from multiple districts indicated that while they understood the curriculum expectations, classroom experiences differed.

“I am confident with the content, but managing activities in class can sometimes be difficult.”

(Teacher, District C)

“Some students are still adjusting to the way lessons are now conducted.”

(Teacher, District A)

These responses correspond with the comparatively lower mean scores recorded for confidence in implementation and students’ responses.

Theme 4: Perceived Alignment of the CCP with National Educational Goals

Teachers interviewed from the districts generally reported that the CCP aligns with national education goals, although responses varied. This variation is reflected in the relatively lower mean scores and higher standard deviations recorded for Items 6 and 7.

“The curriculum supports the direction education is taking in Ghana.”
(Teacher, District D)

“It fits national goals, but implementing everything fully can be challenging.”
(Teacher, District B).

4.3.2 Research Question Two: What instructional practices are used by general science teachers in implementing the CCP curriculum in SHSs in five districts of the Volta Region.?

This research question examines how general science teachers implement instructional practices required under the Common Core Programme (CCP) curriculum. The results integrate quantitative data from 104 teachers with qualitative insights from interviews and classroom observations to provide a comprehensive understanding of classroom practices.

Table 7: Instructional Practices of Teachers under the CCP Curriculum

Item	Statement	Mean (M)	SD	Interpretation
1	I plan science lessons with clear CCP-aligned objectives	3.85	1.08	High
2	I use varied instructional practices such as inquiry-based and collaborative learning	3.95	1.06	High
3	I assess students continuously using tasks, portfolios and practical work	3.62	1.13	High
4	I adapt my teaching to students' learning needs	3.82	1.17	High
5	I use real-life examples and local materials to make lessons relevant	3.96	1.17	High
6	I create opportunities for students to work independently and in groups	3.99	1.06	High
7	I integrate ICT tools in delivering science lessons	3.91	1.20	High
	Overall Mean (OM)	3.87	1.20	High

Source: Field Data (2025)

Table 7 presents teachers' responses to seven items measuring instructional practices under the CCP curriculum. Mean scores ranged from 3.62 to 3.99, with an overall mean score of 3.87 (SD = 1.20). Based on the established interpretation criteria, mean values between 3.50 and 5.00 indicate high levels of practice. The overall mean therefore indicates that teachers reported frequent use of instructional practices aligned with the CCP curriculum.

The highest mean score was recorded for creating opportunities for students to work independently and in groups (Item 6: M = 3.99, SD = 1.06). High mean scores were also recorded for the use of real-life examples and locally available materials (Item 5: M = 3.96, SD = 1.17) and the use of varied instructional practices such as inquiry-based and collaborative learning (Item 2: M = 3.95, SD = 1.06). These results indicate that teachers reported regular use of learner-centred and contextualised instructional strategies in General Science lessons.

Items relating to lesson planning aligned with CCP objectives (Item 1) and adapting teaching to students' learning needs (Item 4) recorded mean scores of 3.85 (SD = 1.08) and 3.82 (SD = 1.17), respectively. Although these values fall within the high practice category, they are comparatively lower than those associated with collaborative and contextual teaching strategies. The lowest mean score was recorded for continuous assessment using tasks, portfolios, and practical work (Item 3: M = 3.62, SD = 1.13). The item on ICT integration recorded a mean score of 3.87 (SD = 1.20), indicating variation in reported practice across schools.

Theme 1: Use of Learner-Centred Instructional Strategies

Interview responses from teachers across the five districts reflected frequent use of learner-centred strategies such as group work, discussions, and inquiry-based activities, corresponding with the high mean scores recorded for Items 2 and 6.

“I often use group discussions to get students involved in the lesson.”
(Teacher, District C)

“Students are usually asked to work together when we are solving problems.”
(Teacher, District A)

Classroom observations across the districts showed evidence of group activities and student interaction during lessons, although the level of participation varied among learners.

Theme 2: Contextualisation of Science Content

Teachers interviewed from different districts reported regular use of real-life examples and local materials when teaching science concepts, reflecting the high mean score for Item 5.

“I relate topics to things students see around them, like farming or sanitation.”

(Teacher, District E)

Observations also indicated that teachers frequently linked lesson content to everyday experiences familiar to learners.

Theme 3: Lesson Planning and Adaptation to Learner Needs

Interview responses indicated that teachers commonly planned lessons with reference to CCP learning objectives and attempted to adjust instruction to suit learners' needs, consistent with the mean scores recorded for Items 1 and 4.

“I prepare my lesson objectives based on the competencies in the syllabus.”

(Teacher, District B)

“Sometimes I change my approach when students do not understand.”

(Teacher, District D)

Classroom observations showed that lesson objectives were generally stated at the beginning of lessons.

Theme 4: Assessment Practices and ICT Integration

Interview data reflected variation in the use of continuous assessment and ICT tools, corresponding with the comparatively lower mean score for Item 3 and the variability observed in Item 7.

“We give exercises and tests often, but projects are not done regularly.”

(Teacher, District C)

“I use videos occasionally, but not every lesson.”

(Teacher, District A)

Classroom observations indicated limited use of structured performance-based assessment tasks and sporadic integration of ICT tools during science lessons.

4.3.3 Research Question Three: What Relationship Exists Between Teachers’ Years of Teaching Experience and their Perceptions and Instructional Practices regarding the CCP Curriculum?

The question sought to examine the association between teachers’ years of teaching experience and their perceptions and instructional practices in implementing the Common Core Programme curriculum. Since years of teaching experience was measured in ordered categories, Spearman’s rank-order correlation was employed to determine the strength, direction, and statistical significance of the relationships.

Null Hypothesis (H₀)

There is no statistically significant relationship between teachers’ years of teaching experience, their perceptions and instructional practices in implementing the CCP curriculum.

Table 8: *Presentation of Spearman Rank-Order Correlation Matrix for Years of Teaching Experience, Perception, and Instructional Practice (N = 104)*

Variables	1	2	3
1. Years of teaching experience	—		
2. Perception mean score	-.12	—	
3. Instructional practice mean score	-.22*	.71**	—

Note. ρ = Spearman's rank-order correlation coefficient. p values are two-tailed. (* $p < .05$). (** $p < .01$).

The results in Table 8 indicated that years of teaching experience was not significantly associated with teachers' perception scores, ($\rho = -.12$, $p = .21$). Since the p value exceeded the .05 significance level, the null hypothesis was not rejected for this relationship. This indicated that teacher' perceptions of the CCP curriculum was not significantly related to their years of teaching experience.

In contrast, the analysis indicated a weak but statistically significant negative association between years of teaching experience and instructional practice scores, ($\rho = -.22$, $p = .02$). Since $p < .05$, the null hypothesis was therefore rejected. The negative coefficient indicates a slight inverse association between years of teaching experience and CCP-aligned instructional practices. However, the strength of the relationship is weak.

The results also showed a strong positive relationship between teachers' perceptions and instructional practices, ($\rho = .71$, $p < .01$), suggesting that teachers who reported more positive perceptions of the CCP curriculum also tended to report higher levels of CCP-aligned instructional practices.

Overall, the null hypothesis was therefore partially rejected, as teachers' years of teaching experience showed no significant relationship with their perceptions of the

CCP curriculum but demonstrated a weak yet statistically significant relationship with their instructional practices. The results further suggest that teachers' perceptions are strongly related to their instructional practices.

4.3.4 Research Question Four: What Challenges Do General Science Teachers Face in Implementing the CCP Curriculum in Senior High Schools in Selected

Districts of the Volta Region?

This section presents the results on the challenges encountered by General Science teachers in implementing the Common Core Programme (CCP) curriculum. The findings are based on quantitative responses from 104 teachers, complemented by qualitative data from interviews and classroom observations conducted across the five selected districts.

Table 9: *Challenges Facing Teachers in Implementing the CCP Curriculum (N = 104)*

Item	Challenge Indicator	Mean (M)	SD	Interpretation
1	Lack of adequate teaching and learning resources	4.23	0.97	Very High
2	Insufficient training on CCP methodologies	4.07	1.01	High
3	Large class sizes make implementation difficult	3.98	1.09	High
4	Overloaded curriculum content	3.92	1.14	High
5	Limited time for practical activities	3.85	1.06	High
6	Difficulty in assessing higher-order skills	3.74	1.12	High
7	Limited support from school leadership	3.52	1.19	High
Overall Mean/SD		3.90		High

Source: Field Data (2025)

Table 10 presents teachers' responses to seven items measuring challenges associated with CCP implementation. Mean scores ranged from 3.52 to 4.23, with an overall mean score of 3.90. Based on the interpretation criteria outlined in Section 3.10, mean values between 3.50 and 5.00 indicate high to very high levels of challenge. The overall mean

therefore indicates that teachers experienced substantial challenges in implementing the CCP curriculum.

The highest mean score was recorded for lack of adequate teaching and learning resources (Item 1: $M = 4.23$, $SD = 0.97$), which fell within the very high challenge category. Insufficient training on CCP methodologies (Item 2: $M = 4.07$, $SD = 1.01$), large class sizes (Item 3: $M = 3.98$, $SD = 1.09$), overloaded curriculum content (Item 4: $M = 3.92$, $SD = 1.14$), and limited time for practical activities (Item 5: $M = 3.85$, $SD = 1.06$) also recorded high mean scores. Items relating to difficulty in assessing higher-order skills (Item 6: $M = 3.74$, $SD = 1.12$) and limited support from school leadership (Item 7: $M = 3.52$, $SD = 1.19$) recorded comparatively lower mean scores but remained within the high challenge range.

Theme 1: Availability of Teaching and Learning Resources

Interview responses from teachers across the five districts reflected concerns regarding the availability of teaching and learning resources, corresponding with the very high mean score recorded for Item 1.

“We do not always have the materials needed for practical science lessons.”
(Teacher, District A)

Classroom observations further indicated limited availability of functional laboratory equipment in some schools.

Theme 2: Training and Professional Support

Teachers interviewed from different districts reported challenges related to training on CCP instructional approaches, consistent with the high mean score recorded for insufficient training.

“The training we received was not enough to cover everything in the curriculum.”

(Teacher, District C)

Interview data reflected variation in teachers’ reported preparedness for implementing CCP methodologies.

Theme 3: Class Size, Curriculum Load, and Time Constraints

Interview responses also highlighted challenges associated with large class sizes, curriculum load, and limited instructional time, corresponding with Items 3, 4, and 5.

“Managing group activities becomes difficult when the class is very large.”

(Teacher, District D)

Classroom observations showed variation in lesson pacing and opportunities for practical activities across schools.

Theme 4: Assessment and Leadership Support

Teachers further reported challenges related to assessing higher-order skills and levels of leadership support, aligning with Items 6 and 7.

“Assessing skills like problem-solving is not always easy with the tools we have.”

(Teacher, District B)

Observation data reflected limited use of alternative and performance-based assessment approaches during lessons.

Summary of Findings for Research Question Four

Overall, the results indicate that General Science teachers across the selected districts experienced high to very high levels of challenge in implementing the CCP curriculum.

Questionnaire responses identified resource availability, training, class size, curriculum

load, and time constraints as the most prominent challenges. Interview and observation data reflected similar patterns across schools, confirming the consistency of these challenges within the study area.

4.4 Discussion of Results

Strong conceptual endorsement of the Common Core Programme (CCP) curriculum was demonstrated by General Science teachers, particularly regarding its emphasis on critical thinking, collaboration, problem solving, and contextualised learning. Alignment with the competency-based philosophy articulated by the National Council for Curriculum and Assessment (NaCCA, 2022) was evident in the high perception scores recorded. These findings suggest that reform initiation has been achieved successfully at the level of policy communication and professional orientation, as teachers appear to understand and value the curriculum's intended pedagogical direction.

However, instructional enactment revealed a more differentiated pattern. Although learner-centred and contextualised strategies were reported to be used frequently, deeper reform elements such as differentiated instruction, structured performance-based assessment, and sustained ICT integration were implemented less consistently. This divergence reflects the distinction between belief alignment and enactment capacity identified by Ertmer and Ottenbreit-Leftwich (2010). While reform principles may be cognitively endorsed, their sustained translation into classroom practice may be constrained by contextual limitations.

Within Fullan's (2016) framework, progress appears to have been achieved at the initiation stage, yet continued fragility is observed at the implementation stage. Reform awareness and philosophical endorsement were evident, but sustained behavioural transformation appears to depend heavily on institutional capacity and contextual support.

The correlation analysis provided further insight into the relationships among the study variables. No statistically significant relationship was found between years of teaching experience and teachers' perceptions of the CCP curriculum. This suggests that teachers' perceptions of the reform are not dependent on professional longevity, as favourable views of the curriculum appear to be distributed across teachers with varying levels of experience.

A weak but statistically significant negative relationship was observed between years of teaching experience and instructional practices aligned with the CCP. Teachers with more years of experience reported slightly lower levels of engagement in learner-centred instructional approaches. Although the magnitude of this relationship was small, its direction suggests that increased years of teaching experience are not necessarily associated with greater adoption of competency-based instructional practices. This finding challenges the assumption that professional experience alone enhances readiness for curriculum reform. Similar observations have been reported in other studies indicating that established pedagogical routines may limit responsiveness to instructional innovation unless supported by sustained professional learning (Kennedy, 2016; Darling-Hammond et al., 2020).

The strongest statistical relationship identified in the study was the substantial positive association between teachers' perceptions and their instructional practices ($\rho = .712$, $p < .001$). This indicates that teachers who hold more positive and coherent perceptions of the CCP are more likely to report implementing learner-centred instructional strategies. These findings are consistent with the conceptual framework of the study, which proposed that teachers' perceptions play an important role in shaping classroom instructional practices (Fullan 2016).

Despite the strong perception–practice relationship, structural constraints were consistently identified as major implementation barriers. Inadequate laboratory facilities, limited instructional materials, insufficient CCP-specific professional development, large class sizes, curriculum overload, and assessment misalignment were reported at high levels. These findings are consistent with Ghanaian studies documenting the resource-intensive nature of competency-based science education (Owusu & Boateng, 2022; Agbofa & Mensah, 2023).

Fullan (2016) emphasises that sustainable reform depends on coherence among policy, professional development, leadership support, and material resources. The present findings corroborate this position. Positive perception alone appears insufficient to ensure deep and sustained implementation where institutional capacity is constrained. Contextual conditions were found not merely to influence implementation, but to define its practical limits.

The conceptual framework proposed a directional pathway in which teacher background characteristics influence perception, which subsequently shapes instructional practice, moderated by contextual factors. Partial support for this model was obtained. While perception strongly predicted instructional practice, years of teaching experience did not significantly influence perception and demonstrated only a weak negative association with instructional practice. These findings shift explanatory emphasis from professional longevity toward cognitive alignment and systemic capacity.

CCP implementation in the Volta Region is therefore characterised by strong philosophical acceptance, moderate instructional adaptation, and significant structural constraint. Resistance to reform was not evident; rather, implementation depth appears to be bounded by institutional conditions.

Consistent with Fullan's theory of educational change, sustainable CCP implementation requires strengthened institutional coherence, expanded subject-specific professional development, adequate resource provision, and alignment between curriculum goals and assessment systems. Greater implementation gains are therefore likely to be achieved through systemic capacity enhancement rather than reliance on years of teaching experience as an indicator of reform readiness.

In summary, effective CCP implementation in General Science appears to depend less on teacher longevity and more on the interaction between perception clarity and enabling structural conditions. Where positive perception is supported by institutional capacity, competency-based instructional practices are more likely to be sustained.

4.4.1 Summary of Discussion

The discussions of Research Questions One to Four provide an integrated understanding of how the Common Core Programme (CCP) General Science curriculum is being implemented in selected districts of the Volta Region. Collectively, the findings indicate that implementation outcomes are shaped by the interaction between teachers' cognitive alignment with reform goals and the structural conditions within which instruction occurs. This pattern is consistent with Fullan's Theory of Educational Change and the study's conceptual framework.

First, generally positive perceptions of the CCP were demonstrated. Clear understanding of the curriculum's objectives was evident, and strong endorsement of its emphasis on critical thinking, collaboration, creativity, and problem solving was observed. However, comparatively lower confidence in classroom implementation and moderated perceptions of student responsiveness suggest that conceptual endorsement does not automatically translate into full pedagogical enactment. These findings reinforce the position that favourable perception is a necessary but insufficient condition for effective reform implementation.

Second, frequent use of learner-centred instructional strategies, including inquiry-based activities, group work, and contextualisation of content, was reported. These practices reflect alignment with the pedagogical intentions of the CCP. Nonetheless, continuous assessment and systematic ICT integration were implemented less consistently. Implementation depth appears to be constrained by contextual realities such as limited instructional time, large class sizes, workload pressures, and infrastructural limitations. Instructional practice therefore functions as the proximal mechanism of reform enactment, yet remains highly sensitive to institutional capacity.

Third, no statistically significant relationship was identified between years of teaching experience and teachers' perceptions of the CCP. A weak but statistically significant negative relationship was observed between years of teaching experience and instructional practice. Although modest in magnitude, this finding indicates that increased professional longevity does not necessarily correspond with stronger reform-aligned practice. Experience alone does not appear to function as a decisive driver of implementation quality. In contrast, a strong positive relationship was identified between teachers' perceptions and instructional practices, indicating that perception clarity and endorsement constitute a far more powerful predictor of classroom enactment than years of service.

Finally, substantial challenges were reported across schools, including inadequate teaching and learning resources, insufficient CCP-specific professional development, large class sizes, curriculum overload, limited time for practical activities, assessment difficulties, and inconsistent leadership support. These systemic constraints were pervasive and were found to moderate implementation depth significantly. Interpreted through Fullan's theoretical lens, these barriers reflect limitations in capacity building, institutional coherence, and structural alignment necessary for sustained reform.

In summary, CCP implementation in the Volta Region is characterised by strong philosophical acceptance, moderate instructional adaptation, and significant structural constraint. While reform intentions are broadly supported by teachers, enactment depth remains bounded by institutional conditions. The findings affirm the conceptual framework by demonstrating that curriculum reform operates as a dynamic interaction between perception, practice, and contextual capacity. Sustainable implementation of the CCP General Science curriculum therefore depends less on teacher longevity and more on strengthening systemic and organisational conditions that enable competency-based teaching and learning.



CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.0 Overview

This chapter provides a concise summary of the purpose of the study, the methodology used, and the key findings on general science teachers' perceptions, instructional practices, and the challenges associated with implementing the Common Core Programme (CCP) curriculum in selected districts of the Volta Region. It presents conclusions drawn from the integrated quantitative and qualitative data and offers practical recommendations aimed at strengthening CCP implementation in Senior High School science education. The chapter also identifies areas where further research is needed to deepen understanding of competency-based curriculum delivery in five districts of the Volta Region of Ghana.

5.1 Summary of the Study

This study examined general science teachers' perceptions, instructional practices, and the challenges encountered in implementing the Common Core Programme (CCP) General Science curriculum in selected Senior High Schools across five districts of the Volta Region: Keta, Ketu North, Akatsi South, Akatsi North, and South Tongu. The study involved 104 General Science teachers who were implementing the CCP curriculum at the time of data collection, thereby providing a comprehensive representation of classroom realities within the study area.

The study was guided by four specific objectives:

1. To determine the perceptions of general science teachers regarding the CCP curriculum in Senior High Schools within the selected districts.

2. To examine the instructional practices used in implementing the CCP General Science curriculum.
3. To examine the relationship between teachers' years of teaching experience and their perceptions and instructional practices regarding CCP implementation.
4. To identify the challenges encountered in implementing the CCP General Science curriculum.

A concurrent triangulation mixed-methods design was employed. Quantitative data were collected through structured questionnaires and analysed using descriptive statistics, including means and standard deviations, to summarise teachers' perceptions, instructional practices, and reported challenges. Spearman's rank-order correlation was used to examine the association between teachers' years of teaching experience and their composite perception and instructional practice scores, as years of experience was measured in ordered categories. Qualitative data were gathered through semi-structured interviews with ten General Science teachers, two from each district, and classroom observations conducted in five schools, one per district. These data were analysed thematically to explore lived experiences, contextual constraints, and classroom implementation dynamics.

The quantitative findings revealed generally positive teacher perceptions of the CCP curriculum and moderate to high levels of reported use of learner-centred instructional practices. Correlation analysis indicated no statistically significant relationship between years of teaching experience and teachers' perceptions of the CCP. A weak but statistically significant negative relationship was identified between years of teaching experience and instructional practices, suggesting that increased professional longevity does not necessarily correspond with stronger reform-aligned practice. In contrast, a strong positive relationship was observed between teachers' perceptions and their

instructional practices, indicating that perception clarity and endorsement constitute a far stronger predictor of classroom enactment than years of service.

Qualitative evidence further demonstrated that the depth and consistency of implementation were strongly influenced by contextual factors, including resource availability, class size, professional development opportunities, and leadership support. Integration of quantitative and qualitative findings through triangulation enhanced the credibility of the conclusions and revealed that systemic and institutional constraints significantly limit the full realisation of the CCP's competency-based intentions in General Science classrooms.

5.2 Summary of Key Findings

Teachers' Perceptions of the CCP Curriculum

Generally positive perceptions of the CCP curriculum were demonstrated by General Science teachers. Strong understanding of the curriculum's objectives was evident, and appreciation was expressed for its emphasis on critical thinking, collaboration, creativity, and other competency-based outcomes. However, comparatively lower levels of confidence in classroom implementation and moderated perceptions of student responsiveness suggest that conceptual endorsement does not automatically translate into consistent instructional enactment.

Instructional Practices under the CCP Curriculum

Learner-centred instructional practices, including inquiry-based learning, group work, and the use of real-life and locally relevant examples, were frequently reported. These practices reflect alignment with the pedagogical intentions of the CCP. Nevertheless, their depth and consistency were uneven across schools. Constraints related to limited instructional time, large class sizes, and inadequate teaching and learning resources

were found to restrict sustained implementation of performance-based assessment and systematic ICT integration.

Years of Teaching Experience, Perceptions, and Instructional Practices

No statistically significant relationship was identified between years of teaching experience and teachers' perceptions of the CCP curriculum. A weak but statistically significant negative relationship was observed between years of teaching experience and instructional practices. This finding indicates that increased professional longevity does not necessarily correspond with stronger engagement in CCP-aligned instructional approaches. In contrast, a strong positive relationship was found between teachers' perceptions and their instructional practices, suggesting that perception clarity and endorsement function as a more powerful predictor of classroom enactment than years of service.

Challenges Affecting CCP Implementation

Substantial systemic and school-level challenges were identified as constraints to effective CCP implementation. Key barriers included inadequate teaching and learning resources, poorly equipped or non-functional laboratories, limited ICT infrastructure, large class sizes, curriculum overload, and insufficient time for practical activities. Inadequate subject-specific professional development and limited leadership support were also reported to affect implementation depth. These structural limitations were found to moderate the translation of curriculum intentions into classroom practice.

5.3 Conclusion

This study examined General Science teachers' perceptions, instructional practices, and challenges associated with implementing the Common Core Programme (CCP) curriculum in selected districts of the Volta Region of Ghana. Based on the integrated quantitative and qualitative findings, four principal conclusions were drawn.

First, strong conceptual endorsement of the CCP curriculum was demonstrated. Teachers showed clear understanding of its objectives and expressed support for its competency-based orientation. Broad philosophical acceptance of the reform was therefore evident.

Second, learner-centred instructional strategies were reported to be implemented with moderate consistency. Inquiry-based activities, group learning, and contextualised teaching were observed; however, sustained implementation of performance-based assessment and ICT-supported instruction remained constrained by classroom and institutional conditions.

Third, years of teaching experience were not found to significantly influence teachers' perceptions of the CCP curriculum and demonstrated only a weak negative association with instructional practices. These findings indicate that professional longevity alone does not serve as a reliable determinant of reform-aligned classroom practice. Instead, a strong positive association between teachers' perceptions and instructional practices suggests that cognitive alignment with reform principles is a more decisive factor in curriculum enactment.

Finally, systemic and structural constraints emerged as the dominant barriers to effective implementation. Inadequate resources, large class sizes, curriculum overload, limited time for practical work, assessment challenges, insufficient ICT infrastructure, and inconsistent leadership support collectively limited the depth and sustainability of competency-based instruction.

In conclusion, while the CCP reform has achieved considerable teacher acceptance and philosophical endorsement, its intended competency-based outcomes remain only partially realised in practice. Effective and sustained implementation requires strengthened institutional capacity, targeted professional development, improved

resource provision, and greater coherence between curriculum expectations and assessment systems. Curriculum reform in General Science is therefore shaped less by years of teaching experience and more by the interaction between perception clarity and enabling structural conditions.

5.4 Recommendations

Based on the findings of this study, the following recommendations are proposed specifically for the District Directorates of the Ghana Education Service in Keta, Ketu North, Akatsi South, Akatsi North, and South Tongu.

First, sustained, district-level professional development should be institutionalised within the selected districts. Regular, school-based training workshops focused on inquiry-based science teaching, competency-based assessment, differentiated instruction, and effective classroom facilitation should be organised for General Science teachers. Given the strong association identified between teachers' perceptions and instructional practices, these professional development initiatives should aim not only at skill enhancement but also at deepening teachers' conceptual clarity regarding CCP expectations. Structured mentoring systems and subject-based Professional Learning Communities within the districts are recommended to reinforce classroom implementation.

Second, the District Directorates in the selected districts should prioritise improving access to essential science teaching and learning resources. Schools should be supported to equip and maintain functional science laboratories, secure basic practical equipment, and improve access to ICT tools relevant for science instruction. Since resource inadequacy was identified as a major constraint, targeted allocation of district-level support to under-resourced schools within the five districts is necessary.

Collaboration with local stakeholders and community leaders may also be explored to supplement instructional materials where feasible.

Third, district education authorities should provide clearer guidance and monitoring support for competency-based assessment practices. Practical exemplars, assessment rubrics, and moderated task banks may be developed at district level to support teachers in implementing performance-based assessment more consistently.

Finally, within the selected districts, measures should be considered to manage large class sizes and curriculum pacing pressures. Where immediate reduction of class size is not feasible, strategies such as additional instructional support, improved scheduling of practical sessions, and strengthened instructional leadership at the school level should be implemented. Regular supervisory visits focused on instructional improvement rather than compliance alone are recommended.

Overall, strengthening institutional capacity within the selected districts is essential for ensuring that the positive perceptions demonstrated by teachers are translated into sustained, learner-centred and competency-based science instruction.

5.5 Suggestions for Further Research

Future studies could deepen understanding of CCP implementation by exploring areas not fully examined in the current research. First, an expanded study that involves more districts and includes student perspectives would provide a broader view of how the CCP curriculum influences learning outcomes across different contexts. Second, a longitudinal design following teachers over several years would help reveal how perceptions, practices and challenges evolve with increased familiarity and training. Third, a focused investigation into the effectiveness of continuous assessment methods under the CCP would provide important insights into improving evaluation of higher-order skills. Lastly, an intervention-based study that tests the impact of resource

provision, professional development or ICT integration on instructional practices could offer evidence-based guidance for scaling CCP reforms nationwide.



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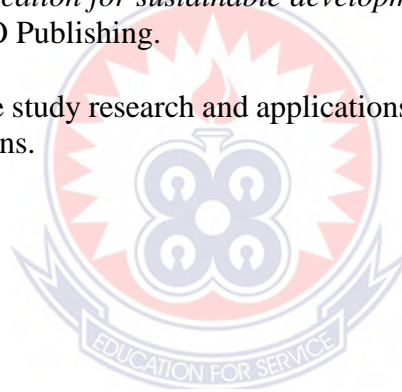
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APPENDIX A
QUESTIONNAIRE ITEMS

**STRUCTURED QUESTIONNAIRE ON THE TOPIC: EXAMINING
GENERAL SCIENCE TEACHERS' PERCEPTIONS, PRACTICES, AND
CHALLENGES IN IMPLEMENTING THE GENERAL SCIENCE
COMPONENT OF THE COMMON CORE CURRICULUM.**

INTRODUCTION

Do you give your informal consent to participate in the research project? **YES** { } **NO** { }

Section A: Demographic Information

(Please tick [✓] the appropriate option)

1. Gender:
 Male Female
2. Age:
 20–29 30–39 40–49 50 and above
3. Academic Qualification:
 Diploma Bachelor's Degree Master's Degree Other (specify):

4. Years of Teaching Experience:
 1–5 years 6–10 years 11–15 years 16 years and above

Section B: Teachers' Perceptions of the Common Core Curriculum

(Use the scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

Statement	1	2	3	4	5
1. I have a good understanding of the objectives of the Common Core curriculum.					
2. The Common Core curriculum content is more detailed than previous curricula.					
3. The Common Core encourages critical thinking and problem-solving among students.					
4. The Common Core promotes collaboration, creativity, and communication among students.					
5. I feel confident implementing the Common Core curriculum in my classroom.					
6. The curriculum aligns well with national educational goals.					
7. Students are responding positively to the Common Core curriculum in science lessons.					

Section C: Instructional Practices

Statement	1	2	3	4	5
8. I plan my science lessons with clear objectives that align with the CCP curriculum.					
9. I use varied instructional practices (e.g., inquiry-based, collaborative learning) in my teaching.					
10. I assess students continuously using tasks, portfolios, and practical activities.					
11. I adapt my teaching based on students' learning needs and responses.					
12. I use real-life examples and locally available materials to make lessons relevant.					
13. I create opportunities for students to work independently and in groups.					
14. I integrate ICT tools (e.g., videos, simulations) in delivering science lessons.					

Section D: Challenges in Implementing the Common Core Curriculum

Statement	1	2	3	4	5
14. The school lacks adequate teaching and learning resources for effective science instruction.					
15. Time allocation for Common Core science content is insufficient.					
16. I have large class sizes which limit active participation and practical work.					
17. I have not received sufficient training on how to implement the Common Core effectively.					
18. The curriculum content is too broad to complete within the academic year at each level.					
19. Students find it difficult to adjust to the competency-based learning model.					
20. I receive enough support from school leadership and curriculum officers.					

APPENDIX B

INTERVIEW GUIDE FOR GENERAL SCIENCE TEACHERS

Introduction:

Thank you for agreeing to participate in this study. The purpose of this interview is to gain deeper insights into your perceptions, instructional practices, and challenges in implementing the Common Core Programme (CCP) curriculum in science. Your responses will be treated confidentially and used solely for academic purposes.

Section A: Perceptions of the CCP Curriculum

1. How would you describe your understanding of the objectives of the CCP curriculum?
2. In your opinion, how different is the CCP curriculum from the previous curriculum in terms of content and focus?
3. Do you think the CCP promotes critical thinking, problem-solving, and creativity among students? Please explain.
4. How have your students responded to the CCP curriculum in your science classes?

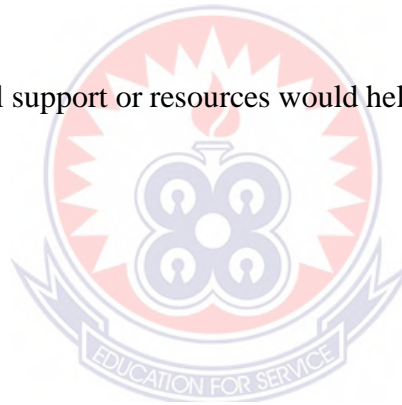
Section B: Instructional Practices

5. Can you describe how you plan your lessons to align with the CCP curriculum?
6. What teaching methods or instructional practices do you commonly use when teaching science under the CCP?
7. How do you assess your students' learning? Do you use continuous assessment techniques (e.g., portfolios, practicals, projects)?
8. Do you make use of ICT tools (e.g., videos, simulations) or locally available resources in your lessons? If yes, how effective are they?

9. How do you adapt your teaching strategies to meet the diverse learning needs of your students?

Section C: Challenges in Implementing CCP

10. What are the main challenges you face in implementing the CCP curriculum in science?
11. Do you think the time allocated for science lessons under CCP is adequate?
12. How does class size affect your ability to implement competency-based strategies?
13. Have you received adequate training and support for implementing the CCP curriculum?
14. What additional support or resources would help you implement the CCP more effectively?



APPENDIX C

CLASSROOM OBSERVATION CHECKLIST

Purpose:

This checklist will be used by the researcher to record observable teaching practices and classroom conditions that relate to the implementation of the CCP curriculum in science.

1. Lesson Planning and Delivery

- Clear lesson objectives stated and aligned with CCP curriculum.
- Lesson incorporates a variety of teaching strategies (e.g., inquiry-based, collaborative learning).
- Effective time management during lesson delivery.

2. Teaching and Learning Resources

- Adequate science teaching materials available.
- Use of locally available or improvised resources.
- Integration of ICT tools (e.g., videos, simulations).

3. Classroom Engagement

- Students encouraged to think critically and solve problems.
- Evidence of student collaboration (group work, peer discussions).
- Opportunities for creativity and independent learning provided.

4. Assessment Practices

- Use of continuous assessment (projects, practicals, portfolios).

- Provision of feedback to students during/after lesson.

5. Implementation Challenges

- Large class size limiting participation.
- Lack of adequate resources for teaching science.
- Time constraints in covering CCP science content.
- Observable teacher difficulties in applying CCP strategies.



APPENDIX D**RELIABILITY TEST**

Table 3.1 presents the reliability coefficients for each scale of the instrument.

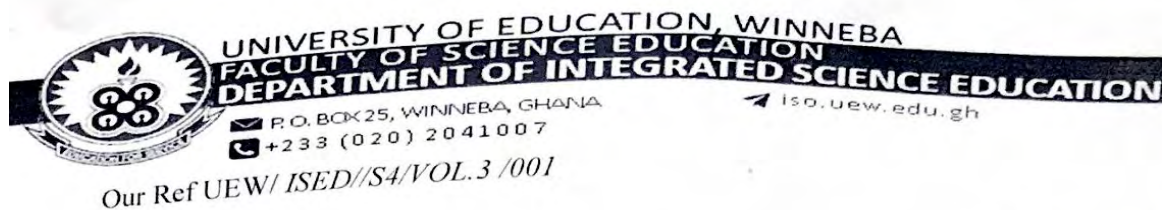
Reliability Coefficients for Questionnaire Scales (N = 104)

Scale	Number of Items	Cronbach's Alpha	Interpretation
Teachers' Perceptions of the CCP Curriculum	7	0.81	Highly reliable
Instructional Practices Under the CCP	7	0.78	Acceptable reliability
Challenges in Implementing the CCP	6	0.83	Highly reliable



APPENDIX E

INTRODUCTORY LETTER



21st January, 2026

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

LETTER OF INTRODUCTION:

I write to introduce to you, the bearer of this letter, **Mr. Prosper Seddy Awudi** with index number 8241180017. He is a postgraduate student in the University of Education, Winneba who is reading Master of Philosophy programme in Integrated Science Education.

As part of the requirements of the programme he is undertaking a research on a topic: **Science teacher's perceptions, instructional practices and challenges in implementing the common core programme in selected districts of the Volta Region, Ghana.**

He needs to gather information to analyse the said research topic that he has chosen.

I would be grateful if he would be given the needed assistance to carry out this exercise.

Thank you.

Yours faithfully,

Dr. (Mrs) Nelly Adjoa Sakyi-Hagan
Head of Department