

UNIVERSITY OF EDUCATION, WINNEBA

**TEACHERS' ADAPTATIONS OF THE NATIONAL CURRICULUM
FOR LEARNERS WITH VISUAL IMPAIRMENTS AT GHANA NATIONAL
INCLUSIVE BASIC SCHOOL, CAPE COAST**

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DOCTOR OF PHILOSOPHY

UNIVERSITY OF EDUCATION, WINNEBA

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**A thesis in the Department of Special Education,
Faculty of Applied Behavioural Sciences in Education,
submitted to the school of Graduate Studies, in partial fulfillment
of the requirements for award of the degree of
Doctor of Philosophy
(Special Education)
in the University of Education, Winneba**

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DECLARATION

Student's Declaration

"I, Cynthia Abekah Okwan hereby declare that this submission is my own work towards the award of Ph.D. Special Education and that, to the best of my knowledge, it contains no previously published materials by another person, nor material which has been accepted for the award of any other degree of the University, except where due acknowledgment has been made in the text. "

.....

Signature

.....

Date

Supervisors' Declaration

We declare that this thesis has been developed under my supervision and we certify that it fulfills the requirements for submission in the pursuit of a Ph.D. in Special Education.

PROF. YAW NYADU OFFEI

.....

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DR. AWINI ADAM

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Date

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DR. DANIEL FOBI

.....

Date

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Signature

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Date

DEDICATION

I dedicate this piece of work to my husband Dr. Edward Osei-Appiah and my children for their unwavering support, encouragement and prayers throughout my academic journey

ACKNOWLEDGMENT

Many individuals assisted and guided me through this work, foremost among them, Prof. Yaw Nyadu Offei, Dr. Adam Awini and Dr. Daniel Fobi who supervised the entire project. I sincerely appreciate their prompt responses, guidance and criticisms, which added value to the work. To them I owed a great deal of gratitude and I pray that God Almighty will replenish their efforts.

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ABBREVIATIONS

ST – Subject Teachers

RT – Resource teachers

JHS – Junior High School

UNESCO- United Nations Education, Scientific and Cultural Organization

UNICEF- United Nations Children’s Fund

WHO- World Health Organization

RPK – Relevant Prior Knowledge

NACCA - National Council for Curriculum and Assessment

UDL – Universal Design for Learning

BDT - Basic Design and Technology

BECE – Basic Education Certificate Examination

ABSTRACT

Learners with visual impairment in inclusive classrooms tend to struggle in subjects like Mathematics and Science due to the high visual components. Teachers' adaptation of elements such as diagrams and mathematical equations for learners with visual impairment is critical and requires careful consideration. The extent to which teachers in Ghana National Inclusive Basic Schools modify the national curriculum for learners with visual impairment remains unclear, which calls for further investigation. The research focused on adaptations in curriculum content, instructional methods, assessment procedures, and instructional materials, using Universal Design for Learning as the theoretical framework. This study utilized an interpretivist perspective and a qualitative approach, which included interviews with five learners with visual impairment, five teachers teaching Mathematics, Science, and Basic Design and Technology, three resource teachers for learners with visual impairment, and direct classroom observations. The data were systematically analyzed to identify patterns.

To accommodate learners with visual impairment in lessons, teachers collaborated with resource teachers, drew on learners' prior knowledge, provided verbal explanations, conducted remedial sessions, offered exemptions, paired sighted learners with learners with visual impairment, facilitated peer tutoring, granted extended time, and read aloud. Assessment adaptations primarily involved procedural accommodations, such as extended time, oral clarification of questions, and transcription of braille responses. Instructional materials were frequently improvised, using real objects, tactile resources, braille sheets, and writing frames. Despite teachers' commitment, barriers such as insufficiently trained subject teachers for learners with visual impairment, inadequate numbers of resource teachers, large class sizes, limited instructional materials, and time constraints hindered effective curriculum adaptation.

CHAPTER ONE

INTRODUCTION

1.0 Background to the Study

Visual impairment significantly affects various aspects of life, including learning, mobility, social engagement, and overall adjustment. This condition encompasses a spectrum from complete blindness to different levels of partial sight (Mason & McCall, 2013; Marques et al., 2022). In the context of this study, learners with visual impairment are defined as those who encounter difficulties in utilizing their visual abilities and require supplementary academic assistance (Wilson, 2016; Gariba & Awini, 2023). These individuals predominantly depend on tactile and auditory stimuli, encountering obstacles with educational resources that include complex visual components such as diagrams and charts, which can hinder their comprehension, particularly in disciplines like Mathematics and Science (Alotaibi et al., 2020; Chandrasekaran et al., 2020; Elangovan & Rani, 2023; Rashid & Chehadeh, 2023). Consequently, these learners frequently perform below average in these subjects.

To effectively engage learners with visual impairment in these visually demanding fields such as Mathematics and Science, teachers must modify the visual elements of the curriculum to cater to their unique requirements, as teachers serve as the link between the curriculum and the learners (McGrath, 2002). Adewumi et al. (2017) described adaptations as a process of modifying and enhancing both the content delivered and the instructional methods employed to ensure that all learners are included in the classroom environment.

This may entail offering materials in alternative formats, including braille, large print, or audio recordings (Hewett et al., 2019; Phutane et al., 2022).

Mwakyeya (2013), highlights the crucial role teachers' adaptations in connecting the curriculum to learners with visual impairment. The author emphasizes that modifying the curriculum is not only necessary for engaging these learners in inclusive educational settings but also serves to acknowledge their unique needs.

The objective of exploring teachers' adaptations of the visual components of the curriculum for learners with visual impairment in inclusive classrooms is to enhance their participation in subjects that involve visual elements, such as Mathematics and Science. This is crucial as it enables these learners to actively engage and excel in these subjects. By identifying and implementing effective teaching strategies, we can establish a more inclusive and accommodating learning environment for all learners.

Preliminary discussions with teachers at Ghana National Inclusive Basic School revealed that they do modify the curriculum to address the needs of the learners with visual impairment. However, these learners frequently lag behind their classmates in subjects such as Mathematics and Science, which are heavily dependent on the visual medium. The performance of the learners with visual impairment in Mathematics and Science was evidenced by the BECE results from the years 2017, 2019, and 2020 (Official School Records, June 15, 2023). This disparity raises critical concerns, especially considering the significance of Mathematics and Science as fundamental elements of the core curriculum (Kahn & Hartman 2018; Bell, et al., 2016).

Miyauchi (2020) and Morelle (2019) indicate that learners with visual impairment frequently encounter limited engagement in Mathematics and Science within inclusive classroom environments. The authors attributed this situation to insufficient adaptations. Studies have also highlighted the absence of adequate instructional materials and the lack of appropriate curriculum modifications as critical obstacles hindering the academic success of learners with visual impairment (Negash & Gasa, 2022). Moreover, it has been observed that the instructional techniques and assessment practices in use are often ineffective for these learners. Teachers' adjustments are typically incidental, inconsistent, and based on personal preferences rather than being part of a systematic approach designed to address the specific needs of each learner (Mwakyēja, 2013).

This predicament is also primarily linked to the limited skills and understanding that teachers possess regarding teaching learners with special educational needs. For example, research by Attia et al. (2023) indicated that teachers in inclusive secondary schools in Northern Ghana, particularly at Sirugu and Wa Senior High Schools, faced challenges in implementing diverse assessment strategies due to insufficient skills, and lack of resources. The extent to which different subjects on the curriculum have been tailored to address the needs of the learners with visual impairment in Ghana's National Inclusive Basic Schools remains largely unexplored. This suggests a significant gap in the literature concerning teachers' adaptations aimed at facilitating the engagement of learners with visual impairment, particularly in subjects like Mathematics, Science and Basic Design and Technology, which heavily rely on visual instruction. Given that visually intensive subjects often require alternative modes of representation, engagement, and expression, failure to

adapt them systematically may restrict equitable access to learning (Rose & Meyer, 2002; CAST, 2018). The absence of empirical evidence on how curriculum adaptations are implemented has serious implications for inclusive education policy, practice, and learner outcomes, as effective inclusion requires deliberate adaptation of curriculum content, pedagogy, and assessment to ensure meaningful access and participation (Florian & Black-Hawkins, 2011; UNESCO, 2017). Without this knowledge, gaps in teacher preparation and professional development remain unidentified, resulting in continued reliance on improvised and inconsistent adaptation practices. This may lead to persistent underperformance among learners with visual impairment, particularly in visually intensive subjects where access depends heavily on teacher mediation and adapted materials.

Furthermore, the lack of documented practices limits the ability of school leadership and the Ghana Education Service to design targeted interventions, allocate resources appropriately, and strengthen institutional support systems. Evidence-based planning depends on a clear understanding of classroom realities; without such evidence, policy implementation risks remaining symbolic rather than transformative (Ainscow, 2005).

At a theoretical level, not understanding what is happening in classrooms weakens efforts to apply frameworks such as Universal Design for Learning in context-specific ways, as theoretical models require contextual validation to inform practice effectively (Rose, Meyer, & Hitchcock, 2005). At a practical level, it risks perpetuating inequitable

learning conditions, where learners with visual impairment are physically included but pedagogically marginalized.

Therefore, investigating how adaptations are currently implemented at Ghana National Inclusive Basic Schools is not only necessary to fill a scholarly gap but also essential for informing evidence-based improvements in inclusive education policy and practice, strengthening teacher capacity, and promoting equitable learning opportunities for learners with visual impairment.

Interactions with teachers at the Ghana National Inclusive Basic School also indicated that they employ a variety of methods and strategies to make adaptations, leading to personalized teaching and assessment practices. These methods are often influenced by their cognitive frameworks, which have not been adequately investigated. Therefore, it is essential to conduct this study to clarify and document the various methods and adaptation strategies employed by teachers in subjects like Mathematics and Science, especially those that incorporate visual aids such as diagrams, charts, and maps that require visual understanding.

Prioritizing adaptations of the visual elements for learners with visual impairment is of utmost importance. This is because approximately 80% of information is generally processed visually, and other sensory modalities cannot adequately substitute for the absence of sight in tasks that involve spatial learning (Atkinson & Nashleanas, 2018; Orpwood, 1998). For example, the research conducted by Sahin and Yorek (2009) indicated that learners with visual impairment frequently encounter difficulties in science due to its abstract nature and dependence on visual aids, which pose significant challenges

in mainstream educational settings. Their findings underscored the necessity for instructional adjustments, as these learners derive greater benefit from tactile and auditory learning experiences. The authors emphasized the critical need to modify classroom environments to enhance teaching efficacy for these learners. Furthermore, the study revealed a deficiency in the existing literature concerning adaptations of instructional materials and strategies aimed at facilitating access to visually oriented subjects.

Adaptations must also extend to the content, instructional methods, assessment procedures, and instructional materials to ensure that learners with visual impairment can fully engage in the classroom (Morelle et al., 2022; Van et al., 2019). This involves modifying the content, instructional strategies, and using different means to assess what they have learnt. The goal is not to reduce content, but to make the content accessible to them. The contents encompass facts, concepts, and skills embedded in the curriculum. By making adjustments, the learners with visual impairment can excel in science and math concepts just like sighted learners because studies have shown that these learners have the intellectual ability to succeed in the standard curriculum alongside their sighted peers (Argyropoulos, et al., 2017; Gebrehiwot, 2015; Morelle, 2016). In light of this context, it is anticipated that learners with visual impairment will engage with the general curriculum within inclusive classroom settings and attain a level of proficiency (Asamoah et al., 2018; Mwakyēja, 2013; Negash & Gasa, 2022; Odame et al., 2021; Worlanyo, 2012).

Disciplines such as science and mathematics are predominantly visual (Koehler & Wild, 2019; Wild & Koehler, 2017), which renders elements like charts and diagrams

particularly difficult to adapt. Special consideration must be given to the braille process to promote effective understanding (Bowen & Ferrel, 2003).

Instructional resources play a critical role in engaging learners within the classroom, particularly in visually-oriented subjects like science and mathematics. Nevertheless, learners with visual impairment often encounter difficulties in comprehending abstract concepts due to restricted access to visual information (Rule et al., 2011). Their educational experiences frequently emphasize theoretical knowledge over practical applications (Kizilaslan, et al., 2021), and they often miss out on hands-on laboratory experiences due to the complexities associated with experimental materials (Acheampong, 2017). When instructional resources are effectively adapted, these learners can achieve enhanced learning outcomes. This research explored the strategies employed by teachers at Ghana National Inclusive Basic School to adapt instructional resources, thereby enhancing the comprehension of visual concepts for learners with visual impairment.

Msuya (2005) emphasized the essential elements required to integrate learners with visual impairment into an inclusive educational setting. This integration involves the provision of appropriate teaching resources, equipment, and conducive environmental conditions. The author recommended particular materials, including braille resources, audio-visual aids, instructional tools, and mobility devices tailored to address the needs of the learners with visual impairment.

Cryer (2013) highlighted that science education for visually impaired learners predominantly depends on auditory methods; however, these learners frequently encounter difficulties in retaining information, particularly during hands-on demonstrations. The author stressed the necessity for teachers to modify instructional materials to cater for specific requirements of these learners, as traditional textbooks frequently fall short. Although several studies have investigated the necessity for adaptations and the strategies to implement them (Bosompem, 2014; Debarger et al., 2017; Gelmez-Burakgazi, 2020), there remains some gaps in research examining the actual practices of teachers in adapting materials.

Doh (2015) conducted a study on curriculum adaptation in Ghana National Inclusive Basic School, focusing on the strategies teachers reported using and their perceptions of the importance of such adaptations. Using a descriptive survey design, the study provided useful baseline information about teachers' self-reported practices. However, the study relied primarily on questionnaire data, which limited the depth of analysis regarding how adaptations were actually implemented in classroom settings. Because survey research depends largely on participants' self-reports, responses may be influenced by social desirability bias or subjective interpretation, potentially affecting the credibility and depth of the findings.

Moreover, Doh's (2015) study did not provide detailed classroom-based evidence demonstrating how curriculum adaptations were enacted across specific subjects, particularly visually intensive ones such as Mathematics and Science. The absence of qualitative data such as classroom observations, learner perspectives, or document analysis

meant that the practical realities, contextual constraints, and subject-specific challenges of adaptation were not comprehensively explored. In this sense, the limitation of the study lies not in its methodological scope, which restricted deeper insight into the lived experiences of teachers and learners.

The current study builds on Doh's (2015) work by adopting a qualitative content analysis approach that incorporates interviews, classroom observations, and learner feedback to provide a more comprehensive and contextually grounded understanding of how curriculum content, instructional methods, assessment procedures, and instructional materials are adapted for learners with visual impairment. By moving beyond self-reported strategies to examine actual classroom practices and challenges, this study addresses the methodological and contextual gaps identified in earlier research. By examining these aspects of curriculum adaptation, the study sought to illuminate the strategies that teachers utilize to enhance the accessibility of the curriculum for learners with visual impairment.

This study was conducted at the Ghana National Basic School in Cape Coast, located in the Central region, due to its dedication to inclusivity, especially in enrolling learners with visual impairment. These learners follow the same curriculum as their sighted peers and receive instruction from the same teachers in a shared classroom setting. In 2015, the school was selected as a pilot institution to assess the effectiveness of inclusive education in Ghana and has since been actively implementing inclusive educational practices. However, research by Agyei (2020) and Doh (2015) indicates that learners with visual impairment at this school often struggle in subjects like Mathematics and Science.

1.1 Statement of the Problem

As a parent of a child with visual impairment enrolled in an inclusive classroom, I have noticed a decline in my child's enthusiasm for subjects such as Mathematics and Science since she got to Basic School five. She complained of being neglected during lessons in these subjects, particularly in topics that involved diagrams, pictures and mathematical formulas, which make it impossible for to understand the instruction and participate in learning activities. Indeed, my ward's grade in the subjects deteriorated from grades 2 (Very Good, 85%) in Mathematics and 3 (Good, 75%) in Science in Basic School Four to 5 (Credit, 57%) in Mathematics and 6 (Pass, 52%) in Science in Basic School Five, and further declined to 7 (Pass, 47%) in Mathematics and 8 (Low Pass, 42%) in Science in Basic School Six, reflecting a consistent downward trend in performance. It is expected that learners in Basic Education attain satisfactory grades to qualify for admission into senior high schools (Agyei, 2020).

The issue of underperformance in mathematics was reported in a research conducted by Agyei (2020), which focused on the academic performance of learners with visual impairment in mathematics within inclusive schools in Ghana, specifically Ghana National and St. Joseph Basic Schools. The findings of Agyei (2020) revealed that there are several factors that contribute to underperformance of students with visual impairment, including the pedagogical content.

Agyei (2020) further compared the performance of learners with visual impairment to that of their sighted counterparts using class exercises, terminal examination results, and cumulative assessment records obtained from school reports. The study indicated that, on

average, learners with visual impairment consistently scored lower in Mathematics than their peers without visual impairment. For instance, analysis of terminal report data showed that while sighted learners obtained mean scores above the class average in most mathematics assessments, learners with visual impairment frequently performed below the class mean, particularly in topics involving geometry, graphs, and word problems requiring spatial interpretation. Class exercise records also revealed that learners with visual impairment completed fewer visual-based tasks and often required additional support during problem-solving activities.

These findings demonstrate not only the performance gap between learners with visual impairment and their sighted peers but also provide empirical evidence drawn from documented assessment data rather than perception alone. However, although Agyei (2020) established disparities in achievement and identified contributory factors such as pedagogical content, the study did not provide an in-depth qualitative examination of how specific curriculum adaptations were implemented within mathematics classrooms. This creates the need for further investigation into how curriculum content, instructional methods, assessment procedures, and instructional materials are adapted in practice to support learners with visual impairment in inclusive settings.

The research by Agyei (2020) centered exclusively on performance of students with visual impairment at Ghana National and St. Joseph Basics in mathematic School investigating the mathematical performance of learners with visual impairment at Ghana National and St. Joseph Basic Schools. It aims to identify the factors that affect their performance in mathematics and to propose strategies for enhancing their academic

outcomes in this subject area. Notably, the study did not address the existing instructional methods employed, despite recognizing that such methods and pedagogical content are significant factors influencing learners' performance in mathematics. Furthermore, it did not focus on how teachers modify the visual elements of the curriculum, their instructional techniques, assessment methods, and the teaching materials utilized, all of which are crucial for a subject like mathematics which includes diagrams, charts, graphs, pictures and complex mathematical equations to ensure accessibility for learners with visual impairment. Additionally, the study encompassed other subjects, such as science and basic design and technology, which also rely on visual comprehension through diagrams and designs.

A comprehensive analysis of the school's official records obtained from the Headmistress's Office, Ghana National Inclusive Basic School, revealed the academic performance of learners with visual impairment in the Basic Education Certificate Examination (BECE). The examination results from the years 2017, 2019, and 2020 revealed that these learners consistently scored below the average benchmark. In 2017, four learners who participated in the examinations achieved aggregate scores of eight in Mathematics and nine in Science, with three learners earning an aggregate of nine in Basic Design and Technology, while one learner secured an aggregate of seven in BDT (Ghana National Inclusive Basic School, 2023).

The 2019 BECE results indicated that six learners with visual impairment attained an aggregate score of nine in both Mathematics and Science, with three learners achieving an aggregate of eight in BDT, while the other three scored nine (Ghana National Inclusive

Basic School, 2023). In 2020, eight learners with visual impairment who took the BECE recorded aggregate scores of nine in Mathematics, eight in Science, and nine in BDT, further illustrating their below-average performance in these subjects (Ghana National Inclusive Basic School, 2023). Access to these records was formally granted by the Headmistress of Ghana National Inclusive Basic School for research purposes, with strict adherence to ethical guidelines, including confidentiality and anonymization of student identities.

As Addadzi-Koom (2013) explained, an aggregate of seven indicates a low performance, an aggregate of eight indicates a lower performance, and an aggregate of nine represents a fail under the BECE grading system. Based on this grading standard, the recorded aggregates suggest that learners with visual impairment performed below the expected benchmark in Mathematics, Science, and Basic Design and Technology. These outcomes do not support the assertion by Leonhardt and Teferra (2023) that learners with visual impairment are not enrolled in Mathematics and Science courses in Ghana, as the school records confirm their participation in these subjects and in the BECE examinations. However, the persistent low performance may be associated with the highly visual nature of these subjects, which rely heavily on diagrams, symbols, spatial representations, and graphical illustrations that require deliberate instructional adaptations to ensure meaningful access for learners with visual impairment.

Similarly, in the Hohoe municipality, learners with visual impairment enrolled in the integrated education programme have been found to perform poorly in mathematics (Dorleku, et al., 2019). To address this issue, the study recommended the use of appropriate

teaching methodologies. Similarly, other studies by Riwa, Namunga, & Juma (2021) and Kelly Bohning (2000) have shown that effective instructional methods can significantly improve academic performance.

An examination of instructional accommodations for learners with visual impairment in Ghanaian schools revealed the limitations teachers experience when responding to the needs of these learners in mainstream classrooms. Teachers tend to apply the same teaching and assessment standards to all learners, regardless of their diverse needs (Agamboka & Dogbe, 2020; Agbenyefia, 2017; Saforo, 2018; Okyere, et al., 2002). This indicates that some learners may not benefit from the teaching methods and materials used in regular classrooms (Agbenyega & Deku, 2011; Avoke & Avoke, 2004).

The existing literature highlights the importance of teachers' curriculum adjustments in creating connections between course material and learners, which helps to reduce learning barriers. In particular, adaptations in content, teaching methods, assessment techniques, and educational resources have been identified as vital factors influencing the academic success of learners with visual impairment (Agyei, 2020; Dorleku, Kwashie, & Rockson, 2019; Fofie, 2022; Odame et al., 2021). However, scholarly works have not paid attention to how teachers modify visual components to enhance accessibility for learners with visual impairment in subjects that predominantly depend on visual input, such as Mathematics, Science, and Basic Design and Technology in Ghana National Inclusive Basic School. Consequently, there is an urgent need for a study that examines these adaptations. The absence of empirical evidence in this area makes it difficult to determine whether instructional practices in these visually intensive subjects genuinely promote

meaningful access, participation, and achievement for learners with visual impairment or whether inclusion is limited to physical placement without adequate curriculum modification. Without such investigation, teacher preparation programs remain insufficiently informed, policy implementation lacks subject-specific direction, and resource allocation may not reflect the actual instructional challenges faced in inclusive classrooms.

As both a researcher and a parent of a child with visual impairment, my attention is particularly drawn to exploring how teachers in Ghana National Inclusive Basic School tailor the curriculum for subjects such as Mathematics, Science, and Basic Design and Technology, which require visual understanding. This dual perspective strengthens the relevance of the study, as it is grounded not only in scholarly inquiry but also in lived experience that highlights the practical consequences of inadequate adaptations. Therefore, examining how visual components are modified in classroom practice is essential for generating context-specific evidence that can inform policy decisions, improve instructional strategies, strengthen teacher professional development, and ultimately ensure equitable academic outcomes for learners with visual impairment.

This research sought to explore how teachers adjust visual content in subjects such as science and mathematics, modify instructional, assessment methods, and adapt instructional materials to meet the needs of learners with visual impairment in Ghana National Inclusive Classrooms, Cape Coast.

1.2 Purpose of the Study

The purpose of the study was to examine how teachers adapt the visual components of the curriculum to facilitate participation of learners with visual impairment in Ghana National Inclusive classroom.

1.3 Objectives of the Study

The study was guided by the following objectives:

1. Explore how teachers adapt the content of the national curriculum to meet the needs of the learners with visual impairment in Ghana National Basic School.
2. Examine how teacher modify instructional method in teaching the visual component of the curriculum to learners with visual impairment in Ghana National Basic School.
3. Describe how teachers modify assessment procedures for learners with visual impairment in Ghana National Basic School.
4. Discuss teachers' adaptations made to instructional materials for learners with visual impairment in Ghana National Basic School.
5. Determine the challenges teachers face in adapting curriculum content, instructional methods, assessment procedures, and instructional materials to meet the needs of learners with visual impairment in Ghana National Basic School.

1.4. Research Questions

The study was guided by the following research questions:

1. How do teachers adapt the content of the national curriculum to meet the needs of learners with visual impairment in Ghana National Basic School?
2. How do teachers modify instructional methods while teaching the visual components of the curriculum to learners with visual impairment in Ghana National Basic School?
3. How do teachers modify assessment procedures to accommodate learners with visual impairment in Ghana National Basic School?
4. What adaptations are made in the instructional materials to include learners with visual impairment in lessons at Ghana National Basic School?
5. What challenges do teachers face in adapting curriculum content, instructional methods, assessment procedures, and instructional materials to meet the needs of learners with visual impairment in Ghana National Basic School?

1.5 Significance of the Study

The study primarily focuses on how teachers modify the visual aspects of the curriculum, teaching methods, assessment procedures, and instructional materials to meet the needs of learners with visual impairment, ensuring their active involvement in the educational setting. The findings of this study are expected to reveal the pedagogical practices, accommodations, and modifications currently being employed to support learners with visual impairment in Ghana National Inclusive Basic School. Specifically,

the study will identify areas in the curriculum adaptation process that require improvement to ensure full participation of these learners in inclusive classrooms.

The study would directly benefit learners with visual impairment, as it highlights strategies that make lessons more accessible, engaging, and meaningful, particularly in subjects like Mathematics, Science, and Basic Design and Technology, which heavily rely on visual instruction. Subject teachers stand to gain practical insights from the study, learning how to effectively adapt teaching methods and materials while avoiding common challenges encountered in inclusive classrooms. Resource teachers would also benefit by gaining evidence-based guidance on collaboration, instructional support, and resource utilization for learners with visual impairment. Additionally, school administrators, including head teachers and coordinators, could use the findings to make informed decisions about resource allocation, professional development, and classroom support systems.

Beyond the school, policymakers and implementers within the Ministry of Education could leverage the study to examine gaps between inclusive education policy and classroom practice, identifying areas where policy adjustments or additional support are necessary to improve implementation outcomes. Finally, scholars and researchers in the field of inclusive education would benefit from the study's contribution to the literature, particularly regarding the adaptation of visual content in Ghanaian classrooms, providing a foundation for future research, policy recommendations, and teacher training programs

1.6 Delimitation

The study exclusively concentrated on the Ghana National Inclusive Basic School, despite the presence of other inclusive basic schools in Ghana. This particular school was chosen due to its role as a pioneer in inclusive education, having admitted learners with visual impairment for more than a decade and consistently participating in the BECE examinations. The study primarily focuses on how teachers modify the visual aspects of the curriculum, teaching methods, assessment processes, and teaching materials to meet the needs of learners with visual impairment, ensuring their active involvement in the inclusive classroom.

The participants for this study are limited to teachers who teach subjects that are visually demanding in inclusive classrooms, resource teachers who specifically support learners with visual impairment, and learners with visual impairment themselves. This focus ensures that the perspectives gathered are directly relevant to understanding how curriculum content, instructional methods, assessment procedures, and instructional materials are adapted to meet the specific learning needs of learners with visual impairment. By concentrating on these participant groups, the study captures both the instructional strategies employed by teachers and the experiences of learners, providing a comprehensive view of effective adaptations and the challenges encountered in inclusive classroom settings. The study excluded learners with visual impairment who also had additional disabilities, focusing solely on learners with visual impairment whose end goal is to write the BECE.

1.7 Limitations

Despite the usefulness of this study, it has some limitations to be acknowledged. Geographically, the study is limited to Ghana National Inclusive Basic School. However, the findings suggest potential strategies that, if implemented, may enhance the academic performance of learners with visual impairment in areas of the curriculum that are predominantly visual.

The study interviewed only the teachers whose classes comprise both learners with visual impairment and sighted learners in the same classroom, as well as teachers who handle classes made up of only learners with visual impairment within the school. This implies that teachers who do not teach visually demanding subjects or who have not had direct instructional responsibility for learners with visual impairment were not included in the study. The intention was to obtain in-depth, experience-based insights from professionals directly engaged in adapting visual curriculum content, instructional methods, assessment procedures, and instructional materials, as well as the difficulties they encounter in implementing these adaptations. While this focus strengthens the relevance and depth of the data collected, it may limit the transferability of the findings to other schools or inclusive contexts.

Moreover, the small sample size limits the reliability and the generalization ability of the study. However, it could still hold significance in comparable contexts. Additionally, the teachers' adaptations are conceptualized on the adaptations of the content of the curriculum, the instructional method, assessment procedures, and instructional materials for teaching the visual components of the curriculum. Due to the limited availability of

local research materials about teachers' adaptations of the curriculum to include learners with visual impairment in mainstream schools in Ghana, the extensive use of international literature is also seen as a limitation.

1.8 Operational Definition of Terms

To clarify the essential phenomenon of this study, the following terms were used:

1.8.1 Adaptations

Mwakyeja (2013) defined adaptations as the modifications and changes of the teaching practices and learning environments to suit the individual needs of all learners in inclusive classrooms. Adaptations are modifications and adjustments made to the curriculum to make it more accessible. The adaptations consist of both accommodations and modifications. Accommodation denotes a convenient arrangement for imparting the knowledge among learners whereas modification represents a change or alteration in the way of imparting the knowledge usually to support and ease the accessibility of information to all (Edwards et al., 2022). For this study, adaptations are the adjustments made to the curriculum to meet their educational needs to include the learners with visual impairment.

1.8.2 Curriculum

Aboagye, (2020). explained that the curriculum is a planned interaction of pupils with instructional content, materials, resources, and processes for assessing the achievement of educational goals. For this study curriculum is what is learnt and what is taught, how it is delivered, how is assessed and the resources used.

1.8.3 Inclusive Classroom

An Inclusive classroom is a classroom that welcomes all learners, irrespective of their weaknesses and strengths and are supports to learn, contribute and participate fully in the classroom (Gyasi, et al, 2020.). Inclusive education ensures all learners, regardless of challenges, are placed in age-appropriate general education classes in their neighborhood schools, receiving high-quality instruction, interventions, and supports to achieve success in the core curriculum. Ainscow (2020) and Graham (2020) described inclusive education as a model of education that ensures all learners can access their community school, highlighting the importance of social integration. In inclusive education, all teachers are responsible for the education of all learners and the curriculum is adapted to cope with this diversity (Lomofsky & Lazarus, 2001). For this study inclusive classroom refers to a classroom system where all learners with visual impairment receive their education together with their non-disabled peers.

1.8.4 Learners with visual impairment

For the purpose of this study learners with visual impairment are learners whose vision prevents them from participating fully in class to the extent that they require educational support.

1.8.5 Visual components

Visual components refer to elements of the curriculum that rely primarily on sight for interpretation and understanding. These include diagrams, graphs, charts, tables,

figures, symbols, maps, illustrations, drawings, and mathematical notations that are used to represent concepts, relationships, and processes in a visual format.

1.9 Organization of the Thesis

Generally, the paper is mainly organized into six chapters. The first chapter deals with the background to the study, statement of the problem, purpose of the study, objectives of the study, significance of the study, delimitations and limitations of the study and definition of terms. The second chapter deals with literature review of the research related to teachers' adaptation of the of curriculum to include learners with visual impairment. Then the third chapter discusses research methodologies, design, and subjects of the study, data collection procedures and methods of data analysis. Additionally, the fourth chapter deals with data analysis and interpretation. Chapter five deals with discussions and the chapter six deals with summary, conclusion and recommendation of the study.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents a comprehensive review of relevant literature concerning the adaptations made by teachers in inclusive classrooms to support learners with visual impairment, drawing from research articles, academic journals, and books. The literature review highlights the theoretical framework underpinning the study, learners with visual impairment and their educational related issues as well as the main themes raised in the research questions. This section covered the following themes:

- Theoretical Framework
- Learners with visual Impairment
- Teachers' adaptations of the visual component of the curriculum.
- Teachers' adaptations of the instructional methods
- Teachers' adaptations of the assessment procedures
- Teachers' adaptations of the instructional materials

2.1 Theoretical Framework

The theoretical framework underpinning this study is Universal Design for Learning (UDL), developed by David Rose and Anne Meyer at the Center for Applied Special Technology (CAST). UDL provides a comprehensive and systematic approach to curriculum design that seeks to make instruction accessible to all learners from the outset,

rather than retrofitting accommodations after barriers have been identified (CAST, 2018; Rao, 2015). It offers structured alternatives for adapting curriculum goals, instructional processes, learning materials, and assessment practices to ensure accessibility, flexibility, and relevance across diverse learning contexts (Chita-Tegmark et al., 2012; Johnson-Harris & Mundschenk, 2014; Mackey et al., 2023; Praveen et al., 2024).

In this study, UDL is not treated merely as a general philosophy of inclusion but as an analytical lens for examining how curriculum and instructional practices either create or remove barriers for learners with visual impairment (LwVI). The framework enables a systematic interrogation of how the curriculum content, instructional delivery, classroom participation, and assessment practices are structured, and whether such structures anticipate learner variability or inadvertently marginalize certain learners (Hartmann, 2015; Rao, 2015).

Beyond serving as an instructional model, UDL aligns with global inclusive education agendas, particularly those advanced by the United Nations through the Sustainable Development Goals (SDGs), which emphasize equitable and quality education for all (McKenzie et al., 2021). By foregrounding accessibility and participation, UDL operationalizes the principle that no learner should be excluded from meaningful educational opportunities (CAST, 2018). Importantly, UDL does not introduce entirely new pedagogical concepts; rather, it consolidates and systematizes inclusive practices within a coherent and research-informed framework (Best, 2016). Its significance lies in shifting the discourse from individual learner deficits toward systemic curriculum reform. In doing so, it supports a transition from the medical model of disability, where impairment

is viewed as the primary problem to a rights-based and diversity-oriented perspective in which environmental and instructional barriers are recognized as central determinants of exclusion (Pace, Pavone & Petrini, 2018; Zhao, 2024).

Inclusive education and UDL are therefore conceptually interconnected. While inclusive education provides the philosophical and policy foundation for educating all learners together, UDL functions as a methodological and pedagogical tool for translating these principles into classroom practice (Rao, 2015; McKenzie et al., 2021). In other words, UDL operationalizes inclusion by embedding flexibility directly into curriculum design.

UDL conceptualizes teaching and learning as a dynamic and interactive system that must be intentionally structured to address learner variability (Best, 2016). Rather than viewing variability as exceptional, UDL positions it as an expected and natural characteristic of any classroom (Pace, Pavone & Petrini, 2018). This analytical repositioning is central to the present study, as it frames curriculum inflexibility not visual impairment as the primary source of exclusion. Thus, when learners with visual impairment experience difficulty in visually intensive subjects, the issue is interpreted not as an inherent limitation but as an indication that curriculum design has not sufficiently anticipated diverse perceptual needs (Chita-Tegmark et al., 2012; Rao, 2015).

While UDL is frequently summarized in terms of its three principles, this study moves beyond descriptive accounts to examine their pedagogical implications within inclusive classrooms. UDL is not a one-size-fits-all model; rather, it anticipates diversity by embedding flexibility within curriculum goals, instructional strategies, learning materials, and assessment methods (Hartmann, 2015; Mayer et al., 2014). By designing

curriculum proactively, teachers reduce reliance on individualized, reactive modifications that may unintentionally stigmatize learners with disabilities (CAST, 2018; Johnson-Harris & Mundschenk, 2014). Instead, supports are normalized as part of routine instructional practice.

The framework is grounded in three interrelated core principles as articulated by CAST (2018):

Multiple Means of Representation. This principle addresses the “what” of learning by emphasizing the provision of diverse ways of presenting information to accommodate differences in perception and comprehension (CAST, 2018). Research indicates that flexible representation enhances access to curriculum content for learners with sensory impairments (Chita-Tegmark et al., 2012; Rao, 2015). In the context of this study, the principle is particularly relevant to the adaptation of visual content such as diagrams, graphs, mathematical symbols, and illustrations. For learners with visual impairment, representation may involve tactile graphics, braille materials, audio descriptions, concrete materials, and explicit verbal explanations.

Multiple Means of Engagement principle focuses on the “why” of learning by recognizing that learners differ in motivation, interest, and persistence (CAST, 2018). Engagement is strengthened when learners are provided with options that foster autonomy, relevance, and collaboration (Best, 2016; Pace, Pavone & Petrini, 2018). Within inclusive classrooms, structured peer support, meaningful contextualization of content, and differentiated levels of challenge promote sustained participation for learners with visual impairment.

Multiple Means of Action and Expression principle addresses the “how” of learning by acknowledging that learners vary in how they demonstrate understanding (CAST, 2018). Flexible assessment approaches such as oral responses, braille writing, tactile demonstrations, and the use of assistive technologies expand opportunities for learners with visual impairment to express competence (Johnson-Harris & Mundschenk, 2014; Mackey et al., 2023).

Collectively, these principles provide a coherent structure for analyzing instructional adaptations in inclusive classrooms. They shift the focus from isolated strategies to broader curriculum design considerations. By applying UDL as the theoretical framework, this study systematically evaluates whether instructional practices reflect proactive flexibility or reactive accommodation. In doing so, it situates the experiences of learners with visual impairment within a broader discourse on curriculum equity, accessibility, and systemic educational reform (Rao, 2015; Zhao, 2024).

2.1.5 The Concept of Universal Design for Learning in Ghana

The Ghana Inclusive Education Policy emphasizes the creation of supportive and inclusive educational environments by promoting curriculum modification, accessible teaching and learning materials, aligned assessments, professional development for teachers, and early identification mechanisms for learners with special educational needs (Senadza et al., 2019). This policy reflects the principles of Universal Design for Learning (UDL) by advocating for systemic curriculum flexibility that anticipates learner diversity rather than responding to barriers after they occur (Adom, 2022).

In the Ghanaian context, the practical application of UDL involves specific strategies to support learners with visual impairment (LwVI). Abdul-Karim and Awuku (2019) highlight that effective UDL implementation includes the integration of tactile materials, Braille resources, assistive technologies such as screen readers and magnification devices, audio descriptions, and alternative assessment formats that provide multiple means of engagement, representation, and expression. These adaptations are crucial in visually intensive subjects such as Mathematics, Science, and Information and Communication Technology (ICT), where conventional teaching approaches often disadvantage LwVI.

Despite these policy provisions, research indicates that UDL practices in Ghanaian inclusive classrooms are inconsistently applied. The effectiveness of these interventions is largely dependent on teacher preparedness, institutional support, and resource availability (Senadza et al., 2019; Abdul-Karim & Awuku, 2019). Teachers often rely on improvisation, limited tactile or Braille materials, and ad hoc assessment modifications to accommodate LwVI, reflecting both their commitment and the systemic challenges faced in inclusive education because many lack sufficient Braille training and the necessary adapted teaching materials such as Braille textbooks and assistive devices (Sikanku, 2018).

Consequently, while the Ghana Inclusive Education Policy establishes a framework for equity, meaningful inclusion and academic success for learners with visual impairment require sustained professional development, adequate resourcing, and institutional commitment to fully operationalize UDL principles in everyday classroom practice.

2.1.6 Application of the Theory to the Study

This study adopts Universal Design for Learning (UDL) to reframe the underperformance of learners with visual impairment (LwVI) at Ghana National Inclusive Basic School as a consequence of curriculum inflexibility rather than individual limitation. Within this framework, teachers' adaptations are conceptualized in four key areas: curriculum content, instructional methods, assessment procedures, and instructional materials, particularly for teaching visually intensive components of the curriculum.

Guided by UDL principles, teachers at Ghana National Inclusive Basic School are expected to modify instructional delivery, integrate tactile and assistive technologies, differentiate assessment formats, and restructure visually oriented subjects to enhance accessibility (Nicholl et al., 2013; CAST, 2020). By embedding flexibility into content, pedagogy, and evaluation, barriers to participation and learning are reduced, creating equitable opportunities for LwVI to engage meaningfully with all subject areas.

In this specific school context, UDL implementation enables learners with visual impairment to access subjects such as Mathematics, Science, Basic Design and Technology, and Information and Communication Technology (ICT), which traditionally rely heavily on visual components. Teachers support LwVI through tactile materials, Braille resources, assistive technologies, verbal explanations, peer-assisted learning, and modified lesson activities, allowing learners to engage with content in ways that match their abilities. Assessment practices are also diversified, using oral responses, Braille, audio recordings, and practical demonstrations, providing multiple means of expression and reducing reliance on purely visual methods.

Applying UDL at Ghana National Inclusive Basic School emphasizes that meaningful inclusion extends beyond physical access. It highlights the importance of learner autonomy, flexible teaching strategies, and systematic institutional support. For LwVI, this approach provides opportunities to participate fully, demonstrate understanding through multiple modalities, and achieve academic objectives. At the same time, it underscores the responsibility of school leadership and the Ghana Education Service to provide resources, structured professional development, and ongoing support to ensure inclusive practices are consistent and effective.

2.2 Learners with visual impairment

learners with visual impairment are characterized by a reduction in vision that significantly impacts their ability to function optimally and hinders their progress in traditional educational settings (Agesa, 2014; Asroruddin, et al., 2017; Ktumaran et al. 2019; Virginia Department of Education, 2017). According to Kızılaslan (2020), learners with visual impairment must possess a range of visual capabilities to fully engage in classroom activities. One key characteristic identified by the author is the ability to see clearly, which is crucial for tasks such as reading fine print, interpreting diagrams, and recognizing facial expressions. Without this ability, learners face significant challenges. Research shows that approximately 80% of information is acquired visually (Argyropoulos et al., 2019; Hatton, 2014; Hodges & Douglas, Lewis & Allman, 2014; Lewis et al., 2014; Naipal & Rampersad, 2018), making it difficult for learners with visual impairment to succeed in their educational endeavors. The limitations in vision restrict the amount and quality of information accessible to these individuals, impacting their classroom

experiences (Bishop, 2004; Hatlen, 1996; Lewis et al., 2014; Lowenfeld, 1973; McLinden & McCall, 2002; Sapp & Hatlen, 2010). Therefore, optimal vision is crucial for learners to effectively acquire knowledge and understand their environment.

Some learners with visual impairment have some remaining vision that they can utilize with different adaptations in the classroom. The specific modifications needed by these learners depend on the extent of their vision loss. Some learners may use tools to enhance their vision to access printed materials, while others may rely on braille (Mboshi, 2018) However, regardless of the method used, the pace of performance may be affected, limiting the learners's ability to progress at the same rate as their sighted peers (Habulezi, & Phasha, 2012; Kızılaslan, 2020). Interventions and appropriate support can help reduce the delays caused by the impairment. Many learners with visual impairment rely on braille and other tactile resources instead of printed materials. This transition may not happen naturally, so educational interventions are necessary to provide experiences that encourage the use of all senses.

2.3 Teaching Learners with Visual Impairment

Teaching learners with visual impairment is of utmost importance due to its profound impact on their learning process. The sense of vision plays a fundamental role in how individuals perceive the world, and without it, learners with visual impairment must heavily rely on their other senses, such as auditory and tactile information (Phutane, et al., 2022).

Uusiku (2020) suggests that learners with visual impairment heavily rely on their auditory and tactile senses, therefore, learning activities should be adjusted to accommodate these specific areas. It is essential to promote verbalism as these learners have limited exposure to the environment. Donal, Lazarus, and Lolwana (2006) stress the importance of enhancing certain aspects to address the needs of these learners, such as providing Braille reading materials for severe cases of visual impairment, utilizing large printed written materials, incorporating audiotape recorders to emphasize spoken speech through audio, and introducing tactile and kinaesthetic activities. For example, a study by Worlanyo (2012) investigated the support and teaching methods used by teachers of the visually impaired during instructional hours and revealed a lack of Braille textbooks for these learners. Consequently, teachers resort to pre-recording lessons, using real objects, and brailleportions of passages to ensure the effectiveness of the lessons for their learners.

In addition to the auditory and tactile provisions, differentiated instructional methods should be employed to ensure effective learning for learners with visual impairment. This requires teachers to clearly teach concepts that sighted learners learn naturally through vision (David, et al, 2016; Zebehazy & Wilton, 2014; Huijgevoort, 2002; Kumar et al., 2001; Yalcin et al., 2020) The extent of vision loss varies among learners with visual impairment, and this determines the adjustments and modifications needed to facilitate their learning (Moon et al 2012; Rule et al 2011). Some learners may have partial vision and use vision enhancement tools, while others may rely solely on braille or other tactile methods.

However, these methods can be slower and hinder their ability to keep up with their sighted peers. Therefore, it is crucial for teachers to make necessary provisions to ensure that learners with visual impairment can progress and reduce fatigue. The utilization of technology can significantly aid in providing learners with access to educational resources and materials (Dim, 2019; Ketema & Negassa, 2023; Moon et al., 2012; Ngonyani, 2018; Yalcin et al., 2020). By utilizing screen readers, magnification software, and other assistive technologies, learners with visual impairment can effectively access information and actively participate in classroom activities (Kizilaslan, 2020).

Supporting learners with visual impairment can be achieved by offering shortened assignments and extended time to finish tasks (Bradley-Johnson, 1994; Harley & Lawrence, 1984; Niure, 2020; Spungin, 2002). This approach enables them to thoroughly understand and finish their work without experiencing pressure or being burdened.

Despite the obstacles they may encounter, learners with visual impairment can attain academic success when provided with appropriate support and accommodations (Miyachi 2020; Okyere et al 2002; Saforo, 2002). Special education modifications, such as individualized education plans (IEPs), can be instrumental in tailoring educational materials and teaching strategies to respond to the needs of learners with visual impairment (Palmer, (2005). Moreover, establishing realistic expectations and setting achievable goals is also fundamental in ensuring their educational success (Niure 2020).

The above studies have shown that, teaching learners with visual impairment may present challenges, however, by utilizing appropriate tools and strategies, it is feasible to deliver a well-rounded education through the use of tactile materials and technology.

Working together with teachers specializing in visual impairment and other experts can further guarantee that learners are provided with the necessary assistance to excel in their academic pursuits. Through the modification of visual resources to cater to the specific requirements of learners with visual impairment, teachers can establish an inclusive educational setting that fosters both academic achievement and self-reliance

2.3.1. Visual Components of the General Curriculum

Visual components within the broader curriculum encompass the incorporation of images, diagrams, charts, graphs, videos, and other visual tools aimed at enriching the educational experience for learners (Shabiralyani et al., 2015; Eilam, 2012). These components are woven into the curriculum to facilitate a deeper comprehension and retention of information, foster connections among concepts, and promote a more interactive and engaging interaction with the material (Ngonyani, 2018). Visual components are prevalent across various disciplines within the general curriculum, including mathematics, science, social studies, and language arts, among others. For instance, in mathematics, visual tools such as number lines, geometric figures, and graphs assist learners in visualizing mathematical ideas and problem-solving techniques. In the realm of science, diagrams and illustrations serve to clarify intricate scientific processes and phenomena. In social studies, resources like maps, timelines, and charts aid learners in understanding historical events and geographical concepts.

It is widely recognized that diagrams, charts, and images are extensively employed for illustrative purposes across various subjects, especially in the formative years of education. Nevertheless, studies have shown that teachers often neglect the visual

components of the curriculum for learners with visual impairment, which leads to their exclusion from educational content that relies on visual aids in inclusive classroom settings (Miyachi, 2020; Mwakyeja, 2013; Sam, 2013). As a result, these learners frequently miss the chance to interact with the same educational resources as their sighted counterparts. Adalakun (2020) noted that visual aids, such as diagrams, are entirely disregarded for these learners, even at the essential basic education level, where such elements are integral to all subjects. This oversight results in learners with visual impairment receiving an incomplete education, particularly in mathematics and other subjects that utilize diagrams.

Numerous research studies have underscored the consequences of non-participation in visually oriented subjects, such as Mathematics and Science (Adalakun, 2017; Lee, 2022; Supalo et al., 2014). In light of these findings, researchers have stressed the necessity of integrating accommodations that align with the principles of Universal Design for Learning (UDL) within inclusive educational frameworks (Adalakun, 2017; Amponsah et al., 2024). This methodology, supported by the work of Burgstahler and Cory (2008), Rose and Meyer (2006), and Rose, et al., (2005), promotes the implementation of "design for all" principles to effectively address the diverse learning needs of all learners in inclusive environments. Additionally, these accommodations are vital in offering critical support to learners with visual impairment.

2.3.2 Experience of teachers who teach subjects with visual components to learners with visual impairment

With the inclusive education policy to include learners with visual impairment in the regular classroom, teachers teaching in the regular classrooms are responsible for

teaching all learners including the learners with visual impairment. These teachers are responsible for making the content of the curriculum accessible to these learners by making adaptations to accommodate them. However, most regular teachers are unable to adapt due to certain challenges they face.

For instance, Sikansu (2018) aimed to explore the difficulties faced by teachers when instructing learners with visual impairment in inclusive classrooms. A total of 59 teachers from 3 inclusive basic schools were selected as participants, and they were given a questionnaire to complete. The results indicated that teachers encounter many obstacles when teaching learners with visual impairment, including issues related to classroom size, the availability of materials, and the necessary skills to effectively educate these learners. Additionally, teachers acknowledged that they possess some assistive devices, but the majority of these devices are not readily accessible to facilitate the teaching of learners with visual impairment. It is recommended that teachers receive additional training on utilizing Braille and large print materials to ensure the successful integration of learners with visual impairment into mainstream schools.

Recent studies have indicated that learners with visual impairment and their sighted peers often follow the same curriculum (Cakmak, Yilmaz & Isitan, 2017; Sozbilir et al., 2017). Nyoni et al. (2011) emphasized the importance of general education teachers having the necessary skills and attitudes to support learners with visual impairment effectively in inclusive educational environments. Unfortunately, it has been noted that many regular teachers lack the knowledge and skills required to meet the needs of learners with special needs (Ahiably, 2023; Kezilahabi, 2021; Morelle, 2016; Mwakyeja, 2013). For instance,

study by Tobias (2017) revealed that teachers often lack the expertise and passion necessary for effectively teaching learners with visual impairment.

Also, a study carried out in South Africa by Maguvhe (2014) to examine the teaching of science and mathematics to learners with visual impairment, it was found that teachers lacked specialized training to educate blind learners. Furthermore, there was a lack of rigorous supervision during their teaching practices. This deficiency was attributed to their inability to effectively transfer knowledge to learners with special learning needs, particularly those who are visually impaired (Maguvhe, 2015).

Kezilahab (2021) emphasizes that the success of the teaching and learning process hinges on the methods employed by teachers and the availability of appropriate teaching materials. When learners with visual impairment are taught by specially trained teachers using participatory methods, there is a higher likelihood of improved academic performance. Additionally, literature suggests that Science teachers should carefully select teaching activities and utilize suitable materials, or make necessary adaptations to materials, to enhance the learning experience for learners with visual impairment (Cavkaytar & Diken, 2012; Sozbilir, Gul, Okcu, Kizilaslan, Zorluoglu & Atilla, 2015).

Ndhlovu and Kasonde-Ng'andu (2015) provided an overview of the conventional instructional approaches employed in educating learners with visual impairment. These methods include the question-and-answer technique as well as the expository teaching method. The latter involves the teacher delivering an explanation of a specific concept, idea, or encounter within the classroom setting, with minimal engagement or participation

from the learners. The methods encompass lecturing, explaining, discussing, and informing.

Learners with visual impairment often require personalized assistance to access and understand the content being taught (Johnson-jones 2017). Regular teachers may struggle to provide this level of support while also attending to the needs of other learners in the classroom. This can result in a lack of individualized instruction, which may hinder the academic progress of learners with visual impairment. Fraser and Maguvhe (2008) conducted a study to explore the experiences of science teachers who worked with learners with visual impairment. The research findings revealed that the utilization of teaching plans specifically designed or modified for learners with visual impairment significantly enhanced their success in science classes. This situation highlights the challenge faced by many teachers who struggle to cater to the individual needs of learners due to large class sizes and limited instructional hours (Attia et al., 2023; Habulezi et al., 2016; Kezilahabi, 2021; Mberimana, 2018; Senkondo, 2010).

Teachers do not encounter as many obstacles when delivering theoretical material to learners with visual impairment compared to content that relies on vision for comprehension. This presents a challenge for teachers in a typical classroom setting. Islek's (2017) research delved into the perspectives of 13 teachers and 12 learners with visual impairment, highlighting their experiences within the academic curriculum and expanded core curriculum. The study uncovered that teacher faced challenges when teaching lessons or subjects with visual components.

Also in a research conducted by Annie, Ndhlovu and Kasonde-Ng'andu (2015), which focused on addressing the issue of low academic achievement among learners with visual impairment in Zambia by identifying the obstacles faced by teachers in educating these learners. The study revealed that teachers encountered difficulties when utilizing various teaching methods such as question and answer, expository, group discussion, demonstration, and inquiry methods with learners with visual impairment. These challenges ultimately led to the learners' inadequate academic performance and limited engagement in classroom activities.

Cecil and colleagues (2007) emphasized that assessing learners with visual impairment differs from assessing those without visual impairment. Inclusive classrooms present teachers with difficulties as they cater to learners with varying abilities. For example, Penda et al. (2015) pointed out ineffective teaching methods such as question and answer, expository, group discussion, demonstration, and inquiry methods. These challenges have resulted in poor academic performance and limited classroom participation among learners.

Attia, et al., (2022) noted that many teachers struggle to use alternative assessment methods to evaluate learners with visual impairment due to their lack of expertise. Challenges such as overcrowded classrooms, high teacher-learners ratios, insufficient assessment materials, and logistical issues further hinder the implementation of alternative assessments.

One of the main challenges faced by teachers is the need for suitable instructional materials. Teachers must have access to the teaching and learning material and vary their teaching methods to accommodate learners with visual impairment, who may benefit from tactile or auditory learning experiences (AFB, 2012; Gabbert, 2012). This becomes particularly challenging when the curriculum heavily relies on visual aids such as charts, graphs, or diagrams. The process of finding or creating alternative materials that effectively convey information to learners with visual impairment can be time-consuming and demanding.

While some studies have highlighted the lack of sufficient resources for effective inclusion (Donkor, 2023; Matobako, 2021; Ralejoe, 2021), Fofie et al. (2020) conducted a study to investigate the support provided by teachers to learners with low vision in regular classrooms in the Sekyere South District, Agona. The study also revealed that schools offer resource teachers, guidance and counseling services, eye screening, and auditory logical services. Moreover, these schools provide a variety of instructional resources to assist in teaching learners with low vision.

Moreover, conventional teachers may encounter challenges when it comes to effectively interacting with learners who have visual impairment (Bhalalusesa, 2016). As stated by Tsunemoto, et al., (2022), learners with visual impairment may struggle to perceive visual cues like facial expressions or gestures, which highlights the importance for teachers to seek alternative methods of conveying information and ensuring effective communication. Achieving this may necessitate further training and honing of communication strategies.

Furthermore, de Verdier (2016) highlighted that regular teacher may encounter obstacles in promoting social inclusion and facilitating peer interaction for learners with visual impairment. These learners may experience social isolation or encounter difficulties in engaging in group activities due to their visual impairment. As a result, regular teachers must actively foster a sense of belonging and establish avenues for collaboration and interaction among all learners within the classroom setting.

In conclusion, Teachers face numerous challenges when teaching subjects that involve visual elements in an inclusive classroom. the obstacles faced by these teachers when teaching subjects that incorporate visual elements in an inclusive classroom are multifaceted. These challenges encompass pedagogical difficulties related to catering to diverse learning styles and abilities, as well as issues about instructional resources such as the availability and accessibility of visual materials. Overcoming these obstacles requires a combination of adaptability, creativity, and collaboration to ensure that all learners can fully engage with and benefit from the visual elements used in their instruction.

2.3.3 Challenges learners with visual impairment face in learning subjects with visual components in the Inclusive Classroom

Learners with visual impairment encounter various obstacles in the inclusive classroom setting that hinder their complete engagement with the curriculum and active participation in classroom tasks (Morelle, 2016). These challenges can arise from multiple factors such as inflexible curriculum, language barriers, inappropriate communication,

inaccessible and unsafe environments, inadequate support services, and insufficiently trained teachers.

One notable challenge faced by these learners is the limited access to visual information, which significantly affects their ability to fully comprehend and utilize important content (Morelle, 2016; Roe & Webster, 2002; Webster & Roe, 1998). Many curricular graphic materials rely on visual elements, posing significant difficulties for learners with visual impairment (Beck-Whinchatz & Riccobona, 2008; Kouroupetroglou & Kacorri, 2009; Rosenblum & Herzberg, 2015). For instance, these learners may struggle to read visual elements in textbooks that contain crucial information not available in Braille formats.

They also face barriers particularly in subjects that rely on visual perception such as Mathematics and Science which usually rely on sight to comprehend. (Agyei, 2020; Dorleku, et al., 2019; Morelle, 2016; WAEC, 2012). Conventional teaching approaches that heavily depend on the visual medium can create difficulties for these individuals in fully participating in and comprehending content taught (Kizilaslan, et al., 2021). Consequently, this could restrict their ability to access the curriculum materials and impede their academic development.

Fraser and Maguvhe (2008) conducted a study on the education of learners with visual impairment in South Africa, focusing on the teaching of biology. The study revealed that these learners faced obstacles in applying science process skills due to a range of factors, including their lack of vision. Notably, the findings highlighted that blind learners encountered significant difficulties in mastering the skill of 'tabulation'. Furthermore,

practical work and field trips were limited for blind learners, as they were only exposed to basic exercises that provided minimal intellectual stimulation and did not require advanced problem-solving abilities.

Furthermore, comprehending graphs, charts, diagrams, figures, and illustrations can pose a challenge for learners, as these visual aids are essential in explaining intricate mathematical concepts with clarity and brevity (Ndume, 2019, Morelle, 2016). The ability to interpret and extract information from such visuals is a key mathematical skill required for effective problem-solving (Oyebanji & Ubong, 2021).

Nsagha (2012) also emphasized that learners with visual impairment require a variety of educational tools and services to ensure successful inclusion. The author highlighted a wide array of equipment, educational arrangements, and service provisions, such as orientation and mobility training for white cane skills, portable note takers, larger format books, writing frame and stylus tools, magnifying glasses, specialized computer software like Jaws and Zoomtext, electronic Braille writers, and Perkins Braille writers. Nsagha (2012) pointed out that providing learners with visual impairment with access to specialized services such as Braille instruction, tactile graphics, auditory materials are essential in helping learners with visual impairment access the curriculum and develop the necessary skills to succeed in school and beyond.

Moreover, learners with visual impairment may encounter difficulties in navigating the physical layout of the classroom, orienting themselves within the school environment, and locating necessary materials and resources. They may also experience social obstacles, such as feelings of isolation or exclusion from group activities due to their disability

((Dakwa, 2014; Manitsa & Doikou, 2022. Virginia Department of Education (2017) conducted a study which confirmed that Children with visual impairment may also experience restrictions with regard to moving within familiar or unfamiliar surroundings.

Furthermore, it should be emphasized that teachers and peers may lack familiarity, training, and the necessary expertise and resources to effectively assist learners with visual impairment (Agesa, 2014; Beck-Winchatz & Riccobona, 2008; Deku et al., 2017; Fraser & Kezilahabi, 2021; Maguvhe, 2008; Morelle, 2016; Mwakyeja, 2013; Ralejoe, 2021; Smith & Kelley, 2007). This lack of comprehension can lead to misunderstandings, communication challenges, and barriers to the educational process.

Research has shown that teachers often lack the necessary knowledge on multisensory learning techniques, modifications, and accommodations in subjects that rely on visual comprehension (Adelakun, 2020; Ahiabley, 2023; Beck-Winchatz & Riccobono, 2008; Maguvhe, 2015, Mchaporelle, 2016). In particular, many teachers who are responsible for teaching learners with visual impairment find it challenging to adjust the curriculum and effectively utilize various strategies in subjects that involve visual elements (Beck-Winchatz & Riccobono, 2008; Smith & Kelley, 2007).

According to Tobias (2017), subject teachers lack the necessary expertise and comprehension to effectively educate learners with visual impairment. Consequently, this lack of knowledge hampers their active participation in the classroom, resulting in their reluctance to pursue subjects such as Mathematics and Science that heavily rely on a visual medium (Beck-Winchatz & Riccobono, 2008; Fraser & Maguvhe, 2008). Fraser and

Maguvhe (2008) attribute this issue to the fact that most teachers teaching such subjects hold a general education training qualification.

In addition to the above challenges, learners with visual impairment may face additional challenges in inclusive educational settings due to potential negative perceptions from their peers, teachers, and school administrators (Soudin, 2006). These perceptions may stem from misconceptions about their abilities, a lack of understanding of their needs, or limited exposure to individuals with visual impairment (Fraser & Maguvhe, 2008; Gariba & Awini, 2023; Milinga, Possi, 2015).

Alhassan's (2014) research in Ghanaian primary schools found that teachers' attitudes towards learners with disabilities varied based on the type and severity of the disability, as well as the school's inclusion practices. In the study negative attitudes were more common in classrooms with larger class sizes and the presence of a learners with a disability.

It is a common misconception that learners with visual impairment are unable to match the academic performance of their sighted peers and therefore need continuous support (Alhassan, 2014). Additionally, their peers may lack knowledge on how to effectively engage with them or may experience discomfort in their presence, resulting in social isolation and diminished expectations for these learners. Consequently, this hinders their chances for personal development and achievement (Kapinga, 2020 & Gariba & Awini, 2023; Ralejoe, 2021).

Blatchford and Lai's (2010) research conducted in the United Kingdom discovered that overcrowded classrooms have the potential to create passive learners. The presence of too many learners in a classroom increases the burden on teachers for assessment, making it challenging to provide individualized assessment and feedback. Additionally, alternative assessment methods like portfolios and observation seem to be demanding for most teachers to handle and control in overcrowded classrooms (Attia et al., 2023).

Furthermore, the large class size can pose a challenge for learners to actively participate in the learning process (Ali, 2018; Alhassan, 2014; Attia et al., 2023; Habulezi et al., 2016; Mosola, 2020). Due to the high number of learners competing for the teacher's attention, learners may find it difficult to ask questions, engage in discussions, or receive timely feedback on their work. According to the findings of Odongo and Davidson (2016), the presence of larger class sizes has a negative impact on the academic progress of other learners. Consequently, this can lead to feelings of frustration and disengagement among learners, especially those who are already facing academic difficulties.

Learners with visual impairment in inclusive classrooms often encounter challenges related to inconsistencies in examination results (Ahiably, 2023; Kisanga, 2019, Ndume, 2019). These inconsistencies include missing scripts and unmarked scripts specifically designed to accommodate their needs. The absence of markings of braille work presents a significant obstacle for these learners, as it hampers their ability to effectively engage with and complete their coursework. Moreover, the lack of markings prevents them from accessing feedback and corrections from their teachers.

Nyirenda (2020) conducted research on classroom practices in the teaching and learning of geography among pupils with visual impairment in an inclusive classroom. The study revealed that certain teachers in the unit would require three to five days to transcribe pupils' class work from braille to ink print for marking purposes. Due to the time-consuming nature of this process, learners with visual impairment faced delays in receiving their marked books compared to their sighted peers. As a result, they were unable to make timely corrections, ultimately impacting their performance in the subject.

Ndume (2019) also conducted a study at the grade twelve level and found that missing exam results were a common issue due to multiple marking centers. Additionally, Ahiably (2023) conducted a study that revealed mishandling of examination scripts for learners with visual impairment, which proved to be detrimental to their learning experience. This lack of consistency in exam results for learners with visual impairment can have a negative impact on their academic progress and overall educational experience. It can lead to feelings of frustration, inadequacy, and exclusion from the learning process.

It is important to note that adapting educational assessments into braille and other formats is a complex and challenging process. Some assessment materials may present difficulties when being converted into braille (Ralejoe, 2021). While tactile graphics can assist in making certain content more accessible to learners with visual impairment, there are situations where specific items cannot be reproduced in braille (Miyauchi, 2020; Ndume 2019). Consequently, learners may either be exempted from participating in assessments or they may have to complete exams that have not been modified (Jaroshav, 2012; Karangwa et al., 2013; Tobias, 2017). For instance, Adalakun's (2017) study found

exempting the learners with visual impairment is one of the strategies to accommodate them in the inclusive classroom.

The aforementioned studies have documented the numerous obstacles that learners with visual impairment encounter in the inclusive classroom. These difficulties are typical challenges that they often experience. Some of the obstacles that learners with visual impairment face in the inclusive classroom include difficulties with accessing materials in alternative formats, such as braille or audio, challenges with navigating the physical environment, and limitations in participating in visual activities such as art or science experiments.

Additionally, these learners may struggle with social interactions and communication with their peers and teachers, as well as with understanding visual cues and nonverbal communication. Despite these challenges, research has shown that with appropriate accommodations and support, learners with visual impairment can succeed in inclusive classrooms and achieve academic and social success.

In conclusion learners with visual impairment face challenges accessing the general curriculum. these challenges range from the content, instructional method, assessment procedures and instructional materials.

2.4 Adaptations of the national curriculum content for learners with visual impairment in the inclusive classroom

Inclusive basic schools recognize the importance of accommodating learners with visual impairment and strive to provide them with equal educational opportunities. Adapting visual content for learners with visual impairment in inclusive elementary

schools is crucial to ensure their equal access to education. These adaptations aim to provide alternative ways for learners with visual impairment to comprehend and engage with visual information. by modifying visual content, such as images, charts, and diagrams, teachers can create a more inclusive learning environment that caters to the diverse needs of all learners.

Moreland, (2015) indicated that, one main challenge in teaching subjects with high visual components such as science for the visually impaired is the difficulty of translating equations, graphs, and diagrams into an accessible format. This makes it challenging for the learners with visual impairment to participate fully in the lessons. Dalton (2017), recommended that, teachers adapt the visual components through multiple means of representation which is the first principle of the Universal Design for Learning by David Rose and Anne Meyer from the Centre for Applied Special Technology (CAST, 2020). This principle guides the teachers on how to use various methods of representation to ensure effective learning. These methods may include providing materials in alternative formats such as braille, large print, or audio recordings. Teachers may also use tactile models, manipulatives, and other hands-on materials to help learners with visual impairment understand abstract concepts.

Kapur, (2017) suggested that, images can be described in detail using verbal descriptions. Verbal descriptions provide a comprehensive explanation of the visual elements, enabling learners with visual impairment to form mental images of the content. Incorporating explanatory verbal descriptions can improve the cognitive process of visualization. Research in various countries, including Ghana, highlights the use of verbal

descriptions to assist learners with visual impairment in understanding visual materials (Adelakun 2020; Attia et al., 2023; Edwards et al., 2022; Gariba & Awini, 2023; Kapur, 2017; Niure, 2020; Kyeremeh & Adubofour, 2018, Morelle & Tabane, 2019; Saforo 2018, Okyere & Adams 2003, Worlanyo, 2012). All these studies emphasize the importance of verbal descriptions in teaching learners with visual impairments

Also, to create a more participatory classroom that accommodates learners with visual impairment, visual concepts such as graphs could be represented in a tactile graphics, which involves creating raised representations of visual information that can be explored through touch (Carpio et al., 2017 & Perry, 2013). By incorporating these adaptations, learners with visual impairment can actively participate in discussions and activities that involve visual elements.

Another important aspect is simplifying and organizing the information in a way that is easier for learners with visual impairment to understand. Kizilaslan, et al., (2021), recommended that, learners with visual impairment may experience difficulties in comprehending complex content. Therefore, it is crucial to ensure that the content is presented in a simplified manner, making it easier for them to understand. This can be achieved by breaking down complex concepts into smaller, more manageable parts, using clear and concise language, and providing additional explanations or examples when necessary (Niure, 2020).

Furthermore, charts and diagrams can be adapted by using high-contrast colors, larger fonts, or braille labels (Kizilaslan, et al., ,2021). High-contrast colors enhance visibility for learners with low vision, while larger fonts make the text more readable.

Braille labels allow learners with visual impairment who are proficient in braille to independently access and interpret the information presented in charts and diagrams.

Inclusive basic schools should also consider utilizing technology to facilitate visual content adaptations (Niure, 2020). Digital tools and software can convert visual content into accessible formats, such as audio descriptions or screen readers. These technologies enable learners with visual impairment to independently access and engage with visual information, promoting their active participation in the learning process.

Sharpe (2019) emphasized the significance of teachers incorporating learners' existing knowledge and practical applications while catering to the diverse needs of their learners. The author highlighted that neglecting to integrate relevant topics, objectives, activities, and resources into the curriculum can hinder the inclusion of learners with special needs, including those with visual impairment. By establishing connections to real-world experiences, academic tasks are not only enhanced but also foster increased learners participation. The author underscored that enduring learning outcomes are achieved when teachers embrace authentic teaching approaches and encourage learners to establish meaningful connections that directly correlate with real-life scenarios. Adapting visual content in inclusive elementary schools is essential to ensure equal access to education for learners with visual impairment. By modifying visual materials and providing alternative formats, teachers can create a more inclusive learning environment that caters to the diverse needs of all learners, including those with visual impairment.

Drake et al. (2015), emphasized the role of relevant prior knowledge in shaping how learners engage with new educational experiences. Their findings have important implications for teaching learners with visual impairment, particularly when it comes to visual content. Since these learners may not access visual materials through conventional means, they tend to rely more on their previous experiences and existing knowledge to interpret and understand new concepts.

Hailikari et al. (2008) also offered valuable insights into how various forms of prior knowledge, especially procedural knowledge, directly contribute to academic achievement. Their work emphasized the importance of assessing learners' existing knowledge structures to better tailor instruction and support.

Dong et al. (2020) proposed an integrative model demonstrating that prior knowledge enhances learning engagement by reducing cognitive load. The authors suggested that learners with well developed prior knowledge experience less cognitive strain and were more inclined to seek meaningful assistance, resulting in deeper involvement with learning tasks.

2.5 Adaptations of Instructional Methods for Teaching Visual Content to Learners with Visual Impairment in Inclusive classroom

In an educational environment that values inclusivity, the method used to present visual materials to learners with visual impairment focuses on ensuring accessibility and providing necessary accommodations (Saliba, 2019). Universal Design for Learning has been identified as a research-supported framework that helps teachers create and deliver instruction that enables all learners to have equal educational opportunities (Saliba, 2019).

This framework encompasses both the methods of instruction and the content of the curriculum, while maintaining the principle that all learners, regardless of their abilities, deserve access to high-quality instruction and learning experiences that foster enhanced academic success (Katz, Portath, Bendu, & Epp, 2012; Rose & Gravel, 2010; Rose & Meyer, 2002). This includes implementing a variety of strategies to ensure that every learner, regardless of their visual abilities, can fully participate in the educational process (Asamoah et al., 2019; Edwards et al., 2022; Gadagbui, 2010; Ntuli & Traore, 2013).

To establish a fair educational environment for learners with visual impairment, it is crucial to adjust instructional strategies in the classroom (Gadagbui, 2010; Sikanku, 2018). The principles of Universal Design for Learning (UDL) offer a thorough framework for modifying teaching methods and materials, especially those that include visual components, thereby ensuring equitable access to information through suitable adjustments and modifications. These modifications are crucial to meet the specific learning needs of learners with visual impairment and encourage their active involvement in the educational process (Asamoah et al., 2018).

As noted by Sharpe (2019), while educational content and goals remain consistent for all learners, teachers utilize various strategies to effectively achieve these goals. The author stressed that inclusive teachers should incorporate methods such as differentiation, scaffolding techniques, and specially designed instruction to address the diverse needs of their learners. By employing these strategies, teachers can ensure that learners with visual impairment have equal access to education and are actively engaged in their own learning journey (Ntow et al., 2021).

Gadagbui (2010) further emphasized that the implementation of effective and innovative teaching strategies fosters an inclusive environment for children with special needs including learners with visual impairment. Such approaches not only integrate these learners into the mainstream educational framework but also cultivate a sense of belonging, thereby enhancing their learning experiences.

Research has shown that implementing certain universal design instructional practices is crucial for promoting and enhancing inclusive education. These practices include collaboration and co-teaching, cooperative learning, peer support, and differentiated instruction (Olsen, et al, 2016; Quirk, et al, 2017; Villa & Thousand, 2003). The goal of these approaches is to create learning experiences that are inclusive, equitable, and supportive of every learners's success.

Murry (2008), Nees (2013), and Niure (2020) have emphasized the importance of using alternative formats to present visual information when teaching learners with visual impairment in inclusive environments. Text-to-speech and other forms of audio information representation have been proven effective through extensive testing and review (Nees, 2018). This is due to the limited or absent vision of these learners, making traditional visual aids inaccessible.

Mbosh (2018) suggested that teachers can provide tactile materials as an alternative for visual content, such as raised-line drawings or three-dimensional models. These materials allow learners to interact with and understand visual concepts through tactile exploration. This strategy aligns with previous studies (Işlek, 2017; Lee, 2022; Mwakyeja,

2013; Niure, 2020; Polloway et al., 2008) that highlight the importance of adapting instructional methods to accommodate learners with visual impairment in inclusive settings. Utilizing alternative formats for visual content is essential for these learners, as traditional visual materials may not be accessible to them.

Literature suggests that teachers can use verbal explanations or audio recordings to provide detailed descriptions of visual content, aiding learners with visual impairment in creating mental images and comprehending the subject matter (Adelakun, 2020; Edwards et al., 2022; Morelle & Tabane, 2019). Accepting verbal or oral responses as a form of assessment is another effective strategy for teaching learners with visual impairment (Morny, 2016). It has been explained that learners with visual impairment heavily rely on verbal information for their learning, and it is recommended that audio devices be integrated to assist in the teaching process. Lessons can be recorded and provided to learners with visual impairment for later playback at their convenience, reducing the challenges they face during the learning process and ultimately enhancing their academic performance.

Another approach involves utilizing audio descriptions, which consist of detailed verbal explanations of visual content like images, videos (Niure, 2020). These descriptions are meticulously crafted to communicate the visual elements, colors, shapes, and other pertinent details, enabling learners with visual impairment to create mental images of the content. While many learners with visual impairment find audio descriptions to be a straightforward and efficient means of accessing information, materials containing diagrams and tables may pose challenges when presented in audio format (Salisbury,

2008). To address this issue, teachers can employ descriptive language to vividly describe an event and read aloud information displayed on the chalkboard to enhance accessibility (Lewis & Doorlag, 2011). Audio descriptions can be delivered through pre-recorded audio tracks or live narration, ensuring that learners with visual impairment can fully comprehend the visual components of the curriculum (Lewis & Doorlag, 2011).

Niure, (2020) findings from the research also indicated that certain integrated schools in Nepal have implemented an audio version of the text for learners with visual impairment to enhance their access to academic content. Nearly all general education teachers reported that they read aloud most of the text on the chalkboard to facilitate understanding for learners with visual impairment.

Furthermore, the inclusion of questions and answers in the educational toolkit is essential for tailoring education to meet the needs of learners with visual impairment. Utilizing oral communication for instruction and feedback is another effective method. In situations where a teacher is working with learners with visual impairment, it may be beneficial to transcribe orally provided answers, as recommended by Mwakyeja (2013).

Kasebusha and Banda (2021) also opined that participatory methods such as questions and answers, discussions, and cooperative learning are crucial in inclusive classroom teaching for learners with visual impairment. These methods actively involve learners in the learning process by encouraging them to participate, ask questions, and contribute to discussions. Such participation can be enhanced through structured group work, hands-on activities, and interactive teaching strategies that promote collaboration, engagement, and meaningful inclusion.

Bara et al. (2018) have asserted that the use of tactile illustrations, similar to visual illustrations for sighted children, can positively impact the language and literacy development of children with visual impairment. The most commonly used traditional methods for creating tactile graphics involve the use of swell paper and braille embossing (Bara et al., 2018; Kızılaslan, 2020). These methods have been widely adopted and have shown effectiveness in providing tactile representations for learners with visual impairment (Habulezi & Phasha, 2012; Mboshi, 2018; Rooks-Ellis, 2014). Tactile illustrations are a unique approach that caters to the specific needs of learners with visual impairment. Unlike traditional concepts that rely solely on vision, tactile illustrations require learners to physically interact with the tactile image, interpret its meaning, and connect it with the accompanying text (Carney & Levin, 2002; Kızılaslan, 2020).

Research studies conducted by Bara et al. (2018), Heller & Gentaz (2014), and Somma et al. (2021) have shed light on the advantages of using tactile illustrations to enhance comprehension and memory of stories for learners with visual impairment. These studies have shown that tactile illustrations allow the learners to physically interact with the illustrations, feel textures, and understand spatial relationships between different elements. This hands-on approach, as noted by Gentaz (2014) and Bara et al. (2018), not only helps in understanding the story but also aids in retaining information for future use. However, it is crucial to acknowledge that effectively identifying and interpreting tactile illustrations may require specific training and guidance to ensure optimal learning outcomes (Ávila Soto, 2020).

One effective approach to tactile illustration involves creating physical representations of visual content, such as raised maps, diagrams, or objects, that can be explored through touch. Studies by Phutane et al. (2022), Rowell and Ungar (2003), and Somma, et al. (2021) have emphasized the importance of these tactile materials in enhancing the educational experiences of learners with visual impairment. According to the studies, these materials serve as valuable tools for teachers, enabling visually impaired learners to grasp and understand various concepts. By actively engaging with tactile materials, learners can develop a deeper understanding of visual concepts being taught. Additionally, tactile materials can be used not only for academic subjects but also for non-academic areas like tactile literacy, motor skills, and spatial awareness, as highlighted by Phutane et al. (2022).

Gawe, et al., (2011) highlighted the effectiveness of cooperative learning methods such as group work, pair work, individual and peer tutoring for learners with visual impairment. These methods allow visually impaired learners to collaborate with sighted peers to ensure they understand and absorb the material being taught. Van (2007) also defined cooperative learning as a successful teaching strategy where small teams with learners of varying abilities engage in different activities to enhance their understanding of a subject. According to research, cooperative learning involves groups of learners working together, leveraging each other's strengths and knowledge to achieve a common goal (Anuruddhika, 2018; Huang, et al., 2024; Melbacke, 2023; Mwakyeja, 2013; Negash, 2020). Mwakyeja (2013) specifically recommended cooperative learning for fostering

positive interactions between visually impaired learners and their sighted peers in inclusive classrooms.

Thieme et al. (2017) emphasized the benefits of learners with visual impairment collaborating with sighted peers in group settings. They explained that through discussions and visual descriptions provided by classmates, visually impaired learners gain valuable insights into visual content. Additionally, cooperative learning not only enhances knowledge development but also promotes positive relationships among learners from diverse backgrounds (Whitburn, 2014)

Ismail and Al Allaq (2019) underscore the importance of customizing instructions to cater to the unique needs of learners in order to enhance the learning environment through collaborative learning. They argue that cooperative learning not only promotes social interaction but also allows for personalized instruction, accommodating the diverse abilities of learners. Furthermore, they propose that integrating cooperative learning in classrooms fosters a supportive and empathetic atmosphere, ultimately reducing stress and anxiety among learners.

Similarly, Sanasintani (2024) also advocates for the implementation of cooperative learning tasks that actively engage learners, nurturing the development of their social skills and fostering positive relationships among team members. The authors also emphasize the significance of creating learning environments that facilitate the acquisition of new cognitive skills and encourage learners to actively pursue knowledge.

Both Ismail and Al Allaq (2019) and Sanasintani (2024) highlight the importance of incorporating cooperative learning in educational settings. By tailoring instructions to meet individual needs and promoting active participation in tasks, cooperative learning not only improves learning conditions but also cultivates a supportive and understanding environment that motivates learners to enhance their cognitive and social skills.

In order to enhance the inclusive learning experience, Burton (2015) recommends integrating special education teachers with general education teachers. This collaborative approach fosters a supportive learning environment where learners with visual impairment can actively engage and contribute to the learning process. By working together, teachers can engage in joint lesson planning, teaching, and share responsibility for the class (Chong & Kong, 2012; Li et al., 2012; Osei, 2020; Worlanyo, 2012)

Furthermore, Osei (2020) highlights the significant impact of teamwork on teachers' self-efficacy, offering them opportunities to demonstrate their professional competence. This collaborative effort not only benefits learners but also boosts the professional growth and confidence of teachers. By adopting a collaborative approach, fairness in evaluation methods is promoted, and learners with visual impairment are given the chance to clarify and enhance their understanding of the material, ultimately creating a more inclusive and supportive learning environment (Sanasintani, 2024)

Stein (2011) and Osei-Antwi (2015) have also pointed out the importance of technology, such as screen readers and magnification software, in educating learners with visual impairment on visual content. These assistive technologies play a crucial role in converting visual information into auditory or tactile formats, allowing learners with visual

impairment to independently access and engage with visual content, enhancing their overall learning experience (Addai-Wireko et al., 2020).

Additionally, Mwakyeja (2013) has emphasized various adaptive teaching methods that teachers should utilize to facilitate the learning process for learners with visual impairment. These techniques include promoting collaborative learning, incorporating question and answer sessions, utilizing sound projection, addressing learners by their names, adapting teaching materials, integrating audio, optical, and non-optical devices, using tactile materials, and providing additional time allowance.

In conclusion, in an inclusive educational environment, it is crucial to employ strategies that ensure learners with visual impairment have equal access to education and actively participate in the learning process. Teachers should make adjustments to teaching approaches and integrate methods such as Universal Design for Learning, differentiation, scaffolding techniques, and Specially Designed Instruction to meet the specific needs of these learners.

2.6 Adaptations of visual Content in Assessment for learners with visual impairment in Inclusive Classroom

Learners with visual impairment may face significant challenges in processing and understanding visual information (Kapur, 2017; Niure, 2020). This can pose difficulties during assessments that heavily rely on visual elements like graphs, charts, diagrams, or images (Attia et al., 2023). To ensure that these learners have an equal opportunity to demonstrate their knowledge and understanding, the third principle of Universal Design for Learning directs teachers in inclusive classrooms to offer alternative assessment

formats that cater to the requirements of every learners (Adom, 2023). This allows learners to showcase their knowledge in a way that suits them best.

These accommodations may involve granting additional time for completing assessments, offering feedback, and providing alternative formats for learners with visual impairment (Kizilaslan, 2020; Sozbilir et al., 2017). Allowing extra time for learners with visual impairment acknowledges and respects their unique learning needs. It recognizes that they require more time to process and interpret visual information, thus ensuring a fair chance for them to demonstrate their understanding (Attia et al., 2023). This adjustment promotes inclusivity and supports their educational journey by providing them with an equitable opportunity to succeed.

Inclusive education practices can be quite time-consuming due to the need for individualized attention, as outlined in the 2015 inclusive education policy and the Standard and Guidelines for the implementation of inclusive education (Ametepee & Anastasiou, 2015; Johnson-Jones, 2017). However, a recent study by Ntow et al. (2021) discovered that schools strictly adhere to the official teaching timetable for all basic schools without making any adjustments, despite the diverse needs of learners in inclusive settings. This is primarily because teachers are under pressure to complete the syllabus within the designated time frame.

Numerous local studies have identified the insufficient duration of lessons as a major challenge in inclusive classrooms, particularly for learners with visual impairment (Agyei, 2020; Gariba & Awini, 2023; Saforo, 2018; Worlanyo, 2012). This highlights the importance of allocating additional time for the teaching of the highly visual content

subjects such as Mathematics, science and basic design and technology in inclusive classrooms.

Ntow et al (2021) pointed out that, the additional time helps teachers who teach mathematics to provide the needed individual attention in the classrooms and that, without the provision of extended time, learners with visual impairment may feel rushed and overwhelmed during assessments. This can lead to incomplete or inaccurate answers, which do not reflect their true understanding of the subject matter. By allowing them the necessary time, teachers can ensure that these learners have the opportunity to showcase their comprehension effectively during assessment.

In certain rural areas of South Africa, learners with visual impairment are required to write exams through auditory channels, as pointed out by Jaroslav in 2012. However, Ndume argues in 2019 that dictating examinations to these learners may not be a helpful approach. This is because when questions are dictated, there is a higher chance that these learners may not fully comprehend the questions compared to when they read them themselves. Moreover, there is a low probability that these candidates will ask invigilators to repeatedly read the questions to them, which hampers their ability to effectively apply their understanding. Amidst these challenges, the advent of assistive technology has emerged as a beacon of hope, promising to bridge the gap and level the educational playing field (Cullen, 2017).

Assistive technology, encompassing a wide range of devices and software, has emerged as a cornerstone in fostering inclusive education for learners with visual impairment (Burgstahler, 2015). By tailoring educational content to individual needs, these

technologies break down the barriers to learning, offering an array of tools such as screen readers, braille devices, and speech recognition software. Moreover, tactile graphics can be employed to render content accessible to learners with visual impairment, although representing certain items in braille format may prove to be difficult (Jaroshav, 2012).

Kisanga (2019) also highlighted the importance of proper assessment practices, including the provision of feedback following assessments, in order to enhance the academic advancement of learners with visual impairment. This stresses the necessity of offering timely and helpful feedback to aid in the education and growth of learners with visual impairment. Additionally, teachers can consider using alternative assessment methods that do not rely heavily on visual content (Attia et al., 2023).. This could include using verbal or written assessments, hands-on activities, or group projects that allow learners to demonstrate their understanding in ways that are more accessible to them ((Kizilaslan, et al., 2021).

Alden, (2016) recommended that, to enhance the academic performance of learners with visual impairment in subjects such as mathematics, and science which heavily rely on sight, test items must be adapted to ensure accessibility. Learners should be permitted to undertake examinations through alternative formats such as audio recordings, braille, enlarged print, and laptops equipped with screen reader software. The suitability of test items provided to learners with visual impairment centers on their modifiability and familiarity with the content (Willings, 2017).

In summary, learners with visual impairment face challenges in processing visual information during assessments, and it is important to provide alternative assessment formats and accommodations such as extended time to ensure their equal opportunity to demonstrate their knowledge. Dictating exams may not be an effective approach as it may hinder their comprehension and application of understanding as pointed out by Ndume, (2019)

2.7 Adaptations of the Instructional Materials to Teach Visual Components to learners with visual impairment

Visual impairment presents various obstacles to learning, particularly in terms of accessing educational materials (Amaniampong & Nyavor, 2021; Amponsah & Bekele, 2023). Extensive research has explored the impact of this condition on the learning process, especially in subjects like science and mathematics (Jones et al, 2006; Moon et al, 2012; Wu, et al., 2001). Recognizing and addressing the unique needs of these learners is crucial for creating an inclusive education environment (Smith & Abrams, 2019).

In Ghana, the inclusive education policy places a strong emphasis on ensuring that all learners, including those with visual impairment, have access to instructional materials (Asamoah, et al., 2022; Nketsia, 2018). This involves the implementation of universal design for learning, which includes providing appropriate equipment and assistive devices to guarantee that every learners has equal access to a high-quality education (Buabeng, 2022; Fofie, 2022; Saforo, 2018).

For learners with visual impairment, having access to adapted instructional materials is crucial for acquiring the necessary skills and knowledge during the teaching and learning process. Many of these learners face challenges with note-taking and subjects like Mathematics and Science, which heavily rely on visual information due to their limited vision (Kızılaslan, 2020). Subjects such as Mathematics and Science often utilize visual aids like charts, graphs, diagrams, and simulations to convey complex information. Adapting instructional materials to cater to the unique needs of learners with visual impairment is essential for helping them visualize relationships, patterns, and processes that may otherwise be difficult to comprehend (Saforo, 2018).

Hafizh, et al., (2021) conducted a study to evaluate the mathematical comprehension of fifth-grade learners with visual impairment in elementary schools. The research focused on flat shapes, specifically analyzing mathematical operations and problem-solving concepts related to two-dimensional shapes. The findings revealed that many learners struggled to grasp these concepts due to the lack of accessible instructional materials. Inadequate materials often hinder learners in subjects with visual content, such as Mathematics and Science (Agyei, 2020; Dorleku et al., 2019; Fofie, 2022)

Furthermore, Ntow et al. (2021) discovered a shortage of teaching materials, including Braille and other resources, to support teachers in educating visually impaired learners. These materials are essential in helping learners understand mathematical concepts in the classroom.

Cryer (2013) highlighted that teaching science to learners with visual impairment often involves them listening to their teachers. However, these learners tend to forget what they have learned shortly after the lesson, especially when practical applications are required. This is because they are unable to see the illustrations and demonstrations that accompany the theoretical lessons. This concept aligns with the wisdom of the renowned Chinese philosopher and reformer, Confucius, who famously stated, "What I hear, I forget. What I see, I remember. What I do, I understand" (Bennett, 2013). Confucius believed that learners grasp concepts better when they actively participate in hands-on learning experiences.

Saforo (2018) conducted a study at Adidome Senior High School in the Volta region and found that teachers lacked access to a wide range of teaching materials to effectively instruct visually impaired learners in mathematics. This lack of resources hindered the learners' comprehension of mathematical concepts.

Simon et al. (2010) emphasized the importance of utilizing teaching aids in inclusive classrooms to enhance the effectiveness of teaching and learning. Similarly, Ofori (2018) highlighted the significance of Teaching and Learning Materials (TLMs) in schools to support teachers in delivering quality education. This underscores the need for developing instructional materials that cater to the specific needs and abilities of all learners.

Teachers must explore alternative formats and methods of representation to ensure that information is conveyed effectively, without relying solely on visual elements as emphasized by Universal Design for Learning(UDL) principles. This may involve

incorporating tactile materials, auditory descriptions, and assistive technologies to enhance accessibility for learners with visual impairment. By applying ULD principles, teachers aim to provide equal opportunities for success to all learners.

Adapting instructional materials to ensure accessibility through alternative formats, such as audio, braille, or larger print, for learners with visual impairment is crucial (Jackson & Presley, 2012). This process involves transforming visual information into tactile or audio formats, enabling learners to engage with and comprehend visual content through touch and hearing (Gaster & Clark, 1995; Yalcin et al., 2020).

The range of assistive technology designed to facilitate teaching and learning for learners with visual impairment has greatly increased. Tools including screen reader software, text-to-speech applications, screen magnification programs, dictation software, and refreshable Braille displays are essential in delivering educational content in formats that are accessible (Ketema & Negassa, 2024). Utilizing these technologies enables learners with visual impairment to surmount obstacles and engage comprehensively in educational experiences alongside their sighted counterparts (Reiser & Dempsey, 2012).

According to Ketema & Negassa (2024), effectively engaging learners with visual impairment in mathematics instruction requires providing them with equitable access to rapidly evolving assistive technology. This involves addressing issues related to affordability, testing the usability and appropriateness of existing assistive technology, and enhancing accessibility. It is essential to ensure that easily affordable and accessible assistive technologies with multiple non-visual display formats are in place to enable learners with visual impairment to access mathematical symbols, notations, expressions,

and tactile contents. By actively engaging learners with visual impairment in learning mathematics, we can create a more inclusive and supportive learning environment.

Multiple research studies have shown the importance of incorporating computer-based accommodations to tailor instructional materials for learners with visual impairment (Liaga, et al., 2023). Assistive technologies, such as screen readers and magnification software, play a vital role in transforming visual content into auditory or enlarged formats. This transformation is crucial in enabling learners to independently access and engage with materials. Moreover, these technologies empower learners to interact with visual content in a manner that aligns with their unique needs and preferences. Ampratwum, et al., (2016), Buabeng (2022), and Zakaria (2014) underscore the essential role that assistive technologies serve in ensuring that learners with visual impairment have equitable access to educational resources.

In conclusion, visual impairment presents significant barriers to learning, particularly in subjects that rely heavily on visual presentation of information, such as Mathematics, Science, and Basic Design and Technology. Adapting instructional materials and utilizing assistive technologies are essential strategies to ensure that learners with visual impairment can access, comprehend, and engage with visual content in these subjects. Moreover, incorporating hands-on activities, practical demonstrations, and interactive teaching approaches can enhance their learning experiences and promote conceptual understanding. These findings align with existing literature, which emphasizes that accessible instructional strategies such as tactile models, braille materials, adapted visual aids, and participatory teaching methods significantly improve engagement and

academic performance for learners with visual impairment in visually demanding subjects (Ali, 2018; Attia et al., 2023; Hayes & Proulx, 2023; Kasebusha & Banda, 2021; Mosola, 2020). Situating this study within the context of these findings reinforces the importance of curriculum adaptations, inclusive teaching methods, and appropriately designed instructional materials in promoting equitable educational outcomes and meaningful participation for learners with visual impairment in Ghana National Inclusive Basic School.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter outlines the methodological framework adopted to explore how teachers adapt the curriculum for learners with visual impairment at Ghana National Inclusive Basic School. Specifically, the study focused on how teachers modify curriculum content, instructional methods, assessment procedures, and instructional materials in visually demanding subjects such as Mathematics, Science, and Basic Design and Technology. Additionally, the chapter describes how the study investigated the challenges teachers encounter in implementing these adaptations within inclusive classrooms, providing a comprehensive understanding of both practices and barriers in supporting learners with visual impairment.

The chapter discusses the research paradigm, research approach, research design, study site, population, sample and sampling techniques, data collection methods, data collection procedures, data analysis procedures, and ethical considerations. Each methodological choice was guided by the purpose of the study, which aimed to gain an in-depth understanding of teachers' lived experiences and practical strategies in adapting visual curriculum components to ensure the active participation of learners with visual impairment.

3.1 Research Paradigm

This study adopts the interpretivist paradigm, which focuses on understanding how individuals perceive and interpret the world around them. For this reason, the study employed this paradigm to explore how teachers in Ghana National Inclusive Basic School adapt the national curriculum, focusing on key areas such as modifying curriculum content, adapting teaching strategies, adjusting assessment methods, and instructional materials to ensure that learners with visual impairment can meaningfully participate in inclusive classrooms. By examining these aspects, the study seeks to generate an in-depth understanding of teachers' practices and the challenges they encounter in enhancing access and participation for learners who experience visual barriers in their learning. Understanding these practices is essential because without clear insight into what is happening in classrooms, it becomes difficult to determine whether adaptations genuinely promote inclusion or merely provide physical access without meaningful participation.

Proponents of the interpretivist paradigm believe that individuals construct meaning based on their unique experiences and social interactions (Alharahsheh & Pius, 2020; Elbardan et al., 2017; Pulla & Carter, 2018; Soss, 2015). This suggests that reality is not fixed but varies from person to person, depending on individual perspectives and contextual influences. In the context of this study, teachers, resource teachers, and learners with visual impairment may interpret inclusive practices differently based on their lived experiences within the school environment. Exploring these multiple perspectives helps to reveal the actual nature of curriculum adaptation practices rather than relying on assumptions or policy expectations.

Elbardan et al. (2017) highlight that adopting an interpretive approach enables researchers to establish close engagement with participants and to explore issues in depth. Thanh and Thanh (2015) further state that there is a strong connection between the interpretivist paradigm and qualitative methodology. Researchers who adopt interpretivism and qualitative methods typically seek to understand individuals' experiences, perceptions, and interpretations in order to uncover social reality, rather than relying on numerical data or statistical generalizations. Alharahsheh and Pius, (2020) also argue that the adoption of the interpretivist paradigm can enhance the validity of qualitative data because it is grounded in participants' personal accounts and considers multiple contextual variables that shape their experiences.

Given these considerations, the interpretivist paradigm was appropriate for this study, as it enabled a deep exploration of how teachers conceptualize and implement adaptations of visual curriculum components and how they navigate the challenges of inclusive education for learners with visual impairment. By uncovering what is actually occurring in instructional practice, the study provides evidence that can inform teacher preparation, professional development, institutional support, and policy implementation within Ghana National Inclusive Basic Schools.

3.2 Research Approach

This study used qualitative research approach to examine how teachers adapt visual materials, such as diagrams, graphs, and complex math equations, to support learners with visual impairment in inclusive classrooms. The main goal is to explore the strategies and techniques teachers use to make these materials more accessible and understandable for

learners facing visual challenges. To gain insight into how the curriculum is adjusted, a qualitative approach was selected for this research. Qualitative research, as defined by Lim (2024), focuses on understanding the subjective experiences of participants. Cresswell (2013) describes qualitative research as a method for exploring the meanings individuals or groups attribute to social or human problems. Tomaszewski, et al., (2020) emphasize the value of qualitative research in providing rich, contextualized insights that offer a human-centered understanding of the world. Mack (2005) further explains that qualitative research delves into the subjective experiences and perspectives of individuals, giving them a voice. This implies that the qualitative approach allows participants to respond in their own words, rather than being limited by fixed responses.

Studies have shown that open-ended questions used in qualitative studies can elicit meaningful and culturally relevant responses from participants, surprising researchers with the depth and richness of explanation (Akcem, et al., 2019; Kumatongo & Muzata, 2021). Qualitative research designs prioritize data collection in authentic, real-world settings. This approach utilizes various sources, such as interviews, observations, and documents, to provide a comprehensive understanding of the subject matter. Due to these attributes of the qualitative study, the researcher deemed it the most suitable approach for conducting this study.

3.3 Research Design

The research utilized an exploratory case study design to delve into how teachers adapt subjects such as mathematics, science, and basic designs and technology that involves visual elements to cater to the needs of learners with visual impairment in

inclusive classrooms. The participants were individuals with firsthand experience in adapting visual aspects of the curriculum to support these learners.

The use of an exploratory case study design allows for an in-depth exploration of the participants experiences and understanding of how teachers adapt visual components of the curriculum for learners with visual impairment at Ghana National Inclusive Basic School. The exploratory case study enable the collection of detailed information and insights from the participants (Verner & Abdullah, 2012). This method was chosen to uncover new ideas, gain a better understanding of the issues, and identify patterns that may not be immediately apparent.

Yin (2003) emphasizes the significance of exploratory case studies in examining complex social phenomena and providing a comprehensive understanding of real-life events. The case study approach is particularly suitable for this study, as the researcher has limited control over teacher adaptations and aims to address "how" questions (Yin, 2003). The research questions in this study focus on the "how," making the case study approach highly relevant.

The case study method is known for its versatility and flexibility, enabling researchers to utilize different data collection techniques in exploring a research issue (Hancock et tal., 2021; Ponelis, 2015). In this particular study, semi-structured interviews and classroom observations were conducted. This method not only helps researchers build a connection with participants, but also allows for the collection of detailed information that can be relevant to similar scenarios, providing valuable insights (Ponelis, 2015).

Through these approaches, a thorough and multi-dimensional comprehension was achieved regarding how teachers adjust the visual aspects of the curriculum.

3.4 Background Information of the Study Site

The study was carried out in the Ghana National Inclusive Basic School, Cape Coast in the Central Region. Ghana National Inclusive Basic School was established in 1984 in one of the unoccupied flats. It started with kindergarten at the current teachers' flat. The kindergarten (KG) started with the children of the teachers teaching in the Ghana National College because there were no schools available for the children around that time. Initially, it was private until 1995, the government took over the basic school and was later moved to the current premises as a regular school. In 2005, the school was selected as one of the pilot schools for inclusive education in the central region. Initially, the learners with visual impairment were admitted to the Cape Coast School for the blind using the blind unit of the school.

Currently, the learners with visual impairment are first admitted at the blind unit at Cape Coast School for the Deaf, Unit for the Blind to learn the basic braille skills and complete basic three. They are transferred to Ghana National Inclusive Basic School to continue from basic four, progress to junior high school and later complete from the school.

The school has a total population of 522 including 25 learners with visual impairment, 27 teachers and 3 resource teachers. Out of the 27 subject teachers, 14 of them teach learners with visual impairment and out of the 14 teachers who teach the learners only 6 of them teach them subjects with high visual concepts. The inclusive starts from the basic four to Junior High School (JHS) three. At the time of data collection, there were no

learners with visual impairment in basic three and basic four and basic five. The basic six had seven learners with visual impairment out of 60 learners. JHS one had five learners with visual impairment out of 64 total number of learners in the classroom. Junior high school two has 10 learners with visual impairment out of 80 learners and Junior high school three had three learners with visual impairment out of 69 total number of learners. The school currently has 3 resource teachers to support the learners with visual impairment.

The selection of Ghana National Inclusive Basic School as a case study warrants an explanation of the underlying rationale. The Ghana Education Service aimed to implement inclusive education by the year 2015, prompting the Special Education Division to formulate an Education Strategic Plan for the period from 2003 to 2015 to facilitate this initiative. Consequently, specific schools were designated to serve as pilot sites for inclusive education, with Ghana National School being among those selected. Although classified as a mainstream institution, it notably accommodates a considerable number of learners with visual impairment alongside sighted peers, all receiving instruction from the same teachers and following a unified curriculum. This characteristic positions it as an inclusive educational environment within Cape Coast. Furthermore, the choice of this school is underscored by the documented underperformance of learners with visual impairment in visually intensive subjects, such as mathematics (Agyei 2020). The staff at the school has also demonstrated a strong commitment to inclusive educational practices. The objective of the study was to explore the modifications implemented by teachers in these visually-focused subjects and to assess how learners were supported within such educational settings.

3.5 Population of the Study

The targeted population consisted of 24 participants including, teachers teaching subjects characterized by significant visual content, for example Mathematics, Science, Basic Designs and Technology in the inclusive classrooms, the Resource teachers who supported learners with visual impairment as well as learners with visual impairment who are seeking to achieve the Basic Education Certificate Examination (BECE) within the context of Ghana National Inclusive Basic School.

At Ghana National Inclusive Basic, there are a total of 30 teachers. Among these teachers, three are resource teachers, while 14 teach in inclusive classrooms. Specifically, only six out of the 14 teachers teach subjects with highly visual content such as Mathematics, Science and Basic Design and Technology (BDT). The five teachers who participated in this study teach Mathematics, Science, Home Economics, and Creative Art. They were purposefully selected due to their expertise in teaching subjects with complex visual content to both learners with visual impairment and their sighted peers in the same classroom.

3.6 Subject Teachers

Subject teachers are treated as the regular teachers handling classroom lessons in inclusive classrooms. In this study, subject teachers is used to mean a general teacher. These teachers were purposely selected because they are the main implementers of the curriculum. They serve as the mediator between the content and the learners. They are also responsible for teaching the content of the curriculum to meet the needs of all learners including learners with visual impairment. These teachers were purposely selected because,

the study was to get teachers who could provide rich information on how they include the learners with visual impairment in the teaching and learning of subjects that require the visual medium to understand the concept taught in the general classroom.

Table 3. 1: Profile of Teachers Who Participated in The Study

Subject Teacher	Qualification	Area of specialization	Years of experience	Subject teaching	Date of interview
ST 1	Bachelor's degree	Home economics		Home economics	15/02/2023
ST 2	Bachelor's degree	Basic Education (Upper primary)		Mathematics and Science	15/02/2023
ST 3	Bachelor's degree	Basic Education (JHS)		Basic design and technology	14/03/2023
ST 4	Bachelor's degree	Basic Education (JHS)		Mathematics and Science	14/03/2023
ST 5	Bachelor's degree	Basic Education (JHS)		Mathematics and Science	15/03/2023

Source: Field Data 2024

3.7 Resource Teachers

Resource teachers in this research are described in this study as teachers who have undergone specialized training in the field of special education. Resource teachers have a strong background in special education and provide support to learners with visual impairment in meeting their educational goals. Throughout the research, there were three resource teachers assigned to 25 learners with visual impairment in the school. It was observed that one of their duties involves converting various materials, such as class activities, homework, assessments, and tests, between Braille and standard print for the benefit of learners with visual impairment. This process enables other teachers who are not proficient in Braille to evaluate and grade the work of these learners. Furthermore, the resource teachers work closely with subject teachers to adapt teaching techniques and resources to suit the needs of learners with visual impairment in the school.

Table 3. 2: Profile of Resource Teachers Participated in the Study

Resource Teacher	Qualification	Area of specialization	Years of experience	Date of interview
RT 1	Bachelor of Education	Special Education (Visual Impairment)	2 years	18/09/2023
RS 2	Bachelor of Education	Special Education (Visual Impairment)	3 years	18/09/2023
RT 3	Bachelor of Education	Special Education (Visual Impairment)	5 years	19/09/2023

Source: Field Data, 2024

According to the information presented in the above Table, the analysis reveals that there were two male teachers, RT1 and RT2, and one female teacher, RT3. All three participants were adults, aged 36, 35, and 38, respectively. Additionally, the findings indicate that all three teachers were trained as special teachers and possessed fundamental

teaching qualifications. They had respective teaching experiences of two years, three years, and five years. Moreover, it is noteworthy that all teachers were proficient in using Braille, having acquired this skill during their tertiary education.

There were 25 learners with visual impairment at the school. From this group, five were willing to participate and were selected to share their perspectives on how teachers adapt visual content to include them in the classroom.

3.8 Learners with Visual Impairment

Five learners with visual impairment were selected for this study. Out of the five learners two learners are partially sighted and three are totally blind. Two of these learners are females and three are males. Two of these learners are in grade six, one in JHS1, one in JHS2 and one in JHS3. Their ages were between 16 and 22. The table below has the characteristics of the learners with visual impairment who participated in the study.

Table 3. 3 Characteristics learners' participants

Learners	Sex	Level of impairment	Age	Grade
LwVI 1	Female	Partial	16	Class 6
LwVI 2	Female	Total	19	JHS 2
LwVI 3	Male	Partial	22	JHS 3
LwVI 4	Male	Total	19	JHS 1
LwVI 5	Male	Total	16	Class 6

Source: Field Data, 2024

About the attributes of the learners with visual impairment who participated in the research, as presented in Table 1. Three of them were male while two were female. Consequently, there was an uneven distribution of genders among these participants. The age range of these individuals varied from 16 to 22 years old. Additionally, the

aforementioned findings indicate that two of the participants had partial sight, whereas three were completely blind. Moreover, all five learners possessed the knowledge and ability to use Braille. Among these five learners, two were enrolled in the sixth grade, one in junior high one, one in junior high two, and one in junior high three.

3.9 Sample Size

The study comprised a heterogeneous purposively selected sample of 13 participants, including five subject teachers, three resource teachers, and five learners with visual impairment. The heterogeneity of the sample was intentional, as it enabled the researcher to gather multiple perspectives on the adaptation of visual components of the curriculum within inclusive classrooms. By including different participant categories, the study was able to obtain comprehensive and triangulated insights into curriculum content adaptations, instructional method modifications, assessment procedures, instructional material adjustments, and the challenges encountered in practice.

3.9.1 Subject Teachers

The five subject teachers selected for the study were those who taught content subjects that relied significantly on visual medium, such as Science, Mathematics, and Basic Design and Technology. Each of these teachers had direct experience teaching inclusive classrooms that accommodated both sighted learner and learners with visual impairment. Their inclusion was instrumental in exploring the adaptations employed to make visual content accessible to learners with visual impairment.

3.9.2 Resource Teachers

Three resource teachers were chosen based on their specialized roles in supporting learners with visual impairment. They collaborate with the subject teachers to teach the visual contents. Their perspectives offered insight into how the visual contents are made accessible to the learners with visual impairment.

3.9.3 Learners with Visual Impairment

The five learners with visual impairment included in the study represented diverse levels of visual ability, ranging from low vision to total blindness. They were selected from inclusive classrooms where they were taught alongside their sighted peers. Their firsthand accounts were crucial in understanding their learning experiences, perceptions of teacher support, accessibility of curricular materials, and their overall engagement within the inclusive classroom.

Data generated from learners with visual impairment addressed all the research questions of the study. Through their experiences, the study gained insight into how curriculum content was adapted, how instructional methods were implemented, how assessment procedures were modified, how instructional materials were utilized, and the challenges encountered in these processes. Their perspectives provided direct evidence of how teachers' adaptations were experienced in practice and whether such adaptations facilitated meaningful access, participation, and learning. By including learners' voices across all research questions, the study ensured a comprehensive understanding of what is happening in the classroom from the perspective of those most directly affected by curriculum adaptations.

Through their lived experiences, the learners provided direct evidence of how adaptations to curriculum content, instructional methods, assessment procedures, and instructional materials were implemented in practice and how these adaptations influenced their participation and understanding. Their responses also highlighted the challenges they continued to experience despite these adaptations, thereby complementing the teachers' perspectives and strengthening the triangulation of findings.

3.10 Sampling Techniques

To gain a deep understanding of participants with shared experiences, the researcher employed a homogeneous purposive sampling method, a non-probability sampling technique in which participants are deliberately selected based on specific, research-relevant criteria (Alvi, 2016; Rahman, 2023). This approach enabled the researcher to focus on teachers who teach highly visual subjects, resource teachers, and learners with visual impairment. The aim was to explore how teachers adapt visual elements of the curriculum to meet the needs of these learners. By exploring their teaching and learning experiences within inclusive classrooms, this sampling technique was essential to effectively address the research objectives. The deliberate selection of participants is expected to yield rich and contextually meaningful insights.

The researcher identified a target population that met certain inclusion criteria, which encompassed the subjects being taught, the type of the classroom settings, and particular experiences related to teaching learners with visual impairment. This deliberate selection process ensures that the sample accurately represents the key variables being

studied, thereby improving the validity and reliability of the findings (Karunaratna, et al, 2024). According to Alvi (2016), the purposive sampling method is particularly beneficial in qualitative research, where the goal is to explore complex issues in depth, making it a suitable approach for this study focused on understanding how teachers adapt the visual component of the curriculum to meet the needs of learners with visual impairment.

3.11 Data Collection Methods

Data collection methods are systematic strategies used to gather information from individuals involved in a study (Taherdoost, 2021). Yaya (2014) described these methods as procedures designed to obtain data from study participants. Khoa, Hung, and Hejsalem-Brahmi (2023) noted that qualitative research can utilize various formats for data collection, such as interviews, focus groups, observations, and document analysis. Each of these approaches enables researchers to obtain rich and detailed insights into the experiences, perceptions, and behaviors of participants, thereby enhancing the depth and quality of the research outcomes. This study utilized semi-structured interviews and observations to collect the necessary data. According to Taherdoost (2021) and Tracy (2020), employing a range of data collection techniques allows researchers to achieve a comprehensive understanding of the topic being investigated. Consequently, this study implemented both semi-structured interviews and classroom observations to gather the required information. A detailed description of each method follows.

3.11.1 Semi-Structured Interview Guide

Magaldi and Berler (2020) characterize the semi-structured interview as an exploratory tool. They assert that this interview format is designed to uncover new ideas, viewpoints, or information that may have been previously unrecognized or neglected. It typically involves posing open-ended questions and encouraging participants to express their thoughts and experiences freely. The authors clarify that while this interview is directed by a series of questions, it remains centered on the primary topic, providing a broad framework for discussion.

To construct the interview guide, the researcher conducted a thorough review of relevant literature across a range of sources (Adelakun, 2017; Ahiabley, 2023; Dickson, 2014; Kezilahab, 2021; Maloka, 2010; Matobako, 2021; Moreland, 2015; Morelle, 2016; Mwakyeja, 2013; Mwitango, 2016; Omer, 2015; Tobias, 2017; Worlanyo, 2012). Insights from these studies informed the thematic direction and the formulation of initial questions.

The data collection tool used in this study was a two-part semi-structured interview guide form. The first part of the form aimed to gather information about the participants, including their gender, level of education, years of service, and area of specialization. The second part of the form consisted of open-ended questions that explored the teachers' adaptations in the curriculum, specifically in the visual component, instructional methods, assessment procedures, and instructional materials. These adaptations were made to meet the needs of learners with visual impairment in inclusive classrooms.

The draft interview guide and a complementary observational checklist were designed to align with the study's core objectives. These tools were reviewed by the research supervisors, who provided feedback on clarity, relevance, and phrasing. Based on this input, several questions were revised, refined, or reordered. A follow-up round of supervisors' review ensured the modifications improved both comprehension and focus.

A pilot interview was conducted at Wenchi Inclusive Basic School, involving subject teachers with experience teaching Science, Mathematics, Creative Arts, and Information and Communication Technology (ICT) to learners with visual impairment. These participants were not part of the main study. Feedback from this pilot informed further adjustments to wording and flow, enhancing the clarity and contextual appropriateness of the questions.

The finalized interview guide was organized into six sections, with a total of 36 items, providing a structured yet flexible framework to explore curriculum content adaptations, instructional method modifications, assessment procedure adjustments, instructional material adaptations, and the challenges teachers encounter in implementing these adaptations for learners with visual impairment. The six sections are as follows:

3.11.1.1 Background Information

This section has six items designed to gather demographic and professional background information, including gender, years of teaching experience in inclusive classrooms, qualification, and area of specialization.

3.11.1.2 Adaptations of Curriculum Content

Questions under this theme focused on how teachers adapt visually demanding curriculum content to include learners with visual impairment in the inclusive classroom. This section contained one main question and six prompts exploring how teachers modify diagrams, charts, graphs, symbols, and other visual elements to enhance accessibility and participation.

3.11.1.3 Adaptations of Instructional Methods

Questions in this section explored how teachers adapt instructional methods to engage learners with visual impairment in inclusive classrooms. It consisted of one main question and six probing questions designed to examine teaching strategies, learner engagement, classroom interaction, and differentiation practices.

3.11.1.4 Adaptations of Assessment Procedures

This section focused on how teachers adapt assessment procedures to meet the needs of learners with visual impairment. It included one main question and six probing questions exploring alternative assessment available, feedback mechanisms, scoring adjustments, and strategies used to ensure fairness and accessibility.

3.11.1.5 Adaptations of Instructional Materials

This section comprised one main question and six prompts focused on how teachers adapt instructional materials when teaching content with high visual demands. The questions explored the availability of materials, use of Braille and tactile resources,

assistive technologies, and strategies for modifying instructional materials to support learners with visual impairment.

3.11.1.6 Challenges in Curriculum Adaptation

This section addressed the fifth objective of the study by examining the challenges teachers face when adapting curriculum content, instructional methods, assessment procedures, and instructional materials. It contained one main question and six probing questions exploring barriers such as limited resources, inadequate training, time constraints, large class sizes, institutional support, and policy implementation issues.

The open-ended prompts allowed participants to share personal experiences, discuss learners' engagement, and provide detailed insights into how teachers adapt visual components of the curriculum and the challenges they encounter in supporting learners with visual impairment. By structuring the guide in this way, the study ensured alignment with all five research objectives and generated comprehensive data to understand both adaptation practices and the implications of challenges within inclusive classrooms.

3.11.2 Observational Guide

In addition to the semi-structured interviews, non-participant classroom observations were conducted to supplement and validate the verbal accounts provided by participants. This approach provided contextual depth and allowed the researcher to witness inclusive instructional practices in real time. Observations focused on teachers' adaptations to the visual content subjects such as Mathematics, Science, Basic Design and

technology, their instructional method adaptations, their assessment procedure adaptation and their instructional materials adaptation during teaching and learnings.

An observational checklist was developed based on existing literature (e.g., Adalakun, 2017; Moreland, 2015; Mwakyeja, 2013) and insights from the pilot phase. The checklist was structured around key themes:

- Visual Content Adaptations
- Instructional Method Adaptations
- Assessment Procedure Adaptations
- Instructional materials Adaptations
- Challenge in Adaptations

For this study, eight observation sessions were held over two months at the research site, with each session lasting about 40 to 45 minutes. The observations occurred in various classrooms, including Basic Class 6, JHS 1, JHS 2, and JHS 3.

The length of observation was determined by the duration of the lesson planned by the teacher. The primary objective of the study was to closely examine the entire teaching process, focusing on how teachers adapt the content of the visual component of the subject such as mathematics, Science and Basic Design and Technology, their methods to cater to the needs of learners with visual impairment from the beginning to the end of the lesson. Notes were recorded on site and expanded upon immediately following the observation to ensure accuracy and detail.

The combination of both semi- structured interview and the observation provides both the spoken intentions and the observed realities, ensuring that the study reflects not only what participants say they do, but also how they actually implement inclusive practices in the classroom. By triangulating these data sources, the researcher strengthens the validity of the findings and gains a more holistic view of how the teachers adapt the visual contents of the curriculum (Alam, 2021; Magaldi and Berler 2020; Ruslin et al., 2022).

3.12. Procedure for Data Collection

To systematically gather information that addresses the research objectives, the study employed a structured data collection process. This section details the steps undertaken to ensure the reliability, validity, and ethical integrity of the data collection, including pretesting of instruments, entry into the field, and the actual collection of data from participants.

3.12.1 Pretesting

A preliminary inquiry was carried out at Wenchi Inclusive Basic School, involving two teachers and a resource teacher who were excluded from the main study. The primary aim of this pilot study was to evaluate the effectiveness of the interview guide in obtaining the desired information. This process sought to validate the instrument and make any necessary adjustments. Additionally, the functionality of the tape recorder was assessed. Through the pilot study, it was observed that two questions elicited similar responses: "Please explain the process of adapting visual components to meet the needs of learners

with visual impairment in the classroom" and "How do you modify visual content to cater to the needs of learners with visual impairment in the inclusive classroom?" To avoid redundancy, one of these questions was eliminated. Furthermore, the pilot study revealed the need to conduct individual interviews instead of focus group interviews. It became apparent during the pilot study that participants with visual impairment provided nearly identical answers to a question posed by another participant, resulting in a loss of information richness.

3.13.3.2 Getting Entry to the Field

Gaining access to the research site was a carefully planned process to ensure smooth collaboration with school authorities and participants. This section explains the procedures followed to obtain permission, establish rapport, and coordinate the logistics for data collection.

3.13.3.2.1 Pre-Visits

Pre-visits to the Ghana National Inclusive Basic school were made. The purpose was to introduce myself to the school administrators and explain to them the intentions of the study. It was also to make appointments with the teachers who were going to participate in the study on convenient dates and times. The process of data collection spread from September to December 2023.

3.14 Data Collection

Data were gathered via semi-structured interviews, which were chosen due to their flexibility in questioning and responding. The research instruments were approved by the

supervisor, and an introductory letter was acquired from the Special Education Department at the University of Education, Winneba. This letter was then presented to the Ghana National Inclusive Basic School to request permission to conduct the study. With the assistance of the Head teacher, participants were selected, and their agreement to take part in the study was obtained with a promise of confidentiality.

The interviews were carried out at the Ghana National Inclusive Basic School, where all participants were available, and were conducted individually. Responses were recorded simultaneously during the interviews to ensure that no important details were missed. Interview guides were utilized during the interviews, which typically lasted between 30 to 40 minutes. Observation guides were also prepared by the researcher to maintain focus during teaching and learning sessions, allowing for detailed notes to be taken.

The researcher completed the data collection process in the third term of the 2024 academic year. Interviews with teachers in the inclusive classrooms were conducted during the first and second terms, between 15 February 2023 and 19 September 2023. Initially, participants were contacted by phone through the Headmistress, who facilitated communication and confirmed whether they were willing to participate in the study. Appointments were subsequently scheduled for convenient dates and times. On the day of each interview, participants were individually invited by the researcher, and the interviews were conducted in a private and respectful manner, ensuring confidentiality, voluntary participation, and adherence to ethical research standards.

Before starting the interview, they were informed about the purpose and scope of the research and permission was asked to record the interviews. They were assured that their personal and school information would be kept confidential, that codes would be used instead of real names in the study. The researchers recorded all interviews. At the end of the meeting, the interviews were concluded by thanking the them for their participation.

3.15 Data Analysis

Data from interviews and classroom observations were analyzed using content analysis, a method well-suited for capturing the multifaceted experiences of participants within inclusive educational environments. This approach enabled the researcher to systematically identify patterns, themes, and meanings embedded in the qualitative data, offering a nuanced understanding of inclusive teaching practices (Korkie et al, 2025).

the researcher transcribed the interviews verbatim and systematically examined the data to identify emerging codes and patterns. Given the limited existing literature on teachers' adaptations of visual components in inclusive education, inductive content analysis was selected as the most appropriate method. This approach allows themes to emerge directly from the data without imposing preconceived categories, making it particularly suitable for exploratory studies (Lyhne, Thisted, & Bjerrum, 2025). As emphasized by Vears (2025), inductive content analysis is especially effective in applied research contexts where practical insights are sought from participants' experiences. The decision to employ this method was further supported by its capacity to move from specific observations to broader generalizations, allowing the researcher to synthesize individual accounts into meaningful thematic conclusions

Schreier (2012) highlights that qualitative inductive content analysis is characterized by its interpretive, naturalistic, situational, reflexive, emergent flexibility, inductive, case-oriented nature, and its emphasis on validity. This approach involves identifying thematic patterns that emerge organically from the data through a systematic and iterative process of coding and categorization. Rather than applying predefined frameworks, the researcher allows themes to surface inductively by engaging deeply with the data, ensuring that the findings remain grounded in participants' experiences (Williams & Ndlovu, 2025; Zapanta, 2025).

In analyzing qualitative data, the researcher transcribed information from interviews with teachers and learners with visual impairment in addition to classroom observations. The researcher carefully reviewed the transcripts multiple times to develop a profound understanding of the responses. The researcher meticulously analyzed, edited, coded, classified, and tabulated all field data following the inductive content analysis procedure, which involved open coding, category creation, and abstraction (Abedini, et al., 2019).

During open coding, notes and headings were added to the transcriptions while reading, and similar categories were integrated to reduce the number of categories for data categorization. In the abstraction phase, a general description of the research topic was developed by generating categories. Codes were derived from interviews and class observations, with multiple codes assigned to transcripts. Emerging themes were identified and recorded as transcripts were thoroughly reviewed, and concepts with similar meanings

were grouped. Abstract labels were then assigned to these concepts based on participants' views. Finally, A comprehensive list of teachers' adaptations of visual content was developed through a systematic analysis of the interview transcripts. Major themes were identified by comparing and synthesizing recurring patterns across participants' responses, with illustrative quotations used to support and validate each theme (Parsons et al., 2018).

During the analysis of the collected data, each transcript underwent a meticulous, line-by-line examination using an inductive content analysis approach. Codes were generated directly from participants' own words, allowing for a grounded and data-driven interpretation of the material. This method facilitated the identification of recurring patterns and meaningful categories without the imposition of pre-existing frameworks. As Coulston et al. (2025) emphasize, inductive content analysis is particularly effective in exploratory research, as it enables researchers to remain close to the data and uncover in-depth insights that reflect participants' perspectives, experiences, and understanding of how teachers adapt the visual components of the curriculum to meet the needs of learners with visual impairment.

Keywords were identified and utilized as codes, with comments exhibiting similar patterns being categorized and grouped into larger themes that aligned with the research question of the study. The researcher ensured that the identified themes were both logical and distinct from one another, ensuring they made sense and were supported by the data. Once the themes were identified, they were further refined, and the data within each theme was analyzed in detail to explore how it related to the research question. The tables provided in the study offer examples of the relationship between codes, categories, and

themes, including sample quotes for each code. These tables serve as valuable tools for illustrating the coding process and demonstrating how the data was organized and analyzed.

Table 3. 4: Codes, patterns and themes identified on curriculum adaptations for learners with visual impairment.

Codes/Keyword	Category/Patterns	Theme
Collaboration Learners' prior knowledge, Verbal descriptions Demonstration and touch	Content adaptation	
Verbal Instructions Remedial sessions Question and answer Exemptions, Peer tutoring, Providing extra time Reading aloud for the learners with visual impairment	Instructional Method Adaptation	Visual
Verbal answers Braille writing Transcribe braille to text for Marking	Assessment Procedure Adaptation	Components Adaptations for learners with visual impairment
Braille to text Real Objects Tactile model	Instructional Material Adaptation	
Inadequately trained subject teachers Inadequate resources	Content Adaptation Challenges	Visual
Limited instructional time, Limited instructional method	Instructional Method Adaptation Challenges	Components Adaptation Challenges
Inappropriate assessment format Irregularities in Assessments	Assessment Procedure Adaptation Challenges	

Lack of instructional materials	Instructional Challenges	Material
Reluctant attitude of sighted peers and teachers	Other challenges	
Undesirable behaviours of learners with visual impairment		
Overcrowded classes		

Source: Field Data, 2024

Table 3.4 highlights various strategies for adapting content, instruction, assessment, and instructional materials for learners with visual impairment. Content adaptation strategies include collaboration, leveraging prior knowledge, verbal descriptions, demonstration, and tactile experiences. Instructional method adaptations involve verbal instructions, remedial sessions, question and answers techniques, exemptions, peer tutoring, extra time, and reading aloud. Assessment adaptations include verbal responses, braille writing, and transcribing braille to text for grading. Instructional material adaptations encompass braille to text, real objects, and tactile models. Challenges identified include inadequately trained subject teachers, inadequate resources, limited instructional time, inappropriate assessment formats, and irregularities in assessment. Additionally, the reluctant attitude of sighted peers and teachers, undesirable behavior of some learners with visual impairment, and overcrowded classes pose further challenges. The overarching themes that emerge from these data are visual component adaptations for learners with visual impairment and visual component adaptation challenges.

Qualitative research aims to gain into the world by understanding participants' perspective on events and staying true to their shared experiences (Sutten and Austin, 2015) In light of this Creswell (2007) proposed a comprehensive analysis of participants

experiences using a data analysis procedure to gather detailed information about the phenomenon being studied.

Table 3. 5: Sample quotes assigned to codes

Codes	Code Definition	Quotes
Collaboration	Participants shared their views on how teachers adapt the visual components for learners to understand visual concept	ST 3, Male: I teach the whole class, both the learners with visual impairment and the sighted together. When the topic involves visual content, the resource teachers will be with them to use the symbols and codes with them. RT 2, Female: The curriculum is design to suit the sighted learners, However, with our presence in the class, we support them by doing adjustment for them to provide same answers using the braille. We normally take away all pictures which are irrelevant to them. learners with visual impairment 3, Male: when the mathematics teachers are teaching, sometimes our real teachers will be around to show us how to do it with the braille. When he doesn't come, I just sit and listen, sometimes, I sleep without knowing

Source: Field Data, 2024

3.16 Ethical Considerations

The researcher obtained consent from all the participant with professionalism and confidentiality while handling them. All participants were asked to give informed consent and participate on voluntary basis. Benefits of the study were explained to all participants. Trust Worthiness of the Research This study used the following alternative criteria to confer trustworthiness of the study;

3.16.1 Trustworthiness

To establish the validity of the instruments applied, the researcher conducted a study by looking at one issue from different angles using more than one method of data collection. This shows that the findings presented were drawn from participants' original views. The data was collected during observation and long interviews or long-lasting engagement in the field with the participant. This helped the researcher to get rich information. The researcher identified the problem and focused on it in order to get in depth information.

3.16.2 Confirmability

Confirmability is based on the perspective that the integrity of the findings lies in the data and that the researcher adequately ties together the data, analytic processes and findings in such a way that the reader can confirm the adequacy of the findings (Geertz, 1973). The researcher achieved this by, returning to the participants in order to verify the information which they had given earlier. This was done in order to request agreement and check for gaps in the collected data.

3.16.3 Transferability

Transferability refers to the extent to which the reader can transfer the findings of the study to her or his context or another setting (Geertz, 1973). Transferability was achieved by, providing sufficient information on the teachers' adaptations of the visual components of the curriculum to meet the needs of the learners with visual impairment to

enable readers and researchers decide how the current findings could depict a similar picture in a completely different setting.

CHAPTER FOUR

FINDINGS

4.0 Introduction

This chapter presents the findings of the study on teachers' adaptations of the curriculum to meet the needs of learners with visual impairment in the inclusive classroom at Ghana National Inclusive Basic School. The findings are organized in relation to the research questions, focusing on adaptations to curriculum content, instructional methods, assessment procedures, and instructional materials, as well as the challenges encountered in implementing these adaptations. By presenting evidence from interviews and classroom observations, this chapter provides a clear account of what is happening in practice and how these adaptations influence learners' access, participation, and engagement within the inclusive classroom.

The chapter begins with a presentation of the demographic characteristics of the participants, providing contextual background to the data and situating the findings within the study setting. This is followed by the themes and sub-themes generated through the inductive content analysis of the interview and observational data, as described in Chapter Three.

The findings are presented in direct alignment with the following research questions: how teachers adapt the national curriculum to meet the needs of learners with visual impairment; how instructional methods are adapted to engage learners with visual impairment; how assessment procedures are modified to meet their needs; how

instructional materials are adapted to support access to visually demanding subjects; and the challenges teachers encounter in adapting the visual components of the curriculum in inclusive classrooms.

The data were collected using semi-structured interviews and participatory classroom observation from five subject teachers teaching visually demanding subjects in the Ghana National Inclusive Basic School, three resource teachers who support learners with visual impairment, and five learners with visual impairment (LwVI). The participatory observation enabled the researcher to engage directly in the classroom setting while systematically documenting instructional practices and adaptation strategies.

To protect the participants' anonymity, self-styled alphanumeric codes were used to represent them. ST refers to Subject Teachers; RT refers to Resource Teachers; and LwVI refers to Learners with Visual Impairment (e.g., LwVI1, LwVI2).

Table 4.1: Demographics of Study participants

Category	FREQUENCY	PERCENTAGE (%)
TEACHERS		
GENDER		
Male	3	60
Female	2	40
Total	5	100
LEVEL OF EDUCATION		
Diploma	0	0
Degree	5	100
2nd Degree	0	0
Total	5	100
YEARS OF SERVICE		
1-5	0	0
6-9	2	40
10 and above	3	60
TOTAL	5	100
AREA OF SPECILAIZATION		
Basic Education (JHS)	3	60
Basic Education (Upper primary)	1	20
Bachelor of Education (Home economics)	1	20
Total	5	100
RESOURCE TEACHERS		
GENDER		
Male	2	66.7
Female	1	33.3
Total	3	100
LEVEL OF EDUCATION		
Diploma	0	0
Degree	4	100
2nd Degree	0	0
Total	4	100
YEARS OF SERVICE		
1-5	3	75
6-9		
10 and above	1	25

TOTAL	4	100
AREA OF SPECILAIZATION		
Special Education (Visual Impairment)	100	100
Total	100	100
LEARNERS		
GENDER		
Male	3	60
Female	2	40
Total	5	100
AGE RANGE		
10-15	0	0
16 – 19	2	40
20 and above	3	60
Total	5	100
CLASS LEVEL		
JHS	3	60
Upper Primary	2	40
Lower Primary	0	0
Total	5	100

Source: Field Data, 2024

Based on the data presented in table 4.1, it is evident that among the 5 teachers who took part in the current study, the majority (60%) were male. All teachers (100%) had completed tertiary level education, with the majority (60%) having more than 10 years of teaching experience, specializing in Basic Education (80%). Additionally, all resource teachers had completed university education at the tertiary level, specializing in special education for learners with visual impairment. In terms of the learners involved in the study, there were 5 participants, with the majority (60%) being male and falling within the age range of 20 and above. The majority (60%) were at the Junior High School level, while 40% were in upper primary. The teachers' perspectives on the visual components of the

curriculum in inclusive classrooms are outlined below, along with the emergence of sub-themes during the analysis.

4.1 Adaptation of National Curriculum Content to Meet the Needs of Learners with Visual Impairment at Ghana National Inclusive Basic School

This section presents findings related to Research Question One, which explored how teachers adapted the national curriculum content to meet the needs of learners with visual impairment at Ghana National Inclusive Basic School. The focus was on Mathematics, Science, and Basic Design and Technology (BDT), as these subjects contain elements such as diagrams, symbols, drawings, measurements, and demonstrations that are challenging for learners with visual impairment in inclusive classrooms.

The findings revealed that subject teachers adapted the national curriculum content through collaboration with resource teachers, the use of learners' prior knowledge, detailed verbal explanations, and the integration of hands-on activities. Classroom observations showed that although these strategies supported learners' participation, their application varied across lessons due to limited instructional resources, large class sizes, and the complexity of some curriculum topics. In situations where effective adaptation was not feasible, learners with visual impairment were occasionally exempted from full participation in specific activities.

From this main theme, five subthemes emerged, each representing a specific way in which teachers and resource personnel adapted the national curriculum content to support learners with visual impairment at Ghana National Inclusive Basic School.

Table 4.2: Main Theme and Emerging Subthemes for Adaptation of National Curriculum Content

Main Theme	Emerging Subtheme	Description
Adaptation of National Curriculum Content	Collaboration	Subject teachers worked alongside resource teachers to support learners with visual impairment during instruction and curriculum delivery.
	Use of Relevant Prior Knowledge	Instruction was linked to learners' existing knowledge and experiences to support understanding of curriculum topics in Mathematics, Science, and BDT.
	Verbal Description	Teachers used detailed verbal explanations to convey curriculum content that was presented visually during lessons.
	Remedial Classes	Additional instructional sessions were provided, often before or after school, to reinforce curriculum concepts that were difficult to access during regular lessons.
	Exemptions	Learners with visual impairment were exempted from certain tasks or questions when adaptation of the national curriculum content was not feasible.

(Field Data, 2024)

The subthemes emerging under this main theme are discussed in detail below. Each subtheme is presented and analyzed to illustrate the specific patterns, practices, and experiences reported by participants. Relevant excerpts from interviews and observations are integrated to provide evidence and deepen understanding of how these issues manifest within the inclusive classroom context at Ghana National Inclusive Basic School. Together, the subthemes offer a comprehensive interpretation of the findings in relation to the research questions and the overall objectives of the study.

4.1.1 Adaptation of National Curriculum Content

This subsection examines how teachers at Ghana National Inclusive Basic School adapted the national curriculum content in Mathematics, Science, and Basic Design and Technology (BDT) to support learners with visual impairment. The findings showed that teachers relied on the support of resource teachers, learners' prior knowledge, verbal explanations, demonstrations, and hands-on activities to enhance understanding. Classroom observations further indicated that when learners experienced persistent difficulty despite these strategies, tasks were modified or learners were exempted, particularly where time constraints and limited instructional resources restricted further adaptation. Analysis of the data revealed the following subthemes under this overarching theme.

4.1.1.1 Collaboration

Teachers in the inclusive classrooms indicated that they frequently worked alongside resource teachers to support learners with visual impairment. They acknowledged a strong reliance on resource teachers to guide the adaptation of national curriculum content and to provide targeted assistance for learners with visual impairment. Classroom observations confirmed that resource teachers were actively engaged in lessons, assisting learners to understand complex concepts and facilitating participation in classroom activities.

Teachers reported that in subjects such as Mathematics, Science, and Basic Design and Technology (BDT), which rely heavily on visual representation, resource teachers

supported learners by explaining Braille codes, providing tactile materials, and guiding comprehension of abstract concepts. For example, one teacher stated:

“I teach the whole class, both the learners with visual impairment and the sighted together. When the topic involves content, the resource teachers will be with them to use the symbols and codes” (ST3, Male).

Another teacher explained:

“I teach them both Science and Mathematics. Due to the highly visual content of Mathematics and Science, without the resource teacher, it becomes difficult explaining to their understanding. She knows how to make them understand the concepts.” (ST1, Female).

A third teacher highlighted the challenge of large class sizes:

“Because of the class size, I cannot attend to them in addition to the sighted ones. Besides, I don’t know Braille, so when the resource teachers are not around, I only focus on the sighted learners. Moreover, they don’t do exams on highly visual content” (ST5, Male).

Learners also confirmed the importance of resource teachers for meaningful engagement:

“When the mathematics teacher is teaching, sometimes the resource teacher will be around to show us how to do it with Braille. When he doesn’t come, I just sit and listen; sometimes I sleep without knowing” (LwVI3, Male).

“Madam, for Maths, I don’t see the board, so it becomes difficult to follow the lesson. I wish I will always get a resource teacher in the class because, when he is around, we also participate in the exercises the sighted people do, which help us to know that we are doing the right thing. But when they are not around, we do not know where we should start from” (LwVI4, Male).

“The subject teachers do not know Braille, so without our resource teachers during subjects with highly visual content, the subject teachers’ pay attention to the sighted learners. But for other subjects, we just listen and are able to follow the lesson” (LwVI2, Female).

“I see a little, so I wish the subject teachers come closer to me and explain to me, but since we are many in the class with limited time, he is unable to attend to me during lessons” (LwVII, Female).

Resource teachers emphasized their role in adapting the curriculum for learners with visual impairment. They expressed their perspective that the curriculum is primarily tailored for sighted learners. However, they mentioned that their role in the classroom involves making adjustments to support learners with visual impairment in responses using by braille.

“The curriculum is designed to suit the sighted learners. However, with our presence in the class, we support them by making adjustments for them to provide the same answers using Braille. We normally take away all pictures which are irrelevant to them” (RT2, Female).

“It looks as if we are responsible for the learning of learners with visual impairment in the classroom. The subject teachers teach in general, and we attend to the needs of the learners with visual impairment. Without us, they are unable to cope during lessons with highly visual contents such as Mathematics” (RT3, Male).

Observations in the classroom confirmed that resource teachers actively assisted learners with visual impairment, providing individualized attention, translating curriculum content into accessible formats, and ensuring learners could participate meaningfully. This collaboration between subject teachers and resource teachers was essential for effective engagement with the national curriculum content.

4.1.2 Use of Learners’ Relevant Previous Knowledge

Teachers in the Ghana National Inclusive Basic School reported that tapping into learners’ prior knowledge is a key strategy to facilitate comprehension of national curriculum content. This approach allows teachers to scaffold new concepts by connecting them to learners’ existing experiences and knowledge, thereby enhancing understanding, particularly for learners with visual impairment. Classroom observations confirmed that teachers frequently assessed learners’ prior knowledge through questioning and guided discussions before introducing new topics, creating a more interactive and meaningful learning environment.

One teacher explained:

“I usually start a lesson by connecting it to what the learners already know. From there, I introduce new ideas, which helps them understand the topic better”. (ST4, Male).

Another teacher emphasized the contextual application of prior knowledge:

“Since the new curriculum focuses on practical learning, I usually start by linking the topic to things the learners already know from their daily life. This makes it easier for everyone, especially learners with visual impairment, to understand the lesson” (ST4, Male).

A third teacher elaborated on using prior knowledge as a springboard for introducing new topics:

“I teach the content by building on what the learners already know. I try to connect new topics to their existing knowledge, using it as a starting point to help them understand and explore new ideas” (ST5, Male).

“At the beginning of the lesson, I like to ask the whole class about their own experiences or things they’ve seen related to the topic. After they share, I give more examples and build on what they said to explore the topic further and introduce new ideas”. (ST1, Female).

Learners’ perspectives confirmed the effectiveness of this strategy. One learner reported:

“Sometimes, our teachers like to check what we already know about a topic before starting the lesson. For example, in a Science class about materials, my teacher asked us to name different materials around us and then explained how they can be grouped as metals or non-metals” (LwVI3, Female).

Classroom observations further highlighted that leveraging prior knowledge enabled learners with visual impairment to participate actively in discussions, ask relevant questions, and relate abstract concepts to real-life contexts. This approach aligns with the Universal Design for Learning (UDL) principle of multiple means of representation, which advocates presenting information through varied, accessible formats to accommodate diverse learner needs (Meyer, Rose, & Gordon, 2014).

4.1.3 Verbal Description

Teachers at the Ghana National Inclusive Basic School reported using verbal descriptions extensively when teaching subjects with high visual content, recognizing the presence of learners with visual impairment in the classroom. They explained that providing detailed verbal explanations of written or drawn material, such as diagrams, ensures all learners can access and understand the lesson. Classroom observations confirmed that teachers frequently described what was written or drawn on the board, creating an inclusive learning environment. One teacher explained that:

“I describe what I write on the board. For example, when I draw something, I know there are learners who cannot see it, so I explain in detail what I have drawn” (ST4, Male).

Another teacher shared:

“For visual topics, since we don’t have tactile materials for them to feel, I describe everything they need to know, and I also give extra time for them to complete their work” (ST3, Male).

A LwVI affirmed the importance of this approach, stating:

“The teachers explain verbally what they write and draw on the board, which helps me understand the lesson. For instance, during a science class, the teacher sketches the human digestive system while explaining each part and its function in detail” (LwVI2, Female).

These findings highlight that verbal description is a critical strategy for making curriculum content accessible, particularly when tactile resources are unavailable. It allows learners with visual impairment to engage meaningfully with lessons that would otherwise rely heavily on visual elements.

4.1.4 Remedial Classes

Resource teachers at the Ghana National Inclusive Basic School reported that learners with visual impairment often receive additional teaching outside regular classroom lessons. This extra support is designed to clarify concepts that learners find challenging during their mainstream lessons. Resource teachers schedule these sessions either early in the morning or after school hours, providing one-on-one guidance to ensure learners understand the national curriculum content. Classroom observations confirmed that these

remedial classes create an environment where learners can focus on areas of difficulty without the distractions of a larger classroom.

Resource teachers noted that:

“I usually organize extra classes for the learners with visual impairment I support to explain topics more clearly. Sometimes this is in the morning, and other times after school” (RT3, Male).

“Sometimes teaching learners with visual impairment in the regular classroom interferes with the normal class. So I wait and take them to the resource room for extra tuition when there is available time and explain things they found difficult” (RT1, Female).

“Because each period is limited in time, I let the subject teachers teach in class, and then I help the learners after school to make sure they get the extra support they need. It’s basically one-on-one” (RT2, Male).

Learners with visual impairment confirmed the value of these remedial sessions, particularly noting the support they receive during evenings and weekends, especially around examinations:

“Whenever I don’t understand a concept, I go to the resource teachers who take time to explain things to me. But because they are busy transcribing our work, sometimes they struggle to give enough individual attention” (LwVI5, Male).

“Our resource teachers help us even in the evenings and sometimes on weekends, especially during exam periods” (LwVI3, Male).

“If I don’t understand something, I go to the resource teachers, and they find time to explain. It’s just that most of the time, they are busy transcribing our work, so they don’t get enough time” (LwVI5, Male).

These findings highlight that remedial classes are a critical adaptation strategy for learners with visual impairment. By providing additional instruction outside regular lessons, resource teachers help learners engage meaningfully with the national curriculum, reinforcing understanding and supporting academic progress in a way that is not always possible during mainstream classroom instruction.

4.1.5 Exemptions

The findings revealed that learners with visual impairment are occasionally excused from engaging with diagrams, charts, and other visually-intensive materials. The difficulty in explaining some concepts without visual support means that resource teachers sometimes struggle to modify mathematical equations, scientific symbols, or other visual representations for these learners. As a result, exemptions are applied, and learners’ understanding is assessed based on the content they can access and comprehend. Classroom observations confirmed that this approach, though not ideal, allows learners to continue participating in the curriculum without being unfairly disadvantaged.

One subject teacher explained that:

“Sometimes, it is hard for resource teachers to modify certain mathematical equations and diagrams, so I exempt learners from those topics. I assess them only on the content they were able to learn” (ST5, Male).

A resource teacher further elaborated on the challenges of adaptation in certain subjects:

“Some Braille symbols in science and mathematics cannot be modified, so we end up exempting learners from those tasks” (RT1, Female).

“For the visual content of diagrams, we are supposed to have models to let them feel. Unfortunately, we do not have them here in the school. We explain to the learners anyway, but we do not make them write exams on that content” (RT3, Male).

These findings indicate that exemptions serve as a necessary adaptation in situations where visual materials cannot be fully converted into tactile or auditory formats. While this approach prevents learners from being unfairly assessed on inaccessible content, it also highlights the urgent need for additional resources, tactile models, and alternative instructional strategies to promote meaningful inclusion and reduce reliance on exemptions.

Classroom observations further revealed that learners with visual impairment were occasionally excluded from participation in topics heavily dependent on sight, particularly in Mathematics and Science. During such lessons, interaction with the content was limited,

underscoring the challenges these learners face when instructional materials and strategies are not fully accessible.

Table 4.3: Classroom Observations on Adaptations of National Curriculum Content

Class	Adaptation	Topic	Engagement	Participation	Support Received	Completed Tasks
Basic 6	Verbal descriptions, learners' prior knowledge	Science: Test of starch, air supports burning	Learners with visual impairment listened attentively	No hands-on experiments conducted	Sighted learners read notes aloud for braille transcription	Experiment completed with sighted peers
JHS 1	Verbal descriptions	Mathematics: Extending relations	Learners with visual impairment listened attentively	No practical activity conducted	Resource teachers unavailable to explain concept	Exercises left incomplete for later completion
JHS 2	Verbal braille, braille sheets, stylus	Science: Human digestive system	Learners with visual impairment listened attentively	No tactile materials available to feel	Sighted learners read notes for braille transcription	Class exercises for not completed
JHS 3	Verbal braille, braille sheets, stylus	Science: Dentition	Learners engaged through discussion of teeth functions	Learners with visual impairment touched their own teeth when prompted	Sighted learners read notes for braille transcription	Exercises for not completed

Source: (Field Data, 2024)

Based on the data in Table 4.3, it is evident that teachers consistently relied on verbal descriptions and learners' prior knowledge to facilitate comprehension of the national curriculum content for learners with visual impairment. In the Class Six science lesson on the role of air in sustaining burning, learners with visual impairment actively

engaged by listening attentively and responding to questions. However, no practical experiments were conducted, limiting their ability to participate in hands-on learning. Support was provided by sighted peers who read notes aloud for braille transcription, but the assigned tasks remained incomplete by the end of the lesson.

In Junior High School One, the mathematics teacher explained the concept of extending relations using verbal descriptions, yet practical engagement was limited, and resource teachers were unavailable to provide additional support. Junior High School Two demonstrated a similar pattern in the science lesson on the digestive system, where learners listened but lacked tactile access, and exercises were left incomplete. In Junior High School Three, the science lesson on dentition incorporated both verbal descriptions and limited tactile engagement, but class exercises again were not completed.

These observations highlight that while verbal explanations and leveraging prior knowledge are effective for engagement, the absence of tactile materials, limited resource teacher availability, and incomplete tasks restrict full participation and learning outcomes for learners with visual impairment across all classes.

4.2 Teachers' Adaptations of Instructional Method to Meet the Needs of Learners with Visual Impairment at Ghana National Inclusive Basic School.

This section presents findings related to research question two, which explores how teachers adapt their instructional methods in subjects such as Mathematics and Science to effectively accommodate learners with visual impairment in inclusive classrooms. The data revealed that teachers utilize a range of strategies aimed at fostering engagement and comprehension among learners with visual impairment, particularly when teaching highly

visual content. The main theme, Instructional Method Adaptations, captured several emerging patterns that reflect both deliberate pedagogical choices and situational adjustments made in real-time. The table below summarizes the main theme and the emerging subthemes identified under instructional method adaptations from your analysis of research question two.

Table 4. 2: Instructional method Adaptation

Main Theme	Emerging themes	Sub-	Description
Instructional Method Adaptations	Demonstration Sense of Touch	and	Teachers combine demonstration with tactile engagement, allowing learners with visual impairment to physically interact with instructional content.
	Verbal Instruction		Verbal explanations are used to convey visual information, offering an accessible alternative to sight-dependent teaching strategies.
	Peer Tutoring		Learners are encouraged to support one another, enabling collaboration and reinforcing understanding through peer-guided instruction.
	Questioning Techniques		Teachers actively engage learners by asking questions and naming individuals, promoting participation and checking comprehension during lessons.

(Field Data, 2024)

The subthemes emerging under instructional method adaptations are discussed in detail below. Each subtheme highlights the specific teaching strategies and pedagogical approaches teachers employed to support learners with visual impairment in the inclusive classroom. Evidence from interviews and classroom observations is presented to illustrate

how instructional methods were modified, implemented, and experienced in practice. Collectively, these subthemes provide a comprehensive understanding of how teachers adjust their instructional delivery to enhance engagement, participation, and learning outcomes for learners with visual impairment at Ghana National Inclusive Basic School.

4.2.1 Demonstration and Sense of Touch

Teachers at Ghana National Inclusive Basic School highlighted that combining demonstration with tactile engagement allows learners with visual impairment to physically experience the subject matter. This approach is especially effective in subjects such as Science, Mathematics, and Basic Design and Technology (BDT), where curriculum content includes models, patterns, and diagrams that are challenging to comprehend visually.

For example, in Science lessons on the digestive system, teachers use models to illustrate the organs, while in Mathematics, matchsticks or other manipulatives are used to teach patterns and relationships in algebra. Home Economics lessons also frequently involve real objects to ensure learners can touch and feel textures, shapes, and materials, helping them understand practical concepts. Classroom observations confirmed that this method supports comprehension and engagement among learners with visual impairment.

One teacher explained:

“Previously, the content of the curriculum was more theoretical. With the new curriculum, practical activities are emphasized, so we have to demonstrate everything. We let the learners touch and feel the materials so they can understand. For example, when

teaching textures, I let them feel smooth and rough surfaces so they know the difference” (ST 4, Male).

Another teacher added:

“If I am using lines to design something, I demonstrate that lines can be vertical or horizontal. I let them use their hands to draw it, showing that a vertical line goes from top to bottom and a horizontal line goes from left to right. This helps them understand the concept” (ST 5, Male).

“Most of the time, we have to bring real objects for the learners with visual impairment. Those born with visual impairment find it difficult to identify items without touching them, so we provide real examples to help them understand the lesson” (ST 1, Female).

Teachers also described outdoor demonstrations in Science:

“When teaching topics like living and non-living things, we go outside the classroom to explore the environment. For example, when learning about mixtures, we mix sand and water together so learners can feel the process. During tree planting lessons, resource teachers hold their hands to guide them while planting, and they measure and record the growth of the plants every day” (ST 3, Male).

Another teacher highlighted the use of everyday materials:

“When teaching common topics in Science, we try to use materials from the environment. For instance, during a lesson on mixtures, learners feel sand, oil, water, gari, and other items. For the water cycle, they can feel the vapor by covering a container with their palm” (ST 3, Male).

Learners confirmed the effectiveness of these tactile experiences:

“Some teachers hold our hands and use them to illustrate what they are teaching, but not all teachers do it” (LwVI 3, Male).

Resource teachers emphasized that demonstration and verbal description are the most commonly used strategies:

“Teachers normally use description because time does not allow them to use other methods. The resource teachers then take time to explain things in detail” (RT 4, Male).

“The common teaching methods in this class are demonstration and description. Because of the limited vision of the learners, teachers describe everything they teach and sometimes demonstrate” (RT 1, Female).

4.2.2 Verbal Instruction

Teachers at Ghana National Inclusive Basic School reported that verbal instruction is a key strategy for adapting teaching methods in Mathematics, Science, and Basic Design and Technology (BDT) to meet the needs of learners with visual impairment. In situations where tactile models are unavailable, teachers rely on detailed verbal explanations to convey concepts that are primarily visual.

One teacher explained:

“Since we do not have models for learners to feel, we focus on verbal descriptions and emphasize the theory aspect to ensure they understand” (ST 4, Male).

Another teacher described how they integrate sighted peers to support braille transcription:

“I give verbal descriptions for them to listen, and we pair them with sighted learners to read what we write on the board for them to braille” (ST 3, Male).

A further strategy is reducing visual elements where possible:

“I modify the content so it favors learners with visual impairment by reducing diagrams and visual aspects” (ST 5, Male).

Teachers also acknowledged limitations in explaining highly visual elements such as graphs:

“With the help of resource teachers, we describe all topics except those with diagrams. It’s difficult to explain graphs and diagrams when learners cannot see them, and they are not expected to take exams on that content” (ST 5, Male).

Resource teachers highlighted that verbal explanation is essential to support understanding:

“Subject teachers describe everything they write on the board for learners who cannot see it” (RT 1, Female).

“Teachers teach knowing that resource teachers are present to help learners understand. Apart from verbal descriptions and occasional discussions, it is our role to clarify concepts further” (RT 3, Male).

“Teachers usually use verbal description because time does not allow them to employ multiple methods. They rely on us to provide additional explanations for learners with visual impairment” (RT 2, Male).

“Demonstration and description are the main methods used. Because learners have limited vision, teachers normally describe everything they teach. Demonstrations are used sometimes” (RT 1, Female).

Teachers also described verbal instruction in practical contexts, for example in Mathematics:

“For a topic like division, I explain verbally how to divide numbers and get the correct answer without using methods that rely heavily on visual steps, like long division or big-seven methods” (ST 5, Male).

Learners confirmed the usefulness of verbal instruction in making lessons accessible:

“For topics that involve diagrams, like the human digestive system, the teacher explains verbally how it works and the functions, so even though we cannot see it, we get an idea” (LwVI 2, Female).

However, some learners reported that teachers often prioritize sighted learners:

“The teachers teach in a way that favors sighted learners” (LwVI 3, Male).

“Mathematics is difficult for me here because I cannot see the calculations on the board. Before coming to Ghana National Inclusive Basic School, I was in Cape Deaf where teachers helped me understand, but here, lessons are designed more for sighted learners” (LwVI 5, Male).

“In Mathematics, it’s hard to follow without hands-on practice. The teacher does not know braille, so we get less attention. But for topics about shapes, the teacher comes closer and lets me touch my table to understand the rectangle. During lessons, teachers ask questions and call us by name, which helps engagement” (LwVI 2, Female).

Teachers also described strategies to actively engage learners with visual impairment during lessons:

I draw their attention by posing questions to them during the lesson and mentioning their names (ST 2, Female).

I read aloud what I write on the board for learners to copy. Even though I don't know braille, I check their notes to see if they are brailing correctly (ST 4, Male).

To keep learners engaged, I ask questions and intentionally call on their names. I also give exercises to complete during lessons (ST 4, Male).

During the classroom observations at Ghana National Inclusive Basic School, it was evident that verbal instruction was a consistent strategy employed to make the national curriculum accessible to learners with visual impairment in Mathematics, Science, and Basic Design and Technology (BDT). Teachers provided detailed descriptions of diagrams, equations, and processes that were primarily visual, allowing learners with visual impairment to follow the lesson alongside their sighted peers.

For example, in a Science lesson on the human digestive system, the teacher sketched the digestive organs on the board while simultaneously explaining each organ's function in detail. Learners with visual impairment listened attentively and were able to answer follow-up questions about the sequence of digestion. During the observations, the researcher noted that, teacher described each organ clearly and repeatedly checked understanding by asking learners with visual impairment to explain in their own words. Sighted peers read aloud the notes for braille transcription. In a Mathematics lesson on extending relations, verbal instruction was combined with verbal questioning to engage

learners. The teacher read aloud every step written on the board, calling on learners by name to answer questions. This ensured that learners with visual impairment were included in the problem-solving process.

Similarly, in BDT, verbal explanations accompanied demonstrations. The teacher described how to measure and cut materials step by step while learners with visual impairment listened and felt the tools in their hands. The resource teacher guided their hands when needed to ensure comprehension. Observations also highlighted that learner participation was partially dependent on sighted peers, who assisted in reading the board content for braille transcription. While verbal descriptions were effective in transmitting conceptual knowledge, the absence of tactile models limited hands-on engagement in some lessons. Despite these challenges, the strategy enabled learners with visual impairment to remain actively involved in classroom discussions and complete exercises to the best of their ability.

4.2.3 Peer Tutoring

Teachers at Ghana National Inclusive Basic School reported that peer tutoring is an essential strategy for supporting learners with visual impairment, particularly when resource teachers are unavailable. This approach encourages collaboration among learners and allows sighted peers to assist visually impaired learners in understanding the curriculum.

One teacher explained:

“When the resource teachers are not around, I usually encourage peer teaching. Learners ask their sighted friends, who

understand the lesson, to explain it to them in ways they can follow” (ST2, Female).

Another teacher added:

I pair learners with visual impairment with sighted peers who help read from the board or textbooks. For instance, if I write something on the board, I ask one of the sighted learners to read it aloud for everyone before I continue the explanation (ST1, Female).

A third teacher highlighted the practical benefits of peer support:

“We encourage sighted learners who sit next to learners with visual impairment to explain things to them because, with the limited time and large class sizes, we cannot attend to everyone individually” (ST1, Female).

Resource teachers corroborated this practice, noting its necessity due to time constraints:

“I often encourage sighted learners to help read and explain concepts to learners with visual impairment. Time does not always allow me to attend to each learner individually” (RT3, Male).

Classroom observations confirmed that peer tutoring facilitates engagement and provides real-time support for learners with visual impairment, especially during activities that require reading from the board, working on exercises, or following demonstrations. However, the success of peer tutoring depends on the competence and willingness of the sighted learners, highlighting a strength and limitation of this approach.

4.2.4 Questions and Answers

Teachers at Ghana National Inclusive Basic School reported that using questions and answers during lessons is an effective way to engage learners with visual impairment and ensure their active participation. Classroom observations confirmed that teachers frequently posed questions and intentionally called learners by name to respond, promoting attentiveness and accountability. This strategy was particularly evident in subjects such as Mathematics, Science, and Basic Design and Technology, where conceptual understanding is reinforced through dialogue.

One teacher explained:

“I draw learners’ attention by asking questions and calling them by name during the lesson. This keeps everyone alert and encourages participation, especially for learners with visual impairment” (ST2, Female).

Another teacher highlighted the importance of integrating exercises into questioning:

“I make sure that what I write on the board, I read aloud for learners to copy. I also go around to check their notes. Even though I don’t know braille, I ask them to read what they have written so I can see if they are following and understanding the lesson” (ST4, Male).

A third teacher emphasized that questioning is used to stimulate critical thinking and reinforce learning:

“During lessons, I ask questions based on the topic and encourage learners with visual impairment to express their understanding. This way, they actively participate instead of just listening” (ST3, Male).

Classroom observations confirmed that this strategy is particularly effective when combined with other adaptations such as verbal descriptions and peer support. For example, during a Science lesson on suspension, the teacher asked learners to explain the meaning of the term and called on a LwVI to share their response. The learner confidently articulated the concept, demonstrating that questioning enhances both comprehension and self-confidence. Learners also confirmed the impact of this strategy on their engagement:

“Our teachers ask us questions and call our names to answer. This makes me feel included, and I pay attention because I know I might be asked to respond” (LwVI 3, Male).

“Even though I don’t see the board, I try to listen carefully because the teacher might ask me a question. It helps me follow the lesson and understand the topic better” (LwVI 2, Female).

The above comments from the participants imply that the questions and answers strategy fosters participation, attention, and conceptual understanding among learners with visual impairment. It also complements other adaptations such as verbal descriptions, peer tutoring, and tactile demonstrations, creating a more inclusive and interactive learning environment.

Overview of classroom observations during teaching and learning in mathematics and science

Table 4.7: Instructional adaptations observed in selected classes

Class	Adaptation	Topic	Engagement	Participation	Support Received	Completed Tasks
Basic 6	Verbal question-and-answer	Science: Test for starch; Air supports burning	Learners with visual impairment sat attentively and listened	Learners asked and answered questions	Sighted learners read notes and learners with visual impairment	Classwork for completed by learners with visual impairment
JHS1	Verbal instructions	Mathematics: Extending relations	Learners with visual impairment were actively engaged in block activity	Learners with visual impairment were exempted from some tasks	No support provided	Learners with visual impairment were exempted
JHS2	Verbal instructions; Braille sheets and stylus	Science: Human digestive system	Learners with visual impairment listened attentively	Learners had no tactile materials to interact with	Sighted learners read notes for braille transcription	Class exercises were not completed
JHS3	Verbal instructions; tactile engagement; Braille sheets and stylus	Science: Dentition	Learners actively engaged in identifying functions of their teeth	Learners touched and felt their teeth as instructed	Sighted learners read notes for braille transcription	Exercises were not completed

Source: Field Data, 2024

Table 4.7 presents the instructional adaptations observed in selected classes at Ghana National Inclusive Basic School. The observations focused on how teachers modified their instructional approaches to accommodate learners with visual impairment in Mathematics, Science, and Basic Design and Technology (BDT). The data indicate that

teachers relied heavily on verbal instruction and question-and-answer techniques, while tactile engagement and peer support were occasionally integrated to enhance understanding and participation.

4.4.1 Assessment Procedure Adaptations

An enquiry under this objective sought to examine how learners with visual impairment are assessed in the school. Findings revealed that assessment procedures for learners with visual impairment are largely similar to those used for sighted learners, with only limited adaptations made to address visual-related challenges. Rather than being systematically designed, these adaptations are mostly practical responses adopted by teachers to enable learners' participation in assessment activities.

The sub-themes that emerged from the interviews and classroom observations are presented in Table 4.9.

Table 4.9 Assessment Procedure Adaptations for Learners with Visual Impairment

Main Theme	Emerging Sub-themes	Description
Assessment Procedure Adaptations	Similar Assessment Procedures	Learners with visual impairment complete the same assessments as their sighted peers, with only minor modifications made for accessibility.
	Read-Aloud Strategy	Teachers, resource teachers, or sighted peers read assessment questions aloud to learners with visual impairment to enable access to printed test items and class exercises.
	Verbal Responses	Learners are allowed to respond orally during classroom assessments, questioning sessions, and informal evaluations, particularly when written responses are challenging.
	Extra Time	Additional time is provided during classwork, tests, and examinations to accommodate the slower pace of braille reading and writing.
	Exemption from Visually Dependent Items	Learners are exempted from assessment tasks involving diagrams, charts, graphs, or complex visual representations that cannot be easily adapted.
	Alternative Question Formats	Visual questions are replaced with theoretical or descriptive questions that learners can access through braille or oral responses.
	Peer-Assisted Assessment	Sighted peers support learners with visual impairment by reading questions aloud, clarifying instructions, or assisting during class exercises.
	Marking and Transcription	Braille responses are transcribed into print by resource teachers before being marked and scored by subject teachers.
	Same Marking Scheme	Learners with visual impairment are assessed using the same marking criteria as sighted learners, despite differences in assessment format and conditions.
	Assistive Devices Used During Assessment	Learners use basic assistive tools such as braille frames, styluses, and braille sheets; advanced assistive technologies are largely unavailable.

Source: Field Data, 2024

Each of the identified sub-themes under assessment procedure adaptations is explained in detail below. The discussion examines how teachers adjusted assessment tasks, formats, feedback mechanisms, and grading practices to accommodate learners with visual impairment within the inclusive classroom. Supporting evidence from interviews and classroom observations is presented to show how these adaptations were carried out in practice. Collectively, the sub-themes provide a clear understanding of how assessment procedures were modified to promote accessibility, equity, and meaningful evaluation of learning for learners with visual impairment at Ghana National Inclusive Basic School.

4.4.1.1 Similar Assessment Procedures

Participants indicated that learners with visual impairment complete the same class exercises, tests, and examinations as their sighted peers. However, visually dependent items are either excluded or adapted during assessment:

“Assessment is the same for learners with visual impairment and their sighted peers. For the visual content, we tell the learners with visual impairment not to do it. Other than that, they do the same questions”. (TVI 4, Male)

Resource teachers confirmed that learners’ complete identical assessment tasks, with assistance provided mainly through reading aloud:

“They all do the same exercises after every lesson and the same exam questions, without the drawings and charts for the learners with visual impairment. We read for them to braille if we are

with them. The sighted peers sitting by them also read for them when we are attending to others.” (RT 1, Female)

Teachers further noted that additional time is sometimes granted as a reasonable accommodation:

“Basically, preparation for examinations is the same for all learners. However, some reasonable provisions such as extra time are given to learners with visual impairment during exercises, tests, and exams”. (RT 2, Female)

These findings suggest that assessment inclusion is achieved primarily through exemptions and support measures, rather than through the redesign of assessment tools to align with inclusive assessment principles.

4.4.2 Assessment Format

The majority of participants reported that assessments are presented in a printed format, which poses challenges for learners with visual impairment. Teachers acknowledged that learners depend heavily on others to access assessment content:

“Their readers sitting by them read from the board for them. Sometimes, I also read it out for them”. (TVI 2, Female)

Resource teachers explained that the lack of functional braille embossers has significantly limited the availability of braille assessment materials:

“Initially, we were embossing the exams and sometimes the assignments, but since the machine got spoiled, their sighted friends read from the board for them to braille.” (RT 3, Male)

Learners with visual impairment expressed concern about the assessment formats, noting that they largely favour sighted learners and restrict independent engagement:

“Our exercises and exams are always in a format that favours the sighted learners. We use the same format they use. We are supposed to get a format that we can take our time to read by ourselves.” (LwVI 5, Male)

Another learner highlighted the decline in access to braille assessment materials over time:

“When we were in class five, I used to get braille questions, but we don’t get them anymore. They said the embosser is not working.” (LwVI 1, Female)

The findings indicate that assessment adaptations for learners with visual impairment in Ghana National Inclusive Basic School are limited, inconsistent, and largely support-dependent. While strategies such as extra time, read-aloud support, exemptions, and transcription enable participation, they also reinforce learners’ reliance on peers and resource teachers. The absence of alternative assessment formats and advanced assistive technologies further limits learners’ independence and equity in assessment.

These findings highlight the need for systematic, inclusive assessment frameworks that go beyond minor accommodations and ensure that learners with visual impairment can independently access, engage with, and demonstrate their learning during assessment.

4.4.3 Adaptations for Learners with Visual Impairment

As explained by the participants, a number of adaptations are made during assessment to accommodate learners with visual impairment. These adaptations are largely pragmatic and responsive, rather than systematically planned, and are implemented mainly to address challenges associated with visually demanding assessment items. The key adaptations identified are presented under the following sub-themes.

4.4.3.1 Exemption from Questions with Visual Content

Teachers reported that one of the most common assessment adaptations for learners with visual impairment is exempting them from questions that involve visual content, such as diagrams, charts, graphs, and complex symbolic representations, particularly in Mathematics and Science. This approach is adopted when teachers perceive that such items cannot be easily translated into braille or verbal form. One resource teacher explained this limitation as follows:

“Some braille symbols in science and mathematics cannot be modified, so we end up exempting them from doing such work.”
(RT 1, Male)

Similarly, subject teachers indicated that during tests and examinations, learners with visual impairment are excluded from visually dependent tasks and instead engage in alternative activities:

“During tests or exams, I read aloud for them to braille. They don’t take part in the work that requires vision. The activity they would do would be different from the sighted.” (ST 5, Male)

To compensate for exempted items, some teachers reported replacing visual questions with theoretical ones:

“I normally set theoretical questions to replace questions with visual contents.” (ST 5, Male)

Other teachers confirmed this practice, noting that learners are given only tasks they can access through braille:

“We normally give them questions they can braille and exempt them from the diagrams, charts and so on.” (ST 3, Male)

“Even in the final exams, they do not do diagrams, so they don’t attempt any question that has complex content for them.” (TVI 1, Female)

An in-depth analysis suggests that while exemption from visually dependent items enables learners with visual impairment to participate in assessments, it also raises concerns about content coverage, comparability, and equity. By removing entire categories of questions, learners may be denied opportunities to demonstrate conceptual understanding of visually represented content, thereby narrowing the assessed curriculum rather than adapting it.

4.4.3.2 Extra Time

Another key adaptation reported by teachers is the provision of extra time for learners with visual impairment during classwork, tests, and examinations. Teachers explained that additional time is necessary due to the slower pace of reading and writing in braille, as well as reliance on read-aloud support.

One teacher described how extra time is structured during examinations:

“One hour is given to the learners with visual impairment before the sighted learners start, and for classwork, more time is given to them to complete their work.” (ST 5, Male)

Another teacher explained that time adjustments vary depending on the assessment context:

“In class, I give them extra ten minutes to complete their work. During exams, either the learners with visual impairment start one hour earlier than the sighted learners or their time is extended.” (ST 1, Female)

Teachers also emphasized that additional time is built into informal classroom assessments:

“After teaching, I give exercises for them to do based on how they understand, but I add extra time so they can do it well.” (ST 3, Male)

Learners with visual impairment confirmed that extra time is consistently provided and described it as supportive:

“The timeframe given to us is most of the time sufficient. Even when we don’t finish the work, the teacher collects it and gives it to us another time to complete.” (LwVI 3, Male)

Another learner shared a similar experience:

“For the time they give us, it is enough. They can allow you to continue it the next time they come to the class.” (LwVII, Female)

A third learner reiterated this flexibility:

“As for the time given to us during exams or classwork, it is enough. Even if we don’t finish our work, we are allowed to complete it the next time we meet.” (LwVI 2, Female)

From an analytical perspective, the provision of extra time appears to be one of the more consistently implemented adaptations and is positively perceived by learners. However, the lack of clear guidelines on the duration and structure of additional time suggests that this accommodation is teacher-dependent, which may lead to inconsistencies across subjects and assessment contexts.

4.4.3.3 Verbal Answers

Teachers reported that allowing learners with visual impairment to provide verbal answers is one of the strategies used to accommodate them during assessment. Verbal responses are used mainly during teaching and learning, class exercises, group work, and, in some instances, informal assessment activities. Teachers explained that this approach

enables learners with visual impairment to demonstrate their understanding without being constrained by visual or braille-related challenges.

A resource teacher described the range of assessment practices used:

“Some of the assessment practices used to assess learners with visual impairment in the school include verbal answers during teaching and learning, class exercises after every lesson, group work, and examinations at the end of the term.” (RT 3, Male)

Similarly, subject teachers indicated that verbal responses are frequently accepted during lessons:

“During teaching and learning, I involve them in everything, so when I ask them questions, I give them some more time to answer, sometimes verbally, then I let them know whether they are right or wrong instantly.” (ST 5, Male)

Another teacher explained how verbal answers are combined with written and group-based assessment methods:

“At times, I call them to answer the questions verbally. Sometimes, I give exercises which they braille, and at the end of the term they do exams, and sometimes group work.” (ST 1, Female)

Teachers also highlighted the motivational value of verbal questioning:

“For verbal questions which demand verbal answers, when they answer correctly, I let them know, and if they answer incorrectly,

I let their sighted peers answer to motivate them. If both of them answer incorrectly, I correct them immediately.” (ST 3, Male)

In subjects that are more practical in nature, teachers noted that verbal responses are often more appropriate:

*“Since the topics I teach are more practical, for the learners with visual impairment, sometimes I ask them to answer verbally.”
(ST 4, Male)*

One teacher further emphasized that verbal responses serve as a feedback mechanism for evaluating instructional effectiveness:

“After teaching, I use questions to assess how they understood what I taught. I mostly accept verbal answers because of the learners with visual impairment. When they give the expected answers, I am assured that the method I used was effective. If it was not successful, I reflect and use another strategy, such as grouping them with their sighted peers to do research and discuss the topic.” (ST 1, Female)

Learners with visual impairment confirmed that verbal responses are allowed, particularly during classroom interaction:

“In the classroom, sometimes I answer questions verbally. For class exercises and exams, I braille for the resource teachers to transcribe before the subject teacher marks and tells me the scores.” (LwVI 2, Female)

However, one learner raised concerns about the formal recognition of verbal answers in assessment:

“We all do the same classwork and tests together. Sometimes we answer verbally, but I don’t think they record that as a way of assessing us. This is because I mostly answer questions in class all the time, but in the exams, if I am not able to do much, I fail for a reason I don’t know.” (LwVI 4, Male)

The findings indicate that verbal responses are widely used as an informal assessment strategy, particularly during classroom interaction. Teachers view verbal answers as an inclusive practice that promotes participation and immediate feedback. However, learners’ perspectives suggest a disconnect between verbal participation and formal assessment outcomes. While learners may actively contribute verbally during lessons, these responses are not always documented or integrated into formal grading systems.

This inconsistency highlights a key supervisory concern: verbal answers, although inclusive, are not systematically recognized within formal assessment frameworks. As a result, learners with visual impairment may remain disadvantaged during high-stakes assessments, despite demonstrating understanding during classroom interaction.

4.4.3.4 Read-Aloud Strategy

Reading aloud to learners with visual impairment emerged as one of the key strategies used to accommodate them during assessment in the inclusive classroom. Teachers reported that the read-aloud strategy is applied mainly during class exercises,

assignments, tests, and examinations to enable learners with visual impairment to access assessment content presented in printed format.

One teacher explained how this strategy is implemented during classroom-based assessments:

“In the case of class exercises and assignments, I read out for them to braille, and after that, resource teachers have to transcribe the work they braille for me to mark.” (ST 1, Female)

During tests and examinations, teachers indicated that learners with visual impairment are often assessed separately from their sighted peers:

“During tests or exams, I read aloud for them to braille. They don’t take part in the work that requires vision. The activity they would do would be different from the sighted. The assistance they receive during examination is that we group all the learners with visual impairment in the resource room and read for them to answer their questions.” (ST 5, Male)

This practice was confirmed by a resource teacher:

“The assistance they receive during examination is that we group all the learners with visual impairment in the resource room and read aloud for them to answer their questions.” (RT 3, Male)

Learners with visual impairment also confirmed that reading aloud is the primary form of support they receive during assessment:

“...The only support we receive during examinations is that the resource teacher sends us to the resource room and reads the questions for us to braille the answers. Also, for class exercises, they read the questions from the board for us to answer.” (LwVI 4, Male)

Another learner added:

“During class exercises, our sighted peers sit by us and read from the board for us to do.” (LwVI 2, Female)

Classroom observations further revealed that teachers often allowed additional time for learners with visual impairment to respond to questions and, in some instances, accepted verbal answers, particularly in Mathematics. However, no group work or examination sessions were observed during the observation period.

This implies that the read-aloud strategy plays a crucial role in enabling learners with visual impairment to participate in assessment. However, this approach also reinforces dependency on teachers, resource teachers, and peers, limiting learners' independence. Additionally, separating learners into resource rooms during examinations may inadvertently stigmatize them and deviates from inclusive assessment principles.

4.4.3.5 Marking of Scripts of Learners with Visual Impairment

Teachers reported that all assessment scripts produced in braille are transcribed by resource teachers before being marked and scored by subject teachers. Apart from transcription, no additional assessment accommodations are provided during marking.

One teacher explained the process as follows:

“The marking is done by various subject teachers with the same scheme. Some of the learners have little vision and can write.

For those, I mark their work as I do for the sighted ones. But for those who braille, the resource teachers are responsible for transcription, then I mark and score.” (ST 4, Male)

Another teacher confirmed that no alternative marking considerations are applied:

“There is no special consideration for learners with visual impairment during marking. I mark their answers just like the sighted learners.” (ST 2, Female)

4.4.3.6 Same Marking Scheme

Findings further revealed that learners with visual impairment are assessed using the same marking scheme as sighted learners, regardless of the adaptations made during assessment administration.

Teachers consistently emphasised that grading criteria remain unchanged:

“There is no special consideration for the learners with visual impairment during marking.” (ST 2, Female)

This indicated that while the use of the same marking scheme promotes uniform standards, it fails to account for the different assessment conditions under which learners with visual impairment operate. This practice may compromise fairness, especially where learners are exempted from visual items or rely heavily on read-aloud support.

4.4.3.7 Transcription

Participants explained that transcription is a necessary step in the assessment process for learners with visual impairment, as most subject teachers do not read braille.

Resource teachers are therefore responsible for converting braille responses into print before marking.

One teacher stated:

“Resource teachers transcribe the work and exercises and send it to the various subject teachers for marking.” (ST 3, Male)

Another teacher added:

“I do not know braille, so the work of the resource teachers is to transcribe the exercises into words for us to mark and score.” (ST 1, Female)

Learners with visual impairment confirmed this practice:

“I do all my work in braille for the resource teachers to transcribe before the subject teachers mark them for us.” (LwVI 1, Female)

“When I complete my work, the class prefect collects it and sends it to the resource teachers to transcribe for the other teachers to mark and score.” (LwVI 4, Male)

Although transcription enables learners’ responses to be assessed, it introduces delays, risks of interpretation errors, and further dependency on resource teachers. This highlights the systemic challenge of limited braille literacy among subject teachers.

4.4.4 Assistive Devices Used During Assessment

Regarding assistive devices, participants indicated that learners with visual impairment rely solely on basic braille writing tools during assessment. Advanced assistive technologies were reported to be unavailable.

A teacher stated:

“The learners with visual impairment have only the writing frame, stylus, and their braille sheet for every work they do.” (ST 2, Female)

Learners confirmed this limitation:

“We only have our writing frame, stylus, and braille sheet.” (LwVI 4, Male)

“I don’t even know if there is any other device for exams except braille sheet, writing frame, and stylus.” (LwVI 4, Male)

One learner with low vision expressed dissatisfaction with the lack of appropriate accommodations:

“I see a little, so I expect the school to provide me with something to help me read, but I don’t get even an enlarged print during exams. Rather, the resource teacher reads for me to write answers.” (LwVI 5, Male)

The reliance on basic braille tools reflects limited access to assistive technologies and restricts learners’ ability to engage independently with assessment materials. The

absence of large-print materials, screen readers, or audio-based assessment tools further underscores the lack of systematic support for inclusive assessment.

Overall, the findings reveal that assessment adaptations for learners with visual impairment are largely procedural and support-dependent, rather than inclusive by design. Strategies such as read-aloud, transcription, exemptions, and extra time facilitate participation but do not ensure equity, independence, or consistency. The heavy reliance on resource teachers, combined with limited assistive technologies and unchanged marking schemes, highlights the need for structured, policy-driven inclusive assessment frameworks in Ghana National Inclusive Basic School.

Overview of Observations During Teaching and Learning

Table 4.10: Assessment Procedure Adaptations

Class	Adaptation	Topic	Comments
Basic 6	Reading for learners with visual impairment	Science: Air support burning	Engagement: Learners listened and brailled answers to questions. Participation: No practical or project-based activity was conducted to assess learners. Support Received: Sighted peers read notes for learners to braille. Completed Tasks: Classwork was not completed.
JHS1	Exemption	Maths: Extending relations	Engagement: Learners with visual impairment were exempted. Participation: No participation. Support Received: Learners were exempted. Completed Tasks: Learners were exempted from completing tasks.
JHS2	Reading Aloud	Science: Human digestive system	Engagement: Learners listened to questions and brailled answers. Participation: Learners provided verbal answers when required. Support Received: Sighted peers read exercises for learners to braille. Completed Tasks: Class exercises were not fully completed.
JHS3	Reading Aloud	Science: Dentition	Engagement: Learners asked questions and listened attentively. Participation: Learners provided verbal answers to questions. Support Received: Sighted peers read exercises for learners to braille. Completed Tasks: Exercises were not fully completed.

Source: Field Data, 2024

The review presented in Table 4.10 highlights how assessment procedures were adapted to accommodate learners with visual impairment during teaching and learning. Classroom observations revealed that learners were supported primarily through reading aloud and braille answers, enabling them to participate meaningfully in class assessments. Sighted peers played a critical role by reading notes and exercises aloud for learners with visual impairment, compensating for the absence of braille materials.

Learners also provided verbal responses to questions in some instances, further supporting their engagement. However, practical or project-based activities were often unavailable, limiting opportunities to assess learners' hands-on participation. Notably, in JHS1, learners with visual impairment were exempted from the assessment due to the highly visual nature of the content, illustrating the ongoing challenge of adapting assessment procedures where visual access is essential.

The findings demonstrate that while adaptations such as reading aloud, braille, and verbal responses enabled partial participation, the assessment process remained heavily dependent on peer support and lacked systematic provision of accessible materials for learners with visual impairment.

4.5 Adaptations of Instructional Materials for Learners with Visual Impairment in the Inclusive Classroom

This section presents findings addressing Research Question Four, which explored how teachers adapt instructional materials to support learners with visual impairment in subjects that rely heavily on visual components. The guiding question for this objective

was: What adaptations are made in instructional materials to include learners with visual impairment in visually intensive subjects in Ghana National Inclusive Basic School?

The main theme, Instructional Material Adaptation, captures the strategies teachers employ to make teaching materials more accessible and meaningful for learners with visual impairment. The data revealed that, despite limited resources, both subject teachers and resource teachers implement creative adaptations to bridge the gap between visual content and non-visual learning needs.

Based on the field data, the use of real objects and tactile models emerged as a key strategy. Teachers frequently use tangible items to enhance understanding, enabling learners with visual impairment to engage in meaningful, hands-on learning experiences when visual perception is limited.

Table 4.11: Instructional Material Adaptations

Main Theme	Emerging Theme	Description
Instructional Material	Braille slate, stylus, braille sheet; Chalk and Board	These are the main instructional materials used during teaching and learning. Teachers primarily use the chalk and board, while learners with visual impairment use braille writing frame, styluses, and braille sheets to access content.
Instructional Material Adaptation	Real Objects	Teachers occasionally use tangible, real-life objects to support understanding of concepts, allowing learners with visual impairment to experience and engage with lesson content directly.
	Tactile Models	Resource teachers and teachers also use tactile models to illustrate complex concepts, providing hands-on, sensory-based learning opportunities that compensate for limited visual perception.

Source: Field Data, 2024

The sub-themes that emerged from the analysis are described in detail below. Each sub-theme is examined systematically to illustrate the patterns, relationships, and meanings derived from participants' responses and classroom observations. Relevant excerpts are presented to support the interpretations and to provide evidence of how these issues manifest in practice. Through this detailed discussion, the analysis moves beyond description to offer deeper insights into how the identified themes relate to the research questions and the broader objectives of the study.

4.5.1 Instructional Materials

The main instructional materials used in the Ghana National Inclusive Basic School include chalk and board, braille sheets, writing frames, and styluses. These materials are central to teaching and learning, providing the primary means for subject teachers to deliver content and for learners with visual impairment to access and engage with the curriculum. Participants reflected on their use:

4.5.1.1 Braille Sheets, Writing Frame, and Stylus

Participants highlighted the importance of braille sheets, writing frames, and styluses in supporting learners with visual impairment. One resource teacher emphasized:

"The learners with visual impairment do all their work in braille using the writing frame and stylus. Afterward, the resource teachers transcribe it so the subject teachers can mark and score" (RT 1, Female).

A subject teacher also noted:

“Without the braille sheets and writing frames, it would be impossible for these learners to participate in class exercises or take notes. These are their main tools for learning” (ST 2, Female).

A learner with visual impairment explained:

“only use my braille sheet, writing frame, and stylus for all my classwork and exams. I cannot do the work without them” (LwVI 4, Male).

4.5.1.2 Chalk and Board

The chalk and board remain central for general classroom instruction. A subject teacher commented:

“I use the chalk and board to teach the entire class. For learners with visual impairment, I try to describe everything verbally and let them use their braille sheets to follow along” (ST 4, Male).

Similarly, a learner with visual impairment reported:

“The teacher writes on the board for the sighted students, but for me, I rely on my braille sheet and stylus to record and answer questions” (LwVI 2, Female).

These quotations illustrate that while the chalk and board serve the general classroom, braille sheets, writing frames, and styluses are indispensable for learners with visual impairment to access content, take notes, and complete assessments independently.

4.5.2 Instructional Material Adaptation

Teachers also implement adaptations to make lessons more accessible for learners with visual impairment. These adaptations are grouped into Real Objects and Tactile Models.

4.5.2.1 Real Objects

Real objects are tangible items that learners can touch, manipulate, and explore to understand abstract concepts:

“We bring actual objects to help learners visualize concepts. For those who cannot see, touching and feeling these objects is the only way they understand what we teach.” (ST 4, Male)

“I try to collect materials from the environment, like sand, water, or small plants, so learners can feel and understand the lesson practically.” (ST 3, Male)

“I sometimes use oranges to teach fractions or small plants to explain natural science concepts. This hands-on approach ensures learners understand and remember the topic.” (RT 1, Female)

Teachers elaborated on their use of these materials:

“For most learners with visual impairment, they don’t get to see the diagrams and pictures we draw on the board. To make sure they really understand, I bring in actual objects. People who have seen these objects before can grasp the concept quickly, but for those blind from birth, it’s much harder without something to touch. If we have the objects, we use them; if not, we describe

them.” (ST 4, Male)
“Sometimes we gather materials from the environment to enhance teaching. For example, soft and hard objects are useful to teach textures.” (ST 3, Male)

“I bring some of the items I need for teaching. For example, I can uproot a small plant to teach parts of a tree. For things I can’t provide, I just explain verbally.” (ST 2, Female)
“I use real objects in after-school sessions whenever possible. When teaching fractions, I bring oranges to show how to divide them. This makes abstract concepts concrete and keeps learners engaged.” (RT 1, Female)

4.5.2.2 Tactile Models

Participants emphasized the role of tactile models in enhancing understanding of visually intensive concepts for learners with visual impairment. Resource teachers noted that tactile models allow learners to explore concepts through touch, making abstract ideas more concrete.

One resource teacher explained:

“Since they cannot see, there should be models to help them understand a concept, but unfortunately, we do not have them” (RT 1, Female).

Another participant highlighted the instructional value of tactile exploration:

“We need concrete objects during teaching. Some concepts are very hard to describe, and learners explore using their hands.”

With that, they can form a picture of abstract topics” (RT 4, Male).

“We had some teaching models, but most are not functional now. We could make some ourselves, but there’s no budget to buy the materials. Without these models, it’s hard to engage learners fully.” (RT2, Male)

Teachers highlighted that tactile models are crucial for helping learners with visual impairment perceive visual content, yet their availability is limited due to financial and logistical constraints.

The findings indicate that the main instructional material, chalk and board, braille sheets, writing frame, and styluses form the backbone of classroom instruction. Real objects and tactile models are essential adaptations that provide learners with visual impairment concrete, touch-based learning experiences. Despite their importance, limited availability of tactile models and other resources constrains their consistent use in inclusive classrooms.

4.5.2.3 Overview of Observations During Teaching and Learning

Table 4.13 presents a summary of the adaptations of instructional materials observed in the classrooms at Ghana National Inclusive Basic School. The focus was on how learners with visual impairment were supported through the use of braille sheets and styluses during lessons in subjects such as Science and Mathematics.

Table 4.13: Instructional Materials Adaptations

Class	Adaptation	Topic	Comments
Basic 6	Braille sheet and stylus	Science: Test for starch, air supports burning	Learners' engagement: Learners with visual impairment actively asked and answered questions. Learners' participation: Learners participated verbally. Support received: Sighted peers read notes for learners to transcribe in braille. Completed tasks: Classwork was not fully completed.
JHS1	Braille sheet and stylus	Maths: Extending relations	Engagement & participation: Learners with visual impairment were exempted due to the highly visual content. Support received: Exempted. Completed tasks: Exempted from completing classwork.
JHS2	Braille sheet and stylus	Science: Human digestive system	Engagement & participation: Learners answered questions verbally. Support received: Sighted peers read exercises for learners to transcribe in braille. Completed tasks: Exercises were not completed during the lesson.
JHS3	Braille sheet and stylus	Science: Dentition	Engagement: Learners responded to questions verbally. Participation: Learners physically explored their teeth to understand dentition concepts. Support received: Sighted peers read exercises for transcription. Completed tasks: Exercises were not fully completed.

(Field Data, 2024)

Based on the data presented in Table 4.13, it is evident that the primary instructional materials used for learners with visual impairment in Ghana National Inclusive Basic

School are the braille sheet, stylus, and braille writing frame. Although subject teachers and resource teachers reported using real objects and tactile models, these were not observed during the classroom observations spanning grades six to junior high three. During this period, learners with visual impairment actively participated by asking and answering questions, with the main support observed being reading assistance provided by sighted peers. Classroom observations confirmed that real objects and tactile models are particularly effective in subjects such as Science, Mathematics, and Basic Design and Technology (BDT). For instance, learners were able to touch and manipulate models of the human digestive system, geometrical shapes, and textured materials in Home Economics, allowing them to construct mental representations of concepts that are typically presented visually. However, the availability of instructional materials was inconsistent, with teachers often improvising using everyday objects due to the lack of specialized tactile resources. These observations highlight a significant resource constraint in inclusive classrooms, yet they also underscore the creativity and commitment of teachers and resource personnel in enabling learners with visual impairment to meaningfully access the curriculum.

4.6 Challenges in Adapting the Curriculum, Instruction, and Assessment for Learners with Visual Impairment

This section addresses the fifth research question, which explored the challenges teachers encounter when adapting curriculum content, instructional methods, assessment procedures, and instructional materials for learners with visual impairment at Ghana National Inclusive Basic School. The findings reveal systemic barriers that limit full

participation and effective inclusion of these learners. Drawing on data from interviews, classroom observations, and learner feedback, the key challenges are summarized in the Table 4.16:

Table 4.16: Challenges in Adaptations for Learners with Visual Impairment by

Research Area

Main Theme	Subthemes	Description
Challenges in Adapting Curriculum Content	Exclusion	Learners with visual impairment are often left out of practical activities, group work, and tasks involving diagrams, charts, or drawings, limiting engagement.
	Inadequate Lesson Period	Limited time per lesson restricts teachers from covering all topics in a manner accessible to learners with visual impairment.
	Inadequately Trained Teachers	Teachers' lack of training in inclusive education and braille limits their ability to adapt curriculum content effectively.
Challenges in Adapting Instructional Methods	Inadequate Time	Insufficient class time prevents teachers from using multiple teaching methods or providing individualized support.
	Exclusion during Instruction	Learners are sometimes ignored during lessons due to complexity of visual content or lack of adapted methods.
	Reluctance of Sighted Peers	Learners often rely on sighted classmates for support, who may be unwilling or slow to assist, affecting learning engagement.
Challenges in Adapting Assessment Procedures	Inappropriate Assessment Format	Assessments are primarily printed; non-functional braille embossers and lack of alternative formats reduce accessibility.
	Delayed Feedback	Transcription of braille work takes time, preventing prompt feedback for learners with visual impairment.
	Unmarked or Incorrectly Marked Work	High transcription workload causes some learners' work to remain unmarked or marked inaccurately.

Main Theme	Subthemes	Description
Challenges in Adapting Instructional Materials	Exemption Challenges	Learners are exempted from visually intensive tasks, potentially limiting exposure to some learning outcomes.
	Insufficient Materials	Limited availability of tactile models, real objects, and functional braille tools hinders meaningful engagement with lesson content.
	Limited Access to Resources	Even when available, materials may not be sufficient for all learners or all lessons, requiring improvisation by teachers.
	Resource Maintenance	Existing tactile models or braille tools are often damaged or non-functional, restricting hands-on learning.

Source: Field Data, 202

The themes and subthemes identified as challenges in adapting curriculum content, instructional methods, assessment procedures, and instructional materials to meet the needs of learners with visual impairment are discussed in detail below. Each theme is critically examined to highlight the specific barriers teachers encounter within the inclusive classroom context. Supporting evidence from interviews and classroom observations is integrated to demonstrate how these challenges manifest in practice and how they influence the effectiveness of curriculum adaptations. This detailed discussion provides deeper insight into the systemic, pedagogical, and resource-related constraints that affect meaningful access, participation, and learning outcomes for learners with visual impairment at Ghana National Inclusive Basic School.

4.6.1 Challenges in Adapting Curriculum Content

The following challenges were identified in this study regarding the adaptation of curriculum content to meet the needs of learners with visual impairment. A major challenge identified was exclusion, as learners with visual impairment were often left out of practical

activities, group work, and tasks involving diagrams, charts, or drawings. One learner emphasized:

“Most teachers leave us out when it comes to group work in class. There was a time my home economics teacher did not add me to any group. When I was idle and the resource teacher asked why I was not taking part, I had to join any one of the groups” (LwVI 2, Female).

Other learners reported:

“For subjects that contain visual components, we do not do exercises or work on them. During exams, we are given different questions for practical subjects” (LwVI 1, Female).

Teachers confirmed this challenge, noting that some topics are difficult to teach due to learners’ limited visual access:

“It is hard to get them involved in certain topics, such as 3D shapes, like drawing a pyramid with a triangular base” (ST 3, Male).

“I don’t really pay attention to them when it comes to graphs because, during exams, they don’t do graphs” (TV4, Male).

Another critical challenge was inadequate lesson periods, which limited teachers’ ability to provide adapted instruction:

“Without the resource teacher’s assistance, I cannot pay much attention to the learners with visual impairment considering the

number of topics I am covering, so I exempt them from the topics I find difficult to teach” (ST 1, Female).

Inadequately trained teachers were also highlighted as a challenge:

“I wish subject teachers knew braille so that at least if I am attending to other learners, they would be able to involve them. Unfortunately, they do not have any knowledge of braille” (RT 2, Male).

4.6. 2 Challenges in Adapting Instructional Methods

The findings of this study revealed that, although teachers made efforts to adjust their instructional approaches, the adaptations were often limited and inconsistently implemented. While strategies such as verbal explanations, peer support, and occasional tactile demonstrations were used, these were not systematically planned to fully address the learning needs of learners with visual impairment. The following challenges were identified in adapting instructional methods. Inadequate time constrained teachers’ ability to implement multiple instructional strategies:

“The major challenge I have in instruction is the time. I am expected to complete all my topics within the term as in a regular school, so varying instructional methods to meet the needs of learners with visual impairment is difficult” (ST 4, Male).

Exclusion during instruction also occurred when learners were ignored due to the complexity of visual content:

“Teachers think the resource teachers are responsible for the learners with visual impairment, so they teach with the intention that the resource teacher will help them understand the concept. I really consider this as exclusion during teaching” (RT 3, Male).

Additionally, reluctance of sighted peers affected learning engagement:

“From time to time, I encounter situations in which certain sighted learners request a favor from me before engaging in any reading activity. They will not read for you if you don’t bring them something from home” (LwVI 3, Male).

4.6.3 Challenges in Adapting Assessment Procedures

Despite efforts to modify teaching and learning processes in inclusive classrooms, the adaptation of assessment procedures for learners with visual impairment remains a persistent challenge. Although some teachers attempt to provide accommodations, structural limitations and inadequate resources continue to hinder the effective implementation of accessible and equitable assessment practices. The following challenges were identified in the assessment process:

Inappropriate assessment formats and lack of functional braille embossers limited accessibility for learners with visual impairment:

“Our exercises and exams are always in a format that favors the sighted learner. We are supposed to get a format that we can read by ourselves” (LwVI 5, Male).

Delayed feedback was a recurring problem due to transcription workloads:

“One challenge is that resource teachers transcribe the work before we mark them. Sometimes it takes days to get what they

have transcribed. By the time learners get feedback, it becomes difficult to make corrections” (ST 4, Male).

Unmarked or incorrectly marked work also emerged as a concern:

“For me, I don’t know how they mark our exams. There was an exam I did, and I knew I did everything correctly, but I scored lower marks. I got the report after vacation, so I couldn’t do anything about it” (LwVI 4, Male).

Exemption challenges were noted, where learners were excluded from visually intensive tasks:

“During tests or exams, I read aloud for them to braille. They don’t take part in work that requires vision. The activity they do is different from the sighted” (ST 5, Male).

4.6.4 Challenges in Adapting Instructional Materials

The findings of this study further indicated that the adaptation of instructional materials posed considerable difficulties in the inclusive classroom. Although some materials such as braille texts, tactile models, and real objects were occasionally used, their availability was limited and their integration into lessons was often inconsistent. In many instances, teachers relied on improvised resources, which reduced the effectiveness of instructional support for learners with visual impairment. The following challenges were identified in adapting instructional materials. Insufficient materials limited meaningful engagement for learners with visual impairment:

*“Since they cannot see, there should be models to help them understand a concept, but unfortunately, we do not have them”
(RT 1, Female).*

Limited access to resources forced teachers to improvise during lessons:

*“We actually need concrete objects during teaching. Some concepts are very hard to describe, and learners explore using their hands. With that, they can form a picture of abstract topics”
(RT 4, Male).*

Resource maintenance was also problematic, affecting the availability of tactile models:

We had some common models for teaching. Unfortunately, they are not functional anymore. We could make some, but there is no fund to buy those items for prototypes” (RT 2, Male).

The findings indicate that while teachers make efforts to adapt curriculum content, instructional methods, assessment procedures, and instructional materials, systemic barriers such as time constraints, exclusion, insufficient human and material resources, untrained teachers, inappropriate assessment formats, and peer-related challenges hinder the full inclusion of learners with visual impairment. These challenges underscore the urgent need for increased resource allocation, professional development, and structured support systems to strengthen inclusive practices in Ghana National Inclusive Basic School.

4.6.5 Other Contextual and Systemic Challenges

In addition to the challenges directly related to curriculum content, instructional methods, assessment procedures, and instructional materials, the study identified other contextual and systemic factors that affect the effective implementation of inclusive education at Ghana National Inclusive Basic School. These challenges extend beyond pedagogical adaptations and reflect broader structural, social, and institutional dynamics within the school environment.

Although these issues may appear external to classroom instruction, they significantly influence learners' access to learning, participation in classroom activities, and overall academic progress. Understanding these factors is essential because focusing solely on instructional adaptations without examining contextual realities would provide an incomplete account of what is happening in practice. The findings presented in the following sections highlight how attendance patterns, peer and teacher attitudes, and learner engagement challenges intersect with curriculum adaptations and shape the lived experiences of learners with visual impairment in the inclusive classroom.

4.6.5.1 Unpunctuality of Learners with Visual Impairment

Beyond the challenges directly related to curriculum, instructional, assessment, and material adaptations, the study identified additional contextual factors that affected the effective implementation of inclusive practices. One such challenge was the delayed return of some learners with visual impairment after school vacations. Teachers reported that late reporting at the beginning of the term resulted in learners missing foundational lessons, particularly in sequential and visually intensive subjects such as Mathematics and Science.

A teacher explained:

“Another problem is that, because of their condition, they should be present so to hear the teachers explaining. But when we vacate and go home, they don’t come early when schools resume so the time they come, about two topics are already learnt” (ST 4, Male).

This situation has significant implications for learning continuity. In subjects where concepts build progressively, missing introductory topics places learners with visual impairment at a disadvantage, making subsequent adaptations less effective. It also highlights how structural and attendance-related factors can undermine otherwise well-intentioned instructional adjustments.

4.6.5.2 Negative Attitudes from Resource Teachers and Sighted Peers

Another major challenge identified was negative or inconsistent support from resource teachers and sighted peers. Since learners with visual impairment rely heavily on peer readers and resource teachers for accessing chalkboard content and printed materials, the quality of this support directly influences their academic participation and independence.

Learners shared several experiences reflecting reluctance and unreliability among readers:

“Sometimes my reader feels reluctant to read for me. Sometimes, she leaves without notice and that disturbs me a lot” (LwVI 1, Female).

“Sometimes, I don’t know what comes over our readers, the sighted learners. They sometimes leave me without any notices so I don’t get my notes which disturbs me a lot” (LwVI 2, Female).

Some learners also indicated that even resource teachers did not always provide adequate instructional support:

“My reader and my resource teacher read for me from the board or from a printed paper. Sometimes, the resource teacher would not take her time and would not repeat what she read so I miss some words which make it difficult to understand” (LwVI 2, Female).

Other participants described challenges related to incomplete note-taking:

“We copy from the chalkboard with the help of our sighted peers sitting by us. Sometimes, they feel unwilling to read so we normally don’t have complete notes” ((LwVI 1, Female).

“The teacher doesn’t care if you are done or not, he or she cleans it when the sighted people are done” (LwVI 4, Male).

More concerning was reports of transactional relationships between learners and peer readers:

“The readers also demand for something before they read for me. Sometimes I give out all my money and food in exchange for help. If I don’t do that, they won’t read for me” ((LwVI 5, Male).

“As for me, I have someone who is ready to read for me because, when school resumes all the time, I bring something to her” (LwVI 3, Male).

These findings raise serious concerns about equity, dignity, and ethical practice within the inclusive setting. When access to learning depends on personal favors or material exchange, inclusion becomes conditional rather than rights-based. The implications are significant: learners may experience exploitation, reduced self-esteem, emotional distress, and unequal access to instructional content. Such conditions undermine the goals of inclusive education and point to the need for structured peer-support systems, supervision of reader arrangements, and stronger institutional oversight.

4.6.5.3 Inattentiveness of Learners

The study also identified inattentiveness among learners with visual impairment as a challenge, particularly during practical lessons involving drawings, diagrams, or board demonstrations. Teachers attributed this to the limited accessibility of visual demonstrations.

One teacher noted:

“For the challenges, we have a lot. Sometimes when we are teaching practical topics that involve drawings, since they cannot see, they would sleep in the classroom during lessons. This is because they cannot see what we are demonstrating on the board” (ST 4, Male).

Learners themselves confirmed disengagement due to lack of understanding:

“For me, in fact, I don’t pay attention during maths because I don’t understand what the teacher teaches” (LwVI 3, Male).

*“Sometimes they forget to mention what they write on the board”
(LwVI 2, Female).*

Additionally, restrictions on alternative learning tools further contributed to disengagement:

“I have computer but, I am not allowed to use because all the learners with visual impairment are expected to braille and teachers don’t have photocopies of the notes. I wish I would get soft copies of the notes” (LwVI 2, Female).

Another learner explained the difficulty of learning without hands-on engagement:

“Since we listen to the lessons without practicing what they teach, I do not really understand what the teachers teach and I easily forget the little I heard” (LwVI 1, Female).

These findings suggest that inattentiveness is not merely a behavioral issue but a consequence of limited accessibility and lack of meaningful engagement. When instructional delivery relies heavily on visual demonstration without adequate tactile, auditory, or technological alternatives, learners with visual impairment may disengage. The implication of not addressing this issue is continued marginalization within the classroom where learners are physically present but cognitively excluded.

CHAPTER FIVE

DISCUSSION OF FINDINGS

This chapter presents a focused discussion of the findings of the study in relation to the research objectives and questions. The discussion draws selectively on relevant literature to situate the findings, highlighting areas of convergence and divergence with previous studies with emphasis placed on interpreting the findings within the context of inclusive basic schools in Ghana.

The study aimed to explore teachers' adaptations of the national curriculum to meet the needs of learners with visual impairment. To achieve this aim, interviews were conducted with five practical subject teachers, three resource teachers, and five learners with visual impairment. The findings revealed not only the strategies teachers employ to adapt the national curriculum content but also the challenges that hinder the effective implementation of these adaptations. The study was conceptualized around four key areas: adaptations to curriculum content, instructional methods, assessment procedures, and instructional materials.

The findings in this chapter are organized in line with the study objectives and are presented through systematically derived themes and subthemes that emerged from the interview data. These themes capture recurrent patterns in teachers' experiences and practices regarding curriculum adaptation for learners with visual impairment. The discussion is structured around the following major thematic areas:

- Teachers' adaptations of the content of the national curriculum to address the learning needs of learners with visual impairment in Ghana National Inclusive Basic School.
- Teachers' adaptations of instructional methods when teaching curriculum areas with visually demanding components in Ghana National Inclusive Basic School.
- Teachers' adaptations of assessment procedures for learners with visual impairment in Ghana National Inclusive Basic School.
- Teachers' adaptations of instructional materials to support access and participation for learners with visual impairment in Ghana National Inclusive Basic School.
- Challenges encountered by teachers in adapting the national curriculum to meet the needs of learners with visual impairment in Ghana National Inclusive Basic School.

5.1 Teachers' Adaptations of the National Curriculum Content to Meet the Needs of Learners with Visual Impairment in Ghana National Inclusive Basic School

The first objective of the study was to explore how teachers adapt the national curriculum content to meet the needs of learners with visual impairment. This objective was addressed through the research question: How do teachers adapt the National Curriculum content to meet the needs of learners with visual impairment?

The findings indicate that teachers employ a range of strategies to support learners with visual impairment, including collaboration with resource teachers, activation of learners' prior knowledge, detailed verbal explanations, provision of remedial lessons, and selective exemption from certain curriculum tasks. Through these adaptations, learners with visual impairment are able to access and participate in curriculum content that is

largely designed for sighted learners. The discussion that follows is organized around the subthemes that emerged from the interview data.

5.1.1 Collaboration with Resource Teachers

Collaboration with resource teachers emerged as a central mechanism for facilitating access to the visual components of the curriculum for learners with visual impairment. In the inclusive classrooms studied, subject teachers consistently relied on resource teachers to translate printed texts, mathematical symbols, charts, graphs, and diagrams into accessible formats such as braille, embossed tactile graphics, and concrete instructional models. Resource teachers also provided technical guidance on the use of assistive devices, including braille frames, styluses, and other low-vision aids, and frequently offered individualized academic support during classroom instruction.

Beyond material adaptation, resource teachers functioned as instructional mediators. They clarified abstract concepts, reinforced teachers' explanations, transcribed learners' braille responses for marking, and ensured that assessment tasks were accessible. Learners reported noticeable improvements in comprehension, participation, and task completion when resource teachers were present. Conversely, their absence often resulted in delayed access to instructional materials, incomplete classwork, and reduced classroom engagement. This pattern suggests that resource teachers were not merely supplementary personnel but essential actors in enabling equitable participation.

These findings corroborate Mwakyeja (2013) and Salifu (2021), who underscore the pivotal role of resource teachers in adapting instructional content and scaffolding learning for students with visual impairment. Similarly, Hu and Wang (2022) observed that

subject teachers in inclusive classrooms frequently depend on specialized personnel to adapt content in visually demanding subjects such as Mathematics and Science, where diagrams, symbolic notation, and graphical representations dominate instruction. The present study reinforces this evidence by demonstrating that collaboration extends beyond content adaptation to include assessment mediation and assistive technology facilitation.

However, consistent with Burton (2015) and Ismail and Al Allaq (2019), the collaboration observed in this study was largely informal, reactive, and unsystematic. There was limited evidence of structured co-planning, shared lesson design, or clearly defined instructional roles. In most cases, subject teachers delivered lessons as usual, and resource teachers intervened afterward to provide remedial clarification or material conversion. Such an arrangement, while helpful in the short term, raises concerns regarding sustainability, continuity, and equity of support. When collaboration is not institutionalized, it becomes dependent on individual initiative, availability, and goodwill rather than embedded within school policy and practice.

Moreover, heavy reliance on resource teachers may unintentionally reinforce a parallel support model, where responsibility for learners with visual impairment is subtly transferred away from subject teachers. This dynamic risks undermining the principle of inclusive education, which positions all teachers as responsible for all learners. Without deliberate capacity-building for subject teachers, inclusive practice may remain person-dependent rather than system-driven.

Structured collaboration mechanisms could significantly enhance consistency and effectiveness. Formalized schedules for joint lesson planning, co-teaching arrangements in

visually intensive subjects, and ongoing mentorship programs would promote shared accountability and pedagogical integration. Research in inclusive education consistently demonstrates that institutionalized collaboration strengthens teacher self-efficacy, improves instructional coherence, and positively influences learner outcomes (Avramidis & Norwich, 2002; Loreman, 2014; Sharma & Desai, 2019). Co-teaching models, in particular, allow subject teachers and resource teachers to merge content expertise with specialized instructional strategies, thereby reducing fragmentation of support.

5.1.2 Relevant Prior Knowledge (RPK)

The findings indicate that teachers deliberately draw on learners' existing knowledge to facilitate understanding of new concepts, particularly in visually intensive subjects such as Mathematics and Science. Teachers consistently linked new content to learners' prior lessons, familiar experiences, and everyday contexts. By connecting abstract ideas to what learners already know, teachers were able to simplify complex concepts, reduce cognitive barriers, and enable learners with visual impairment to participate meaningfully in classroom activities.

For learners with visual impairment, the activation of prior knowledge functions as a targeted instructional adaptation. Since visual materials such as diagrams, graphs, charts, and symbols may not be fully accessible, teachers relied on learners' existing understanding to scaffold new learning. By anchoring new content in familiar cognitive schemas, teachers facilitated comprehension and promoted engagement without requiring extensive redesign of the curriculum. This approach allowed learners to establish meaningful cognitive connections, bridging gaps created by limited access to visual content.

The use of prior knowledge aligns with cognitive constructivist principles, which assert that learning is most effective when new information is connected to learners' existing knowledge structures (Cook, 2006; Koehler, 2010)

Learners possess limited working memory capacity, and instructional design should aim to minimize unnecessary cognitive load while leveraging familiar knowledge to enhance comprehension. Universal Design for Learning (UDL) similarly emphasizes multiple means of representation and engagement, advocating for teaching strategies that adapt to learners' existing cognitive and experiential frameworks (Johnson-Harris & Mundschenk, 2014; Chita-Tegmark et al., 2012)

By systematically drawing on prior knowledge, teachers operationalize these principles, providing alternative pathways to access visually oriented curriculum content.

Empirical evidence supports the effectiveness of RPK in inclusive education. Learners who can relate new content to prior knowledge demonstrate higher engagement, enhanced problem-solving abilities, and better retention of concepts (Rodrigues, 2007; Pecore et al., 2017; Dong et al., 2020). Research also indicates that learners with stronger prior knowledge and reduced cognitive load are better able to seek help and engage instrumentally with tasks, leading to improved learning outcomes. Conversely, learners with limited prior knowledge may struggle to interpret abstract or visually complex material, highlighting the critical role of teachers in activating and building upon existing knowledge.

Prior knowledge is most effective when linked to meaningful, real-life contexts. Studies show that anchoring abstract concepts in experiences familiar to learners enhances

comprehension and supports application across subjects (Drake et al., 2015; Darling-Hammond et al., 2024; Darling-Hammond & Bransford, 2005)

By drawing on learners' experiential and procedural knowledge, teachers create opportunities for active construction of understanding, fostering engagement and promoting inclusive participation. This approach aligns with research emphasizing that learners actively shape their knowledge by connecting new information to prior experiences, sociocultural contexts, and relational interactions.

Although implementing RPK can present challenges such as accurately assessing learners' prior knowledge or adapting teaching strategies to diverse cognitive backgrounds its benefits outweigh potential difficulties. Utilizing prior knowledge enables teachers to scaffold learning, reduce reliance on inaccessible materials, and promote independent thinking and problem-solving. It also strengthens learners' confidence and agency by acknowledging their existing capacities as foundations for new learning.

In practice, the deliberate use of prior knowledge provides a high-impact, resource-sensitive adaptation in inclusive classrooms. Teachers can facilitate understanding, engagement, and achievement for learners with visual impairment by linking new curriculum content to what learners already know. This strategy not only enhances comprehension and participation but also operationalizes principles of Universal Design for Learning and inclusive education, demonstrating that pedagogical adaptations can be as critical as material adaptations in promoting effective and equitable learning.

5.1.3 Verbal Descriptions

The findings of this study indicate that teachers in inclusive basic classrooms in Ghana frequently rely on verbal explanations to convey visually presented curriculum content to learners with visual impairment. This approach is particularly prevalent in contexts where tactile or other concrete instructional materials are limited or unavailable, making verbal descriptions the primary means through which learners access and comprehend complex visual information such as diagrams, charts, and symbolic representations.

Verbal descriptions serve multiple functions in supporting learners with visual impairment. They provide a narrative scaffold that translates abstract, symbolic, or visually dense content into accessible language, thereby enabling learners to construct mental representations of otherwise inaccessible information. In doing so, teachers align instruction with principles of Universal Design for Learning (UDL), which emphasize multiple means of representation, engagement, and expression to accommodate diverse learner needs (Johnson-Harris & Mundschenk, 2014; Chita-Tegmark et al., 2012)

By using descriptive language, teachers provide learners with an opportunity to integrate new concepts into existing cognitive frameworks, compensating for the absence of visual input and reducing barriers to comprehension.

This approach is supported by empirical evidence from multiple contexts. Heller (2002) emphasizes that verbal explanations can enhance the cognitive process of visualization when combined with tactile or other forms of representation. Studies conducted in Ghana and internationally indicate that verbal descriptions are a widely

employed strategy in inclusive classrooms to assist learners with visual impairment in understanding complex materials (Adelakun, 2020; Edwards et al., 2022; Morelle & Tabane, 2019; Kapur, 2018; Niure, 2020; Attia et al., 2023; Gariba & Awini, 2023; Kyeremeh & Adubofour, 2018; Saforo, 2018; Okyere & Adams, 2003; Worlanyo, 2012)

For instance, Worlanyo (2012) found that learners with visual impairment benefitted from verbal explanations combined with tangible objects, which enhanced comprehension and engagement during lessons. Similarly, Carpio et al. (2017) demonstrated that learners with congenital visual impairments could understand content and aesthetics of images through verbal descriptions, sound cues, and tactile representations.

Verbal descriptions are particularly effective in subjects that involve abstract or dynamic content, such as Science and Chemistry. Justi and Gilbert (2002) and Gilbert (2008) highlight the role of verbal explanations in clarifying chemical processes and atomic structures, often complemented by three-dimensional models. In inclusive classrooms, verbal descriptions provide all learners, both sighted and visually impaired, with access to the same content simultaneously, promoting equity and reducing instructional disparities.

Despite these advantages, verbal descriptions are not without limitations. Teachers may perceive them as time-consuming, particularly when explaining complex or multi-step processes. Conveying intricate concepts accurately using only verbal language can be challenging, and ensuring comprehension requires constant monitoring. Learners may struggle to retain information, especially when unfamiliar terminology is introduced, and the absence of recording or supplementary materials can hinder revision and reinforcement.

Additionally, exclusive reliance on verbal explanations can limit opportunities for experiential or hands-on learning, which are important for constructing deep understanding.

Nevertheless, verbal descriptions remain a practical and adaptable strategy for inclusive classrooms where resource constraints limit the availability of tactile, audio, or digital instructional aids. They enable learners with visual impairment to participate actively in lessons, maintain cognitive engagement, and access curriculum content on a more equitable basis with their sighted peers. To optimize effectiveness, verbal explanations can be combined with other adaptive strategies, such as guided questioning, analogical reasoning, tactile representations, and audio resources. This combination aligns with research advocating for multimodal approaches in inclusive education to accommodate learner diversity and enhance engagement and comprehension (Darling-Hammond et al., 2024; Sharma, 2020).

5.1.4 Remedial Lessons

The findings indicate that resource teachers in inclusive classrooms routinely organize remedial sessions to support learners with visual impairment. These sessions are designed to provide additional explanations and clarifications on topics that learners did not fully grasp during regular class instruction. Conducted in designated resource centers, these lessons offer a controlled and supportive environment, equipped with real objects, tactile materials, and other assistive tools to enhance comprehension. The sessions can be delivered individually or in small groups, depending on learners' levels of understanding and specific learning needs.

Remedial lessons serve a critical function in ensuring that learners with visual impairment achieve meaningful access to curriculum content. By providing personalized and targeted instruction, resource teachers can address gaps in understanding and reinforce key concepts, thereby promoting academic confidence and competence. This approach aligns with the principles of Universal Design for Learning (UDL), which advocate for flexible and multiple means of representation, engagement, and support to accommodate learner diversity (Johnson-Harris & Mundschenk, 2014; Chita-Tegmark et al., 2012).

Through remedial sessions, learners with visual impairment are offered equitable opportunities to access content, engage with learning materials, and achieve outcomes comparable to their sighted peers. The practice of organizing remedial lessons is supported by educational research. Bower (2005) describes remedial teaching as an instructional approach tailored to the individual needs of learners facing developmental or learning challenges, emphasizing the importance of identifying specific difficulties and adapting instruction accordingly. Similarly, Habulezi et al. (2016) found that learners with visual impairment often require additional study sessions outside mainstream class hours to consolidate understanding, particularly in subjects such as Biology, where standard classroom instruction may not provide adequate access to visual content. Mnyanyi (2009) further highlighted that remedial teaching strategies, when implemented effectively, improve both engagement and learning outcomes for learners with visual impairment by allowing teachers to tailor instruction to individual needs.

Remedial lessons often utilize multi-sensory instructional strategies, including real objects, tactile representations, and concrete examples, to support comprehension. Such approaches are consistent with Heller's (2002) recommendation that visualization processes can be enhanced by combining verbal descriptions with tangible or tactile representations. International studies reinforce these findings: Carpio et al. (2017) found that learners with congenital visual impairments could understand complex content through verbal explanations combined with tactile and auditory supports, while Sharma (2020) demonstrated that verbal and practical adaptations in Indian inclusive classrooms improved learner engagement and understanding.

While remedial lessons are highly beneficial, challenges exist. Resource teachers may possess expertise in visual impairment but may lack depth in subject-specific content, potentially limiting the effectiveness of instruction. Additionally, learners with visual impairment may still experience exclusion from practical lessons due to difficulties conveying visual information through verbal or tactile means alone. Time constraints and high learner-to-teacher ratios can further limit the reach and frequency of remedial sessions, which may affect curriculum coverage and consistency of support. These challenges underscore the need for capacity-building for subject teachers to equip them with skills in both content delivery and inclusive teaching strategies, thereby distributing instructional responsibility more evenly and strengthening systemic inclusion.

Despite these challenges, remedial lessons provide a structured and effective strategy for bridging learning gaps for learners with visual impairment. By addressing individual learning needs in a focused environment, these sessions enhance understanding,

promote active engagement, and contribute to the academic success of learners. The findings highlight that when remedial lessons are systematically implemented, they serve as a practical and essential component of inclusive education, reinforcing the commitment to equitable access and participation for all learners.

5.1.5 Exemptions

The findings of this study revealed that learners with visual impairment are occasionally exempted from certain aspects of the curriculum, particularly in subjects or activities that are heavily dependent on visual input. These exemptions often occur in practical or laboratory-based lessons, such as experiments in Science, visual tasks in Mathematics, and certain physical education activities. While teachers do not intend to restrict learning opportunities, exemptions are frequently applied due to the inherent challenges associated with explaining or adapting visual content for learners with limited or no sight. For example, some diagrams, charts, or microscopic observations cannot be effectively translated into tactile or verbal formats, and certain materials may pose safety risks if learners are allowed to manipulate them independently (Karangwa et al., 2013; Virginia Department of Education, 2017).

Exemptions serve multiple functions. On one hand, they are safeguarding measures that protect learners from harm during practical activities involving chemicals, laboratory equipment, or hazardous objects. On the other hand, they aim to prevent frustration or cognitive overload when content cannot be effectively conveyed using available adaptations. Research shows that learners with visual impairment face considerable challenges in accessing visually intensive content, particularly in Geometry, Statistics, and

other subjects that rely heavily on spatial reasoning or symbolic representation (Miyachi, 2020; Tobias, 2017)

Similarly, Palan (2021) demonstrated that systemic barriers, including the lack of adapted teaching methods and accessible materials, restrict participation in both academic and co-curricular activities. Several studies highlight the prevalence and rationale for exemptions in inclusive settings. Ahiably (2023) found that teachers often modify assessment tasks by exempting learners with visual impairment from questions involving diagrams or substituting them with equivalent tasks that do not require visual interpretation. Adalakun (2017) similarly observed that exemptions from visually demanding science and mathematics activities are employed to address accessibility challenges, ensuring that learners can engage meaningfully with the remainder of the curriculum. Ralejoe (2021) also noted that exclusions from sports and physical activities occur, sometimes reflecting implicit assumptions about the suitability of inclusive classrooms versus specialized institutions.

Despite the pragmatic rationale for exemptions, there are significant implications for learners' educational experiences. Exempting learners from particular tasks can unintentionally limit exposure to full curricular content, reduce opportunities for skill acquisition, and affect confidence in participating alongside sighted peers. Research indicates that sustained exclusion can reinforce perceptions of difference and limit learners' engagement in learning activities, potentially impacting long-term academic performance and participation (Karangwa et al., 2013; Palan, 2021)

Moreover, exemptions may inadvertently encourage overreliance on resource teachers, as subject teachers may avoid exploring alternative instructional strategies for conveying complex visual content.

To address these challenges, scholars advocate for alternative adaptations and inclusive instructional strategies that minimize the need for exemptions. These include the use of tactile models, verbal descriptions, 3D representations, adapted laboratory equipment, and assistive technologies that allow learners with visual impairment to engage safely with practical tasks (Justi & Gilbert, 2002; Gilbert, 2008; Worlanyo, 2012)

In addition, careful planning and professional development for subject teachers can build their capacity to integrate learners with visual impairment into activities that would otherwise be excluded, reducing the necessity of blanket exemptions while maintaining safety and accessibility.

In practice, the study demonstrates that exemptions are a pragmatic but limited adaptation, used to manage challenges associated with inaccessible visual content and safety concerns. While they can be justified in specific circumstances, reliance on exemptions should be complemented by proactive instructional modifications, collaboration between subject and resource teachers, and systematic use of alternative representations. When implemented thoughtfully, such approaches can mitigate the negative impact of exemptions and ensure that learners with visual impairment experience fuller access to the curriculum.

5.2 Teachers' Adaptations of Instructional Methods for Visual Components to Meet the Needs of Learners with Visual Impairment in Ghana National Basic School

The primary focus of this study was to examine how teachers modify their instructional methods when teaching visual components of the curriculum to accommodate learners with visual impairment in Ghana National Basic School. This inquiry was guided by the research question: How do teachers modify their instructional methods to meet the specific needs of learners with visual impairment in Ghana National Basic School?

The study aimed to identify and analyze strategies employed by teachers to adapt instruction for learners with visual impairment, with particular attention to subjects such as Mathematics and Science, which rely heavily on visual materials, including diagrams, charts, symbols, and experimental demonstrations. The findings indicate that teachers employ a combination of descriptive teaching, demonstrations, tactile experiences, peer-assisted learning, and interactive questioning to facilitate meaningful engagement with visual curriculum content.

These adaptations reflect an understanding that traditional teaching methods, which emphasize visual presentation, may not adequately serve learners with visual impairment. By adopting alternative instructional approaches, teachers can enhance accessibility, engagement, and comprehension, ensuring that inclusive classrooms offer equitable learning opportunities for all students. The strategies observed are consistent with principles of Universal Design for Learning (UDL), which advocate for multiple means of representation, engagement, and expression to accommodate diverse learner needs (Johnson-Harris & Mundschenk, 2014; Chita-Tegmark et al., 2012). The following sub-

themes emerged under the broader theme of teachers' adaptations of instructional methods to support learners with visual impairment:

5.2.1 Demonstrations and Tactile Experiences

The findings of this study indicate that teachers frequently utilize demonstration and tactile strategies to facilitate learning for learners with visual impairment. These methods provide learners with opportunities to engage with concrete objects, models, and three-dimensional representations, allowing them to experience abstract or visually intensive concepts through touch and kinesthetic exploration. Tactile and demonstration-based approaches were observed in subjects such as Science, Mathematics, Home Economics, and Visual Arts, where learners actively manipulated objects or explored physical models to enhance understanding.

The use of tactile experiences is grounded in the understanding that touch is a primary sensory channel for learners with visual impairment. Research has consistently shown that tactile engagement enables these learners to perceive and process information effectively (Gaster & Clark, 1995; Kızılaslan, 2020; Rahi & Cable, 2003; Yalcin et al., 2020). By interacting with real objects, learners can develop mental models of concepts that would otherwise be inaccessible through visual means alone. Demonstrations, often paired with verbal explanations, further scaffold understanding by translating abstract or symbolic representations into accessible forms, supporting learners' comprehension of spatial, procedural, and conceptual relationships.

Several studies emphasize the efficacy of tactile and demonstration-based learning for learners with visual impairment. Justi and Gilbert (2002) and Gilbert (2008) highlight that three-dimensional models and hands-on experimentation significantly improve learners' grasp of complex concepts, such as atomic structure in Chemistry or geometrical principles in Mathematics. Similarly, McLinden et al. (2019) demonstrate that tactile diagrams and manipulatives enhance learners' engagement, problem-solving abilities, and retention of information. By integrating tactile experiences, teachers enable learners to construct knowledge actively, promoting independence and cognitive development.

Beyond subject-specific learning, demonstration and tactile strategies also encourage multi-sensory engagement. Role-play, guided exploration of textures, and outdoor tactile experiences were cited in the literature as effective methods for fostering experiential learning among learners with visual impairment (Acheampong, 2018; Sahin & Yorek, 2009). These strategies allow learners to rely on auditory and kinesthetic cues, complementing tactile inputs, and facilitating comprehension of abstract or complex phenomena. Such multi-sensory approaches align with Universal Design for Learning principles, which advocate for multiple means of representation to accommodate diverse learning needs (Johnson-Harris & Mundschenk, 2014; Chita-Tegmark et al., 2012).

The literature further demonstrates that tactile learning contributes not only to comprehension but also to learner confidence, autonomy, and inclusion. Bressane et al. (2019) reported that hands-on experimentation allows learners with visual impairment to engage actively in learning, improving both academic outcomes and overall quality of life. Similarly, concrete experimentation using tactile models, as applied in subjects such as

Linear Algebra and Analytic Geometry, provides meaningful access to abstract content, enabling learners to develop conceptual understanding and practical skills.

Despite these advantages, challenges persist. Studies in Zambia and other contexts have identified limitations in teachers' capacity to implement demonstration and tactile strategies effectively (Annie et al., 2015; Penda Ndhlovu & Kasonde-Ng'andu, 2015). Teachers often face constraints such as insufficient training in tactile instruction, limited one-on-one interaction time, and difficulty ensuring comprehension across learners with varying abilities. In addition, adapting teaching aids and balancing instructional time between sighted learners and those with visual impairment remain significant challenges. These limitations can reduce the effectiveness of tactile and demonstration methods and may inadvertently hinder inclusive learning.

In practice, the study demonstrates that demonstration and tactile experiences are indispensable tools for inclusive education. When implemented effectively, these strategies allow learners with visual impairment to engage actively with the curriculum, build meaningful conceptual understanding, and participate alongside sighted peers. However, maximizing their effectiveness requires systematic teacher training, adequate preparation time, access to tactile materials, and integration of complementary strategies such as verbal descriptions, guided questioning, and peer support.

5.2.2 Descriptive and Verbal Instructional Methods

The findings of this study indicate that teachers in Ghana National Inclusive Basic School frequently employ descriptive and verbal instructional methods to facilitate learning for learners with visual impairment, particularly in subjects that rely heavily on visual

materials, such as Mathematics, Science, and Home Economics. Descriptive teaching involves providing detailed verbal explanations of concepts, diagrams, procedures, and processes, enabling learners to construct mental representations in the absence of visual input. This approach allows teachers to convey abstract ideas and complex information, compensating for the limited access to visual materials.

In Mathematics, descriptive methods are used to clarify concepts, equations, problem-solving procedures, spatial relationships, and patterns. Teachers often present multiple approaches to solving problems, allowing learners to select methods aligned with their cognitive strengths. By translating visual symbols, shapes, and arrangements into accessible verbal descriptions, teachers provide learners with a cognitive framework for understanding mathematical principles. Research indicates that learners with visual impairment benefit from structured verbal explanations in Mathematics, as they enable comprehension of sequencing, organization, and spatial relationships that are otherwise presented visually (Matobako, 2021; Karangwa et al., 2013)

In Science, descriptive instruction is used to explain scientific concepts, experimental procedures, and laboratory activities. Teachers provide detailed verbal accounts of experiments and observations, often supplemented with hands-on experiences when materials and resources are available. Descriptive instruction allows learners to form mental models of abstract processes, facilitating engagement with otherwise inaccessible visual content (Teke & Sozbilir, 2019; Habulezi et al., 2016)

However, studies indicate that in many inclusive classrooms, limitations in resources, tactile models, and teacher training can reduce the effectiveness of this method. Consequently, learners with visual impairment may miss opportunities for experiential learning and practical experimentation, which are crucial for understanding scientific phenomena.

In Home Economics, teachers employ descriptive methods to guide learners through cooking, sewing, and other practical skills. Step-by-step verbal instructions, combined with tactile exploration of materials such as fabrics, utensils, and cooking tools, help learners develop practical competencies. This combination of verbal description and tactile engagement aligns with multi-sensory teaching principles, enhancing comprehension and participation for learners with visual impairment. Research supports the use of such strategies to enable learners to actively engage in tasks that would otherwise rely heavily on sight (Sahin & Yorek, 2009; Bressane et al., 2019).

Descriptive and verbal methods provide a practical and accessible way to communicate content that is visually oriented. They allow teachers to convey key information simultaneously to learners with and without visual impairment, ensuring inclusivity within mainstream classrooms. By linking verbal explanations to learners' prior knowledge and tangible examples, teachers can scaffold understanding and promote engagement (Cook, 2006; Koehler, 2010)

Despite its benefits, descriptive instruction presents several challenges. Exclusive reliance on verbal explanations can limit hands-on engagement and reduce opportunities for experiential learning. Learners may struggle to form accurate mental models of complex

or abstract content, particularly when verbal descriptions are not supplemented by tactile or concrete materials (Gyamfi, 2020; Karangwa et al., 2013)

The lack of accessible teaching materials, insufficient teacher training in inclusive pedagogy, and time constraints further compound these challenges. Consequently, learners may experience frustration, decreased motivation, and reduced self-confidence, particularly in subjects like Mathematics and Science that require spatial reasoning and experimentation. Research from various contexts underscores these limitations (UNESCO, 2020; World Health Organization, 2019; UNICEF, 2021; World Bank, 2018; International Council for Education of People with Visual Impairment, 2020). Habulezi et al. (2016) observed that teachers often lack the training required to address the diverse needs of learners with visual impairment fully, while Matobako (2021) emphasizes that verbal instruction alone may be insufficient without accessible materials and guided support. Similarly, Karangwa et al. (2013) and Gyamfi (2020) highlight that learners with visual impairment can be inadvertently excluded from key learning experiences when teaching relies predominantly on visual representations, which can negatively affect their academic engagement and performance.

To optimize the effectiveness of descriptive and verbal instructional methods, they should be integrated with complementary strategies such as tactile exploration, demonstrations, peer-assisted learning, and the use of assistive technologies. Teachers require targeted professional development to build skills in designing and delivering accessible lessons, translating visual content into descriptive language, and integrating multi-sensory strategies effectively. Such measures would ensure that learners with visual

impairment receive equitable access to curriculum content, participate actively in learning, and achieve academic outcomes comparable to their sighted peers.

5.2.3 Peer Tutoring and Pairing Learners with Visual Impairment with Sighted Learners

The study found that peer tutoring and collaborative learning are effective strategies for promoting inclusion in classrooms with learners with visual impairment. In this approach, learners with visual impairment are paired with sighted peers who assist them in accessing visual content, such as information presented on the chalkboard, in textbooks, or during demonstrations. Sighted peers provide verbal descriptions, explanations, and guidance, enabling learners with visual impairment to participate actively in classroom activities.

This method leverages the strengths and abilities of both sighted learners and learners with visual impairment, fostering an inclusive learning environment where knowledge and skills are shared collaboratively. Collaborative learning promotes not only academic engagement but also social development, empathy, cooperation, and peer support, contributing to a positive and equitable classroom culture (Rodrigues, 2007; Pecore et al., 2017)

Peer-assisted learning has particular significance in visually intensive subjects, such as Mathematics and Science, where verbal and tactile strategies may not fully convey visual content. Sighted peers can clarify spatial relationships, describe patterns, and model problem-solving strategies, reinforcing comprehension for learners with visual impairment. Research shows that such interaction enhances confidence, autonomy, and motivation,

while simultaneously reducing the cognitive load on teachers by distributing instructional support (Agamboka et al., 2020; Saforo, 2018; Worlanyo, 2012)

The effectiveness of peer tutoring depends on structured pairing, teacher facilitation, and guidance. Without careful planning, learners with visual impairment may become overly dependent on their peers or receive incomplete information. To maximize benefits, peer-assisted learning should be combined with complementary strategies, including tactile materials, verbal explanations, guided questioning, and assistive technologies. This integrated approach ensures that learners with visual impairment can engage fully with the curriculum while participating collaboratively with sighted peers.

5.2.4 Questions-and-Answers

The findings of this study revealed that the questions-and-answers (Q&A) method is frequently employed by teachers to actively engage learners with visual impairment in inclusive classrooms. This instructional strategy promotes interactive learning, stimulates critical thinking, and encourages learners to articulate understanding while providing teachers with immediate feedback on comprehension. By posing questions and eliciting responses, teachers can identify areas requiring clarification, adapt instruction, and ensure that learners with visual impairment remain actively involved in the learning process.

Research highlights the effectiveness of Q&A methods for learners with visual impairment. Kapur (2018) emphasizes that interactive questioning enables learners to clarify doubts, reflect on concepts, and engage cognitively with lesson content. Owusu-Amoako (2015) found that this method fosters understanding, confidence, and learner independence, while Mwakyeja (2013) notes that it maintains engagement and allows

teachers to monitor participation and comprehension. Agamboka et al. (2020) similarly concluded that Q&A strategies are particularly suitable for teaching learners with visual impairment, as they can be adapted to individual learner needs and do not rely exclusively on visual input.

The method is especially effective when combined with verbal explanations, tactile materials, and assistive technology, creating a multi-sensory learning environment that enhances comprehension and retention (Smith et al., 2015; Jones & Johnson, 2018). In Science and Mathematics, for example, Q&A enables learners to process abstract or spatial concepts through discussion and guided questioning, reinforcing understanding in ways that complement tactile and verbal adaptations. Saforo (2018) and Worlanyo (2012) similarly highlight that Q&A, when used alongside peer tutoring, group discussion, and hands-on activities, actively involves learners with visual impairment and mitigates the challenges of visually oriented content.

Despite its effectiveness, Q&A instruction has limitations. Learners with visual impairment may struggle to engage if questions rely on visual cues or if prompts are not clearly structured. In addition, teachers need to provide sufficient time, scaffolding, and support to ensure learners can respond meaningfully. Kezilahabi (2021) noted that in some cases, Q&A alone may not meet the specific needs of learners in subjects like Mathematics, underscoring the importance of individualized adaptations. These limitations highlight the necessity of integrating Q&A within a multi-modal, inclusive instructional approach that includes descriptive instruction, tactile resources, demonstrations, and peer-assisted learning.

The literature also emphasizes that there is no single teaching method suitable for all learners. Effective instruction for learners with visual impairment requires flexibility, adaptation, and responsiveness to individual needs (Agamboka et al., 2020; Kapur, 2018). Structured Q&A, when complemented with tactile materials and assistive technology, enhances engagement, understanding, and participation. Teachers can further optimize outcomes by maintaining records of learners' responses, monitoring progress, and adjusting questioning strategies to match learners' cognitive and experiential backgrounds.

Further, research could explore alternative instructional methods that may be more effective for teaching mathematics to learners with visual impairment in inclusive settings. Additionally, further studies could investigate the impact of technology and assistive devices on enhancing the learning experience for learners with visual impairment in mathematics education. By continuously evaluating and improving instructional practices, teachers can ensure that all learners, including those with visual impairment, have equal opportunities to succeed academically.

5.3 Teachers' Adaptations to Assessment Procedures for Learners with Visual Impairment in Ghana National Inclusive Basic School

The study aimed to achieve its third objective which was to investigate how teachers adapt assessment procedures for learners with visual impairment in Ghana National Basic Schools. This objective was addressed through the research question 'How do teachers adapt assessment procedures for learners with visual impairment in Ghana National Basic School?'

Findings revealed that learners with visual impairment are generally assessed using the same methods as their sighted peers, with some accommodations such as extended time and exemptions from visually dependent questions. Assessment tasks are primarily presented in printed format, which poses challenges for accessibility. Verbal responses are occasionally accepted during instructional activities, though this practice is inconsistently applied. In addition, learners' Braille responses are typically transcribed by resource teachers before being marked and scored by subject teachers. The data analysis yielded a number of subthemes that reflect the assessment adaptations currently in place.

These findings align with those of Ndume (2022), who investigated national examination practices for learners with visual impairment in selected grade twelve schools across the Mwense and Lusaka districts of Zambia. That study found that exam questions were modified into descriptive formats to improve accessibility, and learners were granted extra time, though, it was deemed insufficient. Notably, there were no special considerations made during the marking of these learners' scripts, mirroring the current study's findings. Ndume also highlighted gaps in the effectiveness of assessment accommodations, pointing to the need for more inclusive and equitable assessment practices.

The findings related to the adaptation of assessment procedures are examined in depth through a series of themes and subthemes that emerged from the data. Two overarching themes are Assessment Procedure and Adaptations to Assessment Procedure. Under these, several subthemes were identified, including the following:

- Extra Time

- Reading Aloud to learners with visual impairment
- Verbal Responses
- Exemptions
- Assessment Format
- Transcription for Marking

5.3.1 Assessment Procedures

Learners with visual impairment are generally assessed using the same procedures as their sighted peers, with minor accommodations applied inconsistently. Teachers and resource personnel reported adjustments such as additional time, reading support, and exemptions for tasks heavily reliant on visual materials including diagrams, maps, and graphs.

While these accommodations promote inclusion, assessment practices remain predominantly standardized and exam-focused, limiting learners' ability to independently demonstrate knowledge. This aligns with Mwakyeja (2013) and Owusu-Amoako (2015), who observed that learners with disabilities often experience marginalization in standardized assessments. The reliance on visual content, without systematic adaptation, risks undermining assessment validity and equity (Niure, 2020; Sozbilir et al., 2017).

The findings suggest that teachers require structured guidelines and training to implement consistent, multimodal assessments. Integrating alternative assessment approaches systematically would align classroom practices with inclusive education principles, ensuring that learners' performance reflects their true understanding rather than limitations imposed by inaccessible formats (Kumar et al., 2001; Kızılaslan, 2020).

5.3.2 Adaptations to Assessment Procedure

Assessment practices in inclusive classrooms require deliberate modification to ensure that learners with visual impairment are evaluated fairly and meaningfully. The findings of this study indicate that teachers implemented several adaptations to assessment procedures in order to improve accessibility and ensure that learners with visual impairment could demonstrate their knowledge without being disadvantaged by visual barriers.

Literature strongly supports the use of alternative assessment strategies for learners with visual impairment. Kumar et al. (2001) recommend assessment approaches such as tactile materials, audio recordings, oral responses, and technology-based tools to enable learners to access assessment tasks and express their understanding effectively. These adaptations reduce reliance on visual formats and provide learners with multiple means of demonstrating competence. Similarly, Sozbilir et al. (2017) emphasize that alternative assessment methods are essential in overcoming the challenges teachers face when evaluating learners with visual impairment, particularly in visually demanding subjects.

Kizilaslan (2020) further argues that when disability affects access to learning, assessment procedures must be adjusted to ensure equity. This perspective aligns with inclusive education principles, which require that assessment measure learners' understanding of content rather than their ability to access visually presented materials. Without such adjustments, assessment practices risk reinforcing exclusion rather than promoting equitable participation.

The findings of the present study revealed that teachers made specific modifications to assessment procedures to accommodate learners with visual impairment. These included providing oral assessments, allowing verbal responses instead of written work, extending time, simplifying visual components of questions, and seeking support in transcribing responses into accessible formats. Such adaptations aimed to remove barriers associated with print-based and visually structured examinations.

However, while these adaptations improved accessibility, the study also suggests that assessment practices were often reactive rather than systematically planned. In some cases, adaptations depended on the availability of support personnel or resources, raising concerns about consistency and sustainability. This reflects broader challenges identified in inclusive education research, where assessment adjustments are sometimes implemented informally without institutional policy guidance.

The specific assessment adaptations identified in this study are further discussed under the sub-themes that emerged from the data:

5.3.2.1 Extra Time

The findings of the study indicate that provision of extra time is one of the primary assessment accommodations granted to learners with visual impairment. Teachers reported that learners are allowed additional time during examinations and selected assessment tasks to compensate for slower reading, processing, and writing speeds, particularly when using braille, large print, or assistive devices.

The literature consistently supports extended time as a reasonable and necessary accommodation. Learners with visual impairment generally require more time to read and

interpret written materials than their sighted peers due to the tactile nature of braille reading and the cognitive demands of auditory processing (Kapur, 2018; Mwakyeja, 2013; Niure, 2020; Owusu-Amoako, 2015). Extended time therefore ensures that assessment measures learners' understanding of content rather than the speed at which they can access print. From an inclusive education perspective, this adjustment promotes equity rather than uniformity, recognizing that equal treatment does not necessarily result in equal opportunity.

Similarly, Mwitango (2016), in a study conducted in Tanzanian primary schools, reported that learners with visual impairment were granted additional time—approximately 20 extra minutes per hour—during formal examinations. However, the study also found that such accommodations were not consistently applied during routine classroom activities. Some teachers justified this inconsistency by suggesting that withholding extra time during regular lessons would improve learners' writing speed.

This inconsistency raises important concerns. While extended time during examinations promotes fairness, failure to provide similar accommodations during classroom assessments may disadvantage learners with visual impairment in day-to-day learning activities. Inconsistent support can affect learners' confidence, performance, and ability to fully demonstrate their competence. Inclusive assessment practices require continuity across instructional and evaluative contexts to ensure that accommodations are not limited to high-stakes examinations alone.

The findings of the present study therefore highlight both the strength and limitation of extended time as an adaptation. Its strength lies in promoting fairness and reducing

disability-related barriers during assessment. However, its impact depends on consistent implementation and alignment with broader instructional practices.

To enhance effectiveness, schools should establish clear guidelines on the provision of extra time across both formal and informal assessments. Teachers should also consider allocating additional time for assignments, particularly in subjects such as Mathematics, where learners may require extended periods to interpret symbols, complete calculations, and verify responses. Such structured and policy-driven implementation would ensure that extended time functions not merely as a reactive adjustment but as an integral component of inclusive assessment practice.

5.3.2.2 Reading Aloud to Learners with Visual Impairment

The findings of this study revealed that reading assessment materials aloud is a commonly used accommodation for learners with visual impairment in Ghana National Inclusive Basic School. During examinations and other assessment activities, learners were provided with auditory access to written questions through teachers or resource personnel. This practice was intended to ensure that learners with visual impairment could access, understand, and respond to assessment tasks without being disadvantaged by print-based formats.

The use of reading aloud reflects teachers' efforts to remove visual barriers embedded in conventional assessment procedures. By converting written text into auditory form, teachers enabled learners to engage cognitively with assessment content rather than struggle with inaccessible print. This approach ensures that assessment measures

conceptual understanding and mastery of subject matter rather than the ability to visually decode text.

The literature supports this adaptation as a recognized inclusive assessment strategy. Kumar et al. (2001) identify oral presentation of assessment materials as an effective alternative for learners with visual impairment, particularly in contexts where braille materials or assistive technologies are limited. Similarly, Sozbilir et al. (2017) emphasize that alternative formats, including auditory delivery, are essential to promote fairness in evaluating learners with visual impairment. Kizilaslan (2020) further argues that when disability affects access to written materials, assessment procedures must be adjusted to ensure equitable participation.

Research conducted in inclusive settings also highlights the importance of auditory access in supporting comprehension. Mwakyeja (2013) and Owusu-Amoako (2015) observe that learners with visual impairment often develop strong listening skills, making oral presentation a viable means of accessing information during assessments. When appropriately implemented, reading aloud reduces exclusion and enhances learner confidence during examinations.

However, while reading aloud is a strong accommodation, it presents certain limitations. Dependence on human readers may raise concerns regarding confidentiality, independence, and standardization of assessment delivery. Variations in tone, speed, or clarity can influence comprehension. Additionally, if learners are consistently separated from their peers to receive oral reading support, this may inadvertently undermine inclusive principles. These concerns suggest that reading aloud should be guided by clear procedures

and complemented with accessible materials such as braille copies, recorded audio formats, or assistive technologies where available.

5.3.2.4 Verbal Response

The findings of this study revealed that verbal response is recognized by teachers as a legitimate form of assessment for learners with visual impairment. Teachers indicated that learners were sometimes allowed to answer questions orally during classroom activities and, in certain cases, during assessments. Verbal responses were considered a practical way of enabling learners with visual impairment to demonstrate understanding without being constrained by written formats.

However, the findings also revealed a perceived gap between policy and practice. While teachers acknowledged the importance of verbal participation, some learners expressed concern that their oral contributions during lessons were not adequately reflected in their overall academic scores. They reported that assessment outcomes were largely determined by written examinations and assignments, which often disadvantaged them. This suggests a disconnect between the recognition of verbal response as an accommodation and its actual weighting in formal assessment structures.

Inclusive assessment literature supports the use of verbal responses as a reasonable and equitable accommodation. Kumar et al. (2001) emphasize that oral assessment formats provide learners with visual impairment alternative means of expression, particularly where writing speed, braille transcription, or print access may pose challenges. Similarly, Kizilaslan (2020) argues that assessment systems must allow flexibility in response formats to ensure that disability does not distort the measurement of learners' conceptual

understanding. From an inclusive pedagogy perspective, assessment should capture multiple modes of demonstrating knowledge rather than privileging written expression alone.

Research further indicates that oral assessment can enhance learner confidence, participation, and engagement (Owusu-Amoako, 2015; Mwakyeja, 2013). For learners with visual impairment who rely heavily on auditory processing, verbal articulation often reflects deeper conceptual mastery. However, when oral contributions are not systematically recorded or formally integrated into grading criteria, their value may remain symbolic rather than substantive.

The findings therefore highlight both a strength and a limitation. The strength lies in teachers' willingness to accept verbal responses as a valid demonstration of knowledge. The limitation lies in the absence of structured assessment frameworks that allocate measurable weight to oral performance. Without clear guidelines, verbal participation risks being treated as supplementary rather than equivalent to written assessment.

To address this concern, assessment policies should incorporate structured oral evaluation components with clear marking schemes. Teachers should document verbal responses systematically and ensure that grading systems reflect multiple modes of expression. Such measures would promote fairness, enhance learner motivation, and ensure that assessment practices genuinely align with inclusive education principles.

5.3.2.3 Exemption

The findings of this study revealed that exemption from visually dependent questions is one of the assessment adaptations used to support learners with visual impairment. In situations where assessment tasks relied heavily on visual interpretation such as diagrams, charts, or spatial illustrations learners with visual impairment were either excused from responding to such questions or provided with alternative items. In national examinations, questions requiring direct visual analysis were sometimes omitted for these learners.

This practice reflects teachers' recognition that certain assessment items may be inaccessible without appropriate adaptations or materials. By exempting learners from visually exclusive tasks, teachers aim to prevent unfair penalization resulting from disability-related barriers. In this sense, exemption functions as a protective measure designed to uphold fairness and reduce disadvantage during assessment.

The literature acknowledges that when assessment tasks are inherently inaccessible, reasonable accommodations including substitution of equivalent tasks—may be necessary (Kumar et al., 2001). Similarly, Kizilaslan (2020) argues that assessment should measure conceptual understanding rather than sensory ability, and when disability prevents access to specific formats, alternative arrangements must be considered. Sozbilir et al. (2017) further emphasize that inclusive assessment requires flexibility to ensure that learners with visual impairment are evaluated equitably.

However, while exemption may promote immediate fairness, it also raises important pedagogical and equity concerns. Inclusive education literature cautions against

practices that lower expectations or unintentionally narrow curriculum access (Mwakyeja, 2013). If learners are routinely exempted from visually oriented content without meaningful adaptation—such as tactile diagrams, descriptive explanations, or assistive technologies—this may limit their exposure to essential concepts, particularly in subjects like Mathematics and Science. Overreliance on exemption risks shifting from accommodation to exclusion.

Research in inclusive settings suggests that adaptation should generally be prioritized over omission. For example, Owusu-Amoako (2015) highlights the importance of modifying instructional and assessment materials to ensure participation rather than removing learners from learning opportunities. Where substitution is necessary, alternative tasks should be equivalent in cognitive demand and aligned with curriculum objectives to maintain academic rigor.

The findings of this study therefore present exemption as both a strength and a limitation. Its strength lies in preventing unfair disadvantage in assessments that are not accessible. Its limitation lies in the potential reduction of learning opportunities if not carefully implemented.

To strengthen inclusive assessment practices, exemption should be applied selectively and accompanied by well-designed alternative tasks that assess the same learning outcomes. Schools and examination bodies should also invest in accessible materials—such as tactile graphics, braille adaptations, and assistive technologies—to reduce the need for exemption and promote full curriculum participation.

5.3.2. 5 Assessment Format

The findings of this study revealed that assessment materials are predominantly presented in printed format. Classroom tasks are written on the chalkboard or taken directly from textbooks, and examination papers are administered in standard print. Although the school previously possessed a braille embosser, it was reported to be non-functional at the time of the study. As a result, learners with visual impairment relied largely on teachers or peers to read instructional and assessment materials aloud.

This reliance on print-based assessment formats presents significant accessibility challenges. For learners with visual impairment—particularly those who depend on braille, large print, or audio formats—standard print examinations limit independent engagement and may compromise performance. Assessment, in this context, risks measuring access to print rather than mastery of subject content.

The literature consistently emphasizes the importance of providing instructional and assessment materials in accessible formats. Kapur (2018), Mwakyeja (2013), Niure (2020), and Owusu-Amoako (2015) recommend braille, large print, audio recordings, and assistive technologies as essential resources for learners with visual impairment. These formats enable learners to process information independently and demonstrate their knowledge without undue reliance on intermediaries. Inclusive education principles further stress that accessibility should be embedded in instructional and assessment design rather than treated as an afterthought.

The findings of this study suggest a gap between recommended inclusive practices and actual implementation. The absence of functional embossing equipment and the

continued use of unmodified printed examination papers indicate structural and resource-related constraints within the school. This situation may disproportionately disadvantage partially sighted learners who require enlarged print or adapted visual layouts. Without accessible formats, such learners may experience slower processing time, increased fatigue, and reduced comprehension.

From an equity perspective, consistent reliance on print-based assessment without adequate adaptation undermines the principle of equal opportunity. While compensatory measures such as reading aloud or extra time may reduce immediate barriers, they do not replace the need for independent access to materials. Sustainable inclusive practice requires institutional investment in accessible formats, maintenance of assistive equipment, and clear policy guidelines for assessment adaptation.

5.3.5 Transcriptions of Scripts for Marking

The findings of this study revealed that learners with visual impairment in Ghanaian National Basic Schools heavily rely on braille as a primary mode of accessing and completing assessment tasks. Most subject teachers lack proficiency in braille, necessitating the involvement of resource teachers to transcribe learners' work into print for marking by the subject teachers. This practice underscores the central role of braille in supporting the learning and assessment of learners with visual impairment and highlights the critical contribution of resource teachers in ensuring equitable evaluation. The reliance on transcription demonstrates both the strengths and limitations of current assessment practices. While it ensures that learners with visual impairment can participate in formal assessments alongside their sighted peers, it also indicates a structural dependence on

resource teachers and a lack of capacity among subject teachers to engage directly with braille materials, highlighting the need for continuous professional development in inclusive assessment strategies.

These findings align with the literature on inclusive assessment. Agamboka and Dogbe (2020) reported that learners with visual impairment are often excused from tasks requiring visual abilities, and alternative accommodations, such as transcription, oral responses, and extended time, are necessary to ensure fair evaluation. Similarly, Mwakyeja (2013) notes that learners with visual impairment are restricted from engaging in tasks that require diagram interpretation, drawing, or calculations when appropriate adaptations are not provided, reflecting broader challenges of curriculum access in assessment. International studies reinforce these observations, as research in Tanzania indicated that learners with visual impairment were sometimes excluded from visually demanding tasks during examinations, and teachers provided alternative questions to ensure equitable assessment. Niure (2020) and Vaughn et al. (2018) emphasize that learners with visual impairment often require braille, large-print materials, audio formats, assistive technology, and additional time to complete tasks effectively. Studies in Botswana and Ghana similarly reported that inclusive assessment practices, including transcription and extended time, were inconsistently applied, particularly in subjects such as Mathematics and Science (Habulezi & Phasha, 2012; Ahiabley, 2023).

While transcription and other accommodations enable learners with visual impairment to participate in assessment, challenges remain. Examination scripts are often evaluated in the same manner as those of sighted peers, without additional consideration

for format or access difficulties. Partially sighted learners who rely on enlarged print or braille may still encounter challenges if examination questions are not fully adapted or if additional support, such as tactile or descriptive formats, is not provided. This mirrors findings from Zambia and Ghana, where learners with visual impairment received extra time and modified questions but lacked consistent access to appropriate accommodations during assessment (Ndume, 2019; Agamboka & Dogbe, 2020).

The findings further underscore the importance of professional development for teachers. Proficiency in braille, knowledge of alternative assessment formats, and familiarity with assistive technologies are critical to ensuring that learners with visual impairment can demonstrate their knowledge effectively. Without these competencies, reliance on resource teachers for transcription remains high, which may limit learner independence and efficiency in assessment practices.

Collectively, these adaptations demonstrate teachers' commitment to equitable assessment, but the study also highlights challenges related to consistency, teacher proficiency, and resource availability. While these strategies reduce immediate barriers, sustainable inclusion requires structured policies, adequate training, and access to assistive technologies to ensure that learners are assessed on their knowledge rather than their access limitations. The study underscores the principle that assessment in inclusive classrooms must be both flexible and responsive, combining multiple modes of access and expression to accurately reflect learners' abilities.

In conclusion, the adaptations observed reflect practical and contextually relevant strategies for facilitating inclusive assessment in Ghana National Basic Schools. When

systematically implemented and supported by appropriate resources and training, these approaches can enhance equity, foster learner participation, and ensure that learners with visual impairment are evaluated on their true understanding and skills, thereby aligning assessment practices with the broader goals of inclusive education.

Future research could explore the long-term impact of assessment adaptations on the academic achievement of learners with visual impairment, including comparative studies between learners in resource-rich and resource-constrained settings. Investigations could also examine the effectiveness of assistive technologies, such as screen readers, braille displays, and audio examinations, in reducing dependence on human transcribers and improving learner independence.

5.4 Teachers' Adaptations of Instructional Materials for Learners with Visual Impairment in Ghana National Basic Schools

The fourth objective of this study was to examine how teachers adapt instructional materials to meet the specific learning needs of learners with visual impairment in Ghana National Basic Schools. This objective was guided by the research question: "What adaptations are made to instructional materials to support learners with visual impairment in Ghana National Basic Schools?"

The findings indicate that teachers actively modify and adapt instructional materials to enhance accessibility and ensure that learners with visual impairment can engage meaningfully with the curriculum. These adaptations involve a range of strategies, including the use of tactile and auditory materials, simplified or enlarged text, braille resources, and descriptive or verbal representations of visual content. The study revealed

that teachers tailor these materials according to the subject matter, the learners' level of visual impairment, and the availability of resources, demonstrating both flexibility and resourcefulness in promoting inclusion.

The results are presented under the main theme of instructional Material Adaptation, with several subthemes emerging from the data analysis. These subthemes reflect specific strategies teachers employ to make learning materials accessible, including the development of tactile models, the use of braille and large-print texts, and verbal descriptions of visual content. Collectively, these enable learners with visual impairment to access information, participate actively in classroom activities, and demonstrate understanding in ways that are aligned with inclusive education principles. Discussions made under the following subthemes:

5.4.2 Instructional Material Adaptations

The findings further indicated that, despite the availability of some resources, teachers made limited adaptations in their instructional practice. While braille, tactile models, and real objects were occasionally used, their integration into lessons was often inconsistent. Teachers relied primarily on chalkboard instruction, and when tactile materials were used, their application was often improvised rather than strategically planned. As a result, the potential of these materials to improve comprehension, engagement, and learner autonomy was not fully realized.

These findings align with the principles of Universal Design for Learning (UDL), which advocates for multiple means of representation so that content is accessible to all learners (Meyer, Rose, & Gordon, 2014). Yet, as this study showed, access to adapted

materials alone was not enough. Effective instructional adaptation depended on purposeful planning and integration into daily teaching. As Supalo et al. (2016) and Perry (2013) emphasized, the structured use of adapted materials enhances engagement and comprehension, while Dim (2019) stressed that braille literacy forms a foundation for academic success. Analysis of the data revealed the following subthemes:

5.4.2.1 Writing Frames, Braille Sheets, and Styluses

Writing frames, Braille sheets, and styluses were identified as essential instructional materials that enable learners with visual impairment (LwVI) to write, read, and take notes independently. Writing frames and styluses allow learners to emboss Braille characters, while Braille sheets provide tactile representations of text, promoting autonomy, engagement, and equitable participation (Dim, 2019; Perry, 2013; Supalo et al., 2016).

Although these materials were among the most commonly available, their pedagogical integration into classroom instruction was limited. Teachers did not systematically embed the use of Braille within lesson delivery, reducing their potential impact on learners' engagement, comprehension, and academic outcomes. This finding aligns with Supalo et al. (2016), who emphasized that mere access to resources is insufficient; instructional materials must be intentionally incorporated into teaching practices. Perry (2013) further notes that the structured and consistent use of adapted materials enhances comprehension, motivation, and overall learning outcomes, while Dim (2019) highlights that Braille literacy is fundamental for achieving academic success among LwVI.

The findings underscore the importance of professional development and institutional support in maximizing the pedagogical effectiveness of these materials. Without structured guidance, learners' access to curriculum content remains contingent on ad hoc teacher initiatives, which limits both independence and meaningful engagement. Deliberately incorporating these tools into lesson planning and delivery in line with Universal Design for Learning (UDL) principles can ensure that LwVI receive consistent, equitable, and accessible educational experiences, thereby enhancing both participation and academic achievement.

5.4.1.2 Real Objects and Tactile Models

The study identified material inadequacy as the most pressing challenge in the school. Consequently, teachers often rely on real objects that are readily available in their surroundings. Findings revealed that teachers incorporate real objects into lessons to support all learners, particularly those with visual impairment, when teaching visual concepts. For instance, one teacher highlighted the convenience of using a young plant to demonstrate parts of a tree, while others emphasized the use of environmental objects to enhance comprehension. It was also noted that real objects are most effective when they are easily accessible.

The findings further demonstrated that learners with visual impairment rely heavily on tactile experiences to understand specific visual concepts. For example, teachers reported using the hand to demonstrate how vertical and horizontal lines appear. They also indicated that the school's tactile models were outdated and largely unusable, complicating the teaching of visual concepts. Learners themselves expressed difficulty in

comprehending visual concepts without tactile models, as they cannot rely on vision for understanding.

These tangible objects function as critical tools to facilitate the comprehension of abstract visual concepts for learners who cannot perceive them visually. By integrating real objects into their instructional strategies, teachers bridge the gap between learners' visual limitations and their need to understand these concepts, thereby promoting an inclusive and effective learning environment.

Empirical research supports these findings. Studies have shown that tactile materials, including graphs and real objects, enhance engagement and understanding for learners with visual impairment (Supalo, Humphrey, Mallouk, David, Wohlers & Carlsen, 2016; Zebehazy & Wilton, 2014). Kumar et al. (2001) emphasized the importance of tactile materials for content that relies heavily on visual media, such as diagrams and labeled graphics. Additionally, auditory supports can further enhance learning for these learners (Yalcin & Kamali Arslantas, 2020).

Acheampong (2018) highlighted that children with visual impairment rely on touch and hearing to interact with their environment. Through tactile exploration of real objects or models, learners can understand concepts such as shape, size, weight, hardness, texture, pliability, and temperature. Yalcin et al. (2020) similarly found that mentoring programs for in-service teachers improved the adaptation of science instruction for visually impaired learners, ensuring alignment with curriculum objectives and enhancing learner engagement.

Phutane et al. (2022) further corroborated the importance of real objects and 3D models in teaching tactile graphics. Despite implementation challenges, teachers demonstrated a strong preference for using 3D models, which provide multisensory experiences and enable learners to comprehend abstract concepts more effectively. The use of tactile objects, particularly 3D models, fosters deeper understanding, retention, and application of knowledge.

However, challenges persist, including limited availability of appropriate models, the time and effort required to create or adapt them, and the need for specialized teacher training to incorporate these tools effectively into lesson delivery.

The findings highlight that integrating tangible objects is essential for teaching learners with visual impairment, confirming prior research. To enhance the learning experience at Ghana National Inclusive Basic School, additional resources such as tactile diagrams, 3D models, and other hands-on materials should be prioritized. By incorporating these objects, learners can better understand complex concepts, improve spatial awareness, and develop problem-solving skills. Furthermore, tactile teaching materials help bridge the gap between visual and non-visual learners, ensuring equitable access to educational opportunities. Teachers, school administrators, and policymakers must therefore prioritize the provision and integration of these resources to support the academic success of learners with visual impairment.

5.5 Challenges Hindering the Implementation of Curriculum Adaptations for Learners with Visual Impairment

This section addresses the fifth research question: What challenges hinder the implementation of curriculum adaptations for learners with visual impairment in Ghana National Inclusive Basic School? The findings indicate a range of interrelated systemic, instructional, and contextual barriers that constrain teachers' capacity to effectively adapt curriculum content, instructional methods, materials, and assessment procedures to meet the needs of learners with visual impairment (LwVI). These challenges emerged consistently across interviews, classroom observations, and interactions with subject teachers, resource teachers, and LwVI. The discussion is organized under the following sub-themes:

5.5.1 Inadequately Trained Subject Teachers

The most critical challenge identified in this study was the limited knowledge and skills of subject teachers in effectively teaching learners with visual impairment (LwVI). Many teachers lacked proficiency in Braille literacy, were unfamiliar with tactile teaching strategies, and had limited ability to adapt curriculum content to meet the needs of LwVI. As a result, learners' work was sometimes left unassessed, and they were excluded from key classroom activities, reducing their engagement and learning opportunities.

This finding corroborates previous studies (Spungin & Ferrell, 2000; Tuttle & Ferrell, 1995; Mwakyeja, 2013; Kezilahabi, 2021), highlighting the critical role of targeted professional development in inclusive education. Without specialized training and ongoing support, teachers are unable to implement inclusive strategies effectively, which negatively

impacts learners' confidence, participation, and overall academic performance. These results underscore the urgent need for structured teacher training programs that equip educators with the knowledge, skills, and resources required to support LwVI in mainstream classrooms.

5.5.2 Inadequate Instructional Materials

A major challenge identified in the study was the shortage of adapted instructional materials, including tactile diagrams, Braille resources, audio texts, and assistive technologies. In many instances, teachers were compelled to improvise using real objects or the chalkboard, which constrained learners' independent engagement and limited their comprehension of visually intensive content in subjects such as Mathematics, Science, and Home Economics.

These findings are consistent with previous research in Ghana (Owusu-Amoako, 2015; Ahiabley, 2023; Donkor, 2023), as well as studies conducted in Turkey (Islek, 2017) and Ethiopia (Negash & Gasa, 2022), which highlight that the absence of adapted resources undermines effective inclusion. Karamustafaoglu (2006) and Sahin (2019) further emphasize that the systematic provision and integration of adapted instructional materials are critical to ensuring equitable learning opportunities and enhancing comprehension, motivation, and academic achievement for learners with visual impairment.

5.5.3 Limited Instructional Methods

The study revealed that teachers predominantly relied on verbal explanations and repetition, with minimal integration of tactile experiences, demonstrations, or peer-assisted

strategies. Limited lesson durations further constrained the implementation of differentiated instruction, and learners with visual impairment (LwVI) reported receiving insufficient individualized attention to support their understanding of visually intensive content.

These findings are consistent with Morelle (2016) and Karangwa et al. (2013), who emphasize that the absence of diverse, multimodal instructional strategies restricts learners' ability to comprehend abstract, spatial, and conceptually complex materials. The study underscores the importance of adopting learner-centered, participatory, and multimodal teaching approaches, particularly in subjects such as Mathematics, Science, and Home Economics, to foster meaningful engagement and promote equitable learning outcomes for LwVI

5.5.4 Large Class Sizes

The study revealed that overcrowded classrooms, sometimes exceeding sixty learners with multiple learners with visual impairment (LwVI), significantly constrained teachers' ability to provide individualized support. Observations indicated that LwVI often depended on peer assistance to follow instructions or complete tasks, highlighting systemic limitations in supporting inclusive learning.

These findings are consistent with Habulezi et al. (2016), Attia et al. (2023), and Ali (2018), who assert that large class sizes hinder personalized instruction, reduce learner engagement, and adversely affect academic outcomes. To address these challenges, strategies such as flexible grouping, small learning clusters, rotational support, or team

teaching are recommended to ensure equitable access to instruction and meaningful participation for LwVI in inclusive classrooms.

5.5.5 Inadequate Number of Resource Teachers

The study identified the limited number of resource teachers as a significant structural barrier to effective curriculum adaptation. Only three resource teachers were responsible for supporting twenty-five learners with visual impairment (LwVI) across multiple grade levels. This imbalance resulted in excessive workloads and inconsistent classroom support. Their duties extended beyond instructional assistance to include Braille transcription, preparation of adapted materials, and consultation with subject teachers. Consequently, delays in transcription and feedback limited learners' timely access to instructional content and assessment outcomes.

These findings corroborate studies conducted in Ghana (Mprah et al., 2015) and other African contexts (Worlanyo, 2012; Habulezi et al., 2016), which highlight how inadequate staffing undermines individualized support, collaborative planning, and effective implementation of inclusive practices. The results of this study therefore underscore the need for systematic recruitment, equitable deployment, and structured coordination of resource teachers to ensure consistent, responsive, and learner-centered support for LwVI in inclusive classrooms.

5.5.7 Irregularities in Assessment Feedback

Another significant challenge identified was the irregular and delayed provision of assessment feedback. Due to transcription backlogs and limited personnel, learners' Braille

scripts were often marked after considerable delays. As a result, learners were unable to review their errors promptly, seek clarification, or make timely improvements in subsequent tasks.

The findings suggest that feedback mechanisms were not systematically structured to support continuous learning for LwVI. Delayed feedback reduced learners' awareness of their academic progress and negatively affected motivation, engagement, and self-confidence. In some instances, learners reported uncertainty about their performance, which further limited their ability to take ownership of their learning.

Timely and constructive feedback is widely recognized as a critical component of effective learning (Committee on the Foundations of Assessment, 2010). Similarly, Nyirenda (2020) and Ahiably (2023) emphasize that structured feedback systems are essential in inclusive settings to ensure that learners with disabilities benefit meaningfully from assessment processes. The findings of this study therefore highlight the need for streamlined transcription processes, collaborative marking strategies, and alternative feedback mechanisms such as audio-recorded feedback or immediate oral conferencing to enhance responsiveness and learner engagement.

5.5.8 Negative Attitudes of Teachers and Sighted Peers

The study further revealed that attitudinal barriers posed significant challenges to effective curriculum adaptation. Instances were observed where Braille materials were read too quickly, limiting comprehension, or where sighted peers were reluctant to provide academic assistance. Such behaviors contributed to feelings of exclusion and diminished learners' confidence and sense of belonging within the classroom.

These attitudinal challenges extended beyond isolated behaviors; they reflected broader perceptions about the capabilities of LwVI. When teachers or peers demonstrated impatience or low expectations, learners were less likely to participate actively or seek support. This not only affected academic engagement but also had social and emotional implications.

The findings corroborate studies by Agesa (2014), Asamoah et al. (2018), and Gariba and Awini (2023), which highlight the central role of positive teacher attitudes and collaborative peer relationships in fostering inclusive education. Inclusive classrooms require not only structural and instructional adjustments but also a supportive social climate characterized by empathy, respect, and high expectations. Awareness programs, peer-sensitization initiatives, and professional development focused on inclusive values are therefore critical in cultivating environments where LwVI can participate confidently and meaningfully.

5.5.9 Inadequate Instructional Time

The findings revealed that limited instructional time significantly constrained the effective implementation of curriculum adaptations for learners with visual impairment (LwVI). Lesson periods were often too short to allow teachers to employ varied instructional strategies, provide individualized guidance, or facilitate hands-on and tactile exploration of concepts. Given that LwVI may require additional time to read Braille, interpret tactile materials, or process verbally described visual information, the standard lesson duration proved insufficient to accommodate differentiated instruction.

Classroom observations indicated that teachers frequently prioritized completing syllabus content within the allocated time, often at the expense of inclusive instructional adjustments. As a result, LwVI sometimes relied on peers to clarify missed explanations or complete unfinished tasks. While peer support can be beneficial, overreliance on it suggests systemic time constraints that hinder structured teacher-led support. This dynamic limited opportunity for formative assessment, immediate clarification of misconceptions, and meaningful engagement with complex visual or abstract concepts.

These findings are consistent with Attia et al. (2023), Kezilahabi (2021), and Habulezi et al. (2016), who emphasize that flexible scheduling and extended instructional periods are critical in inclusive classrooms. Adequate instructional time enables teachers to incorporate tactile demonstrations, guided practice, collaborative learning, and continuous assessment strategies that enhance comprehension. The results of this study therefore highlight the need for strategic lesson planning, flexible timetabling, and institutional policies that recognize the additional instructional demands of inclusive education. Without such adjustments, curriculum adaptation efforts remain constrained by time-related structural limitations.

5.5.10 Undesirable Behaviors of Learners with Visual Impairment

The study also identified certain behaviors among learners with visual impairment that were perceived as disruptive, including inattentiveness, misplacement of materials, occasional disengagement, and reduced participation. However, deeper analysis of classroom interactions suggests that these behaviors were often symptomatic of broader instructional and contextual challenges rather than deliberate misconduct.

Observations indicated that disengagement frequently occurred during lessons that relied heavily on visual explanations without corresponding tactile or descriptive adaptations. In such instances, learners appeared withdrawn or distracted, likely due to limited access to the instructional content. Similarly, misplacing materials or appearing inattentive was sometimes linked to insufficient structured guidance or unclear instructions within fast-paced classroom environments.

These findings align with Ho (2004), Bowen et al. (2003), and Mensah et al. (2023), who argue that behaviors labeled as disruptive often reflect unmet academic, social, or emotional needs. When learners experience exclusion, low expectations, or limited meaningful participation, behavioral responses may emerge as coping mechanisms.

The results therefore suggest that addressing such behaviors requires proactive instructional and environmental adjustments rather than punitive measures. Positive reinforcement strategies, participatory teaching approaches, clearly structured routines, and consistent teacher support can enhance engagement and reduce disengagement. Furthermore, fostering inclusive classroom climates where learners feel valued and supported can mitigate frustration and promote self-regulation.

Understanding these behaviors within the broader context of curriculum adaptation challenges shifts the focus from individual learner deficits to systemic and instructional improvements. This perspective reinforces the study's central argument that effective inclusion depends not only on resources and training but also on responsive pedagogical practices that actively engage learners with visual impairment.

Collectively, these findings reinforce the interconnected nature of systemic, pedagogical, and social factors influencing inclusive education. Effective curriculum adaptation for learners with visual impairment requires more than isolated adjustments; it necessitates coordinated personnel deployment, strengthened teacher preparation, consistent institutional support, and structured integration of peer collaboration. Without deliberate planning and sustained investment in these areas, inclusive practices risk remaining dependent on individual goodwill rather than institutionalized frameworks that guarantee equitable learning opportunities.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.0 Summary

This study examined how teachers adapt the national curriculum to facilitate the meaningful participation of learners with visual impairment in Ghana National Inclusive Basic School. The study was grounded in the recognition that the national curriculum is designed primarily for the general learner population and may not automatically address the specific access needs of learners with visual impairment. In inclusive classrooms, effective participation requires deliberate adjustments to curriculum content, instructional methods, assessment procedures, and instructional materials to ensure equitable learning opportunities.

The objective of the study was to:

1. Examine how teachers adapt the content of the national curriculum to meet the learning needs of learners with visual impairment.
2. Investigate how teachers modify instructional methods when teaching the national curriculum to learners with visual impairment.
3. Explore how assessment procedures are adjusted to ensure equitable evaluation of learners with visual impairment.
4. Analyze the adaptations made to instructional materials to enhance access to the national curriculum.

5. Identify the challenges teachers encounter in adapting curriculum content, instructional methods, assessment procedures, and instructional materials to meet the needs of learners with visual impairment in inclusive classrooms.

Through these objectives, the study sought to provide a comprehensive understanding of how inclusive curriculum implementation is enacted in practice and the factors that either support or constrain effective participation of learners with visual impairment. The study was guided by the following research questions:

Research Questions

1. How do teachers adapt the content of the national curriculum to meet the needs of learners with visual impairment in Ghana National Inclusive Basic School?
2. How do teachers modify instructional methods when teaching the visual components of the curriculum to learners with visual impairment in Ghana National Inclusive Basic School?
3. How do teachers modify assessment procedures for learners with visual impairment in Ghana National Inclusive Basic School?
4. What adaptations do teachers make to instructional materials to support learners with visual impairment in Ghana National Inclusive Basic School?
5. What challenges do teachers face in adapting curriculum content, instructional methods, assessment procedures, and instructional materials to meet the needs of learners with visual impairment in Ghana National Inclusive Basic School?

The study was grounded in the interpretivist paradigm, which assumes that reality is socially constructed and best understood through the meanings individuals assign to their

experiences. This paradigm was considered appropriate because the study sought to understand how teachers interpret and implement curriculum adaptations within their natural classroom contexts, as well as how learners with visual impairment experience these adaptations. Rather than measuring variables quantitatively, the study aimed to explore participants' perspectives, practices, and lived experiences in depth.

Consistent with the interpretivist stance, a qualitative research approach was employed. The qualitative design enabled the researcher to obtain rich, descriptive data on instructional practices, classroom interactions, and contextual challenges influencing curriculum adaptation. This approach was particularly suitable for examining inclusive classroom processes, where meanings, interactions, and contextual dynamics play a critical role.

Data were collected through semi-structured interviews and participatory classroom observations. Semi-structured interviews provided flexibility to probe participants' experiences while maintaining alignment with the research questions. Interviews were conducted with subject teachers responsible for implementing the national curriculum, resource teachers who supported learners with visual impairment, and learners with visual impairment themselves. This triangulation of perspectives enhanced the credibility and depth of the findings.

Participatory classroom observation allowed the researcher to directly witness instructional practices, assessment procedures, material adaptations, and classroom interactions as they occurred. Observing lessons in real time enabled the study to move beyond self-reported practices and capture actual classroom implementation of curriculum

adaptations. Field notes were systematically recorded to document instructional strategies, learner engagement, and contextual constraints.

The data were analyzed using inductive content analysis. This analytical approach allowed themes and sub-themes to emerge from the data rather than being imposed a priori. Interview transcripts and observation notes were coded systematically, patterns were identified, and related categories were grouped to generate themes aligned with the research questions. The inductive process ensured that findings were grounded in participants' experiences while maintaining coherence with the study's objectives.

The methodological choices were consistent with the study's aim of developing an in-depth understanding of how the national curriculum is adapted for learners with visual impairment within an inclusive educational setting.

6.1 Key Findings

This section presents the key findings of the study, strictly aligned with the five research questions. The findings reflect the perspectives of subject teachers, resource teachers, and learners with visual impairment (LwVI), triangulated with participatory classroom observations. The presentation emphasizes what was found, not discussion or interpretation, to maintain clarity and consistency with the research objectives.

6.1.1 Adaptation of Curriculum Content

The study found that teachers employed several strategies to adapt the national curriculum for learners with visual impairment (LwVI) in inclusive classrooms, aiming to

make lessons more accessible, engaging, and comprehensible, though the extent and consistency of these adaptations varied.

6.1.1.1 Verbal Descriptions and Simplified Visuals

Teachers translated diagrams, charts, and other visual materials into verbal explanations, allowing learners to form mental representations of the content. Complex diagrams were often simplified, highlighting key elements to aid comprehension, though some details were occasionally lost.

6.1.1.2 Use of Real Objects and Prior Knowledge

Concrete materials from the classroom or environment, such as rulers, measuring cups, and biological samples, were used to illustrate abstract concepts. Teachers also linked lessons to learners' prior knowledge, making content more meaningful and easier to understand.

6.1.1.3 Collaboration and Support

Collaboration with resource teachers provided guidance, adapted materials, and in-class assistance, enhancing learners' access to content. However, such support was not always available, leading to improvised adaptations by class teachers.

6.1.1.4 Exclusion of Overly Visual Content and Improvisation

When content was too visual to adapt, it was sometimes omitted, which limited learners' exposure to certain concepts. Overall, adaptations were often improvised rather

than systematically planned, resulting in inconsistencies in lesson delivery and learning experiences.

These findings align with existing literature on inclusive education, which emphasizes that ad hoc adaptations, while helpful, cannot fully substitute for planned, resource-supported inclusive instruction (Meyer, Rose, & Gordon, 2014). Therefore, reflection on these practices points to the need for both teacher capacity-building and policy-level support to ensure equitable access to learning for all students.

6.1.2 Adaptation of Instructional Methods

The study revealed that teachers adapted instructional methods to support learners with visual impairment (LwVI) in inclusive classrooms, though the extent and consistency of these adaptations varied across subjects and lessons.

6.1.2. 1 Verbal Explanations and Repetition

Teachers relied heavily on verbal explanations and repeated instructions to reinforce understanding. This approach helped LwVI follow lessons and grasp key concepts, particularly in subjects with complex or abstract content. However, over-reliance on verbal instruction sometimes limited learner engagement and interaction.

6.1.2.2 Demonstrations, Tactile Experiences, and Peer-Assisted Strategies

Practical demonstrations, tactile activities, and peer-assisted learning were employed to enhance comprehension and participation. These methods allowed learners to interact with materials directly, making abstract concepts more tangible. Despite their

effectiveness, these strategies were used infrequently due to time constraints, large class sizes, and limited availability of teaching resources.

6.1.2.3 Question-and-Answer Techniques and Remedial Support

Teachers used questioning and remedial sessions to check understanding and provide additional support. These techniques encouraged active participation and offered opportunities for learners to clarify misconceptions, though their implementation varied depending on lesson pacing and teacher workload.

6.1.2.4 Additional Time and Read-Aloud Support

To accommodate individual learning needs, teachers often allowed extra time for tasks and read aloud instructions or written content. This helped LwVI access information at their own pace, supporting comprehension and reducing learning barriers.

6.1.2.5 Modification Based on Learner Needs

Instructional methods were adapted according to the perceived needs of individual learners. While these efforts demonstrated teacher responsiveness, the effectiveness of adaptations varied, highlighting the need for systematic strategies, professional training, and consistent application of inclusive instructional practices.

6.1.3 Adaptation of Assessment Procedures

The study revealed that assessment practices in inclusive classrooms were largely designed for sighted learners, with only limited accommodations for learners with visual impairment (LwVI).

6.1.3.1 Extra Time and Read-Aloud Support

Teachers often provided LwVI with additional time to complete assessments, and in some cases, questions or instructions were read aloud. These accommodations enabled learners to access the assessment content and respond more accurately, though the support was not consistently applied across all subjects.

6.1.3.2 Braille Responses and Transcription

When learners submitted responses in Braille, resource teachers transcribed them into standard print for grading by subject teachers. While this process allowed LwVI to participate in assessments, it created additional workload and sometimes delayed feedback, which could affect timely learning reinforcement.

6.1.3.3 Alternative Assessment Approaches

Some teachers occasionally used alternative methods, such as oral responses, practical demonstrations, or tactile activities, to assess understanding. These approaches provided more inclusive ways to evaluate learners' knowledge and skills, but their implementation was infrequent and often depended on the availability of resources and teacher initiative.

Overall, assessment adaptations were limited and inconsistently applied. The reliance on standard assessment formats, coupled with transcription delays and staffing constraints, reduced the effectiveness of evaluations for LwVI. This highlights the need for systematic assessment planning, increased teacher training on inclusive evaluation

strategies, and provision of accessible assessment tools to ensure equitable measurement of learning outcomes.

6.1.4 Adaptation of Instructional Materials

The study revealed that teachers made deliberate efforts to adapt instructional materials to support learners with visual impairment (LwVI), though the availability and quality of these resources varied.

6.1.4.1 Key Materials for Independent Learning

Braille sheets, writing frames, and styluses were commonly used, allowing learners to read, write, and take notes independently. These tools promoted learner autonomy and facilitated active participation in lessons, especially in subjects with high visual content.

6.1.4.2 Use of Real Objects and Tactile Models

Teachers frequently incorporated real objects and tactile models to illustrate concepts, particularly in subjects like Science, Mathematics, and Basic Design and Technology. These materials enabled LwVI to explore abstract or visually complex ideas through touch, enhancing comprehension and engagement.

6.1.4.3 Challenges of Material Availability

Despite these efforts, instructional materials were often insufficient, outdated, or completely unavailable. The lack of adequate and up-to-date resources limited the effectiveness of lessons and placed additional pressure on teachers to improvise

adaptations. This scarcity also hindered learners' consistent access to meaningful learning experiences.

6.1.4.4 Collaboration for Material Development

Collaboration between class teachers and resource teachers was instrumental in developing and adapting instructional materials for LwVI. Resource teachers provided expertise, guidance, and specialized materials, ensuring that lessons were more accessible. However, the effectiveness of this collaboration depended on the availability of trained staff and the presence of necessary resources.

while teachers' efforts facilitated access to instructional content, gaps in material availability and systematic adaptation highlight the need for structured planning, sufficient provision of specialized resources, and ongoing teacher support to optimize learning outcomes for LwVI.

6.1.5 Challenges Hindering Curriculum Adaptation

- Subject teachers' limited training in special needs education, Braille literacy, and curriculum adaptation constrained effective inclusion.
- Instructional methods were limited, with minimal use of multimodal strategies, reducing engagement and comprehension of abstract and spatial concepts.
- Shortages of adapted instructional materials including tactile diagrams, Braille resources, and assistive technologies restricted independent learning.
- Large class sizes prevented individualized attention and effective implementation of adapted strategies.

- A limited number of resource teachers created high workloads and inconsistent classroom support.
- Assessment formats were often inappropriate for LwVI, and feedback was delayed, reducing learning opportunities.
- Negative attitudes and behaviors from teachers and sighted peers affected learners' confidence, participation, and sense of inclusion.
- Insufficient instructional time hindered the delivery of adapted teaching strategies.
- LwVI occasionally exhibited undesirable behaviors, such as inattentiveness or misplacement of materials, often linked to unmet academic or social needs.

6.1.6 Additional Findings

The study revealed several additional factors affecting the inclusion and support of learners with visual impairment (LwVI) in inclusive classrooms.

6.1.6.1 Central Role of Subject Teachers

Due to the limited number of resource teachers, subject teachers assumed a central role in supporting LwVI. They often had to adapt lessons, provide individualized attention, and ensure learners could access content, highlighting their critical role in facilitating inclusive education.

6.1.6.2 Intermittent Resource Teacher Support

While resource teachers provided guidance and specialized support, their assistance was intermittent and fragmented. Constraints such as workload, scheduling conflicts, and

staffing shortages limited their ability to offer consistent support across all lessons, which placed additional responsibilities on class teachers.

6.1.6.3 Reliance on Peer Support

LwVI frequently relied on peers to access instructional materials, understand lesson content, and navigate classroom tasks. Peer assistance served as an informal but essential strategy, compensating for gaps in teacher support and instructional resources.

6.1.6.4 Improvisation, Collaboration, and Individualized Adjustments

Teachers often employed improvisation, collaboration with colleagues, and individualized adjustments to facilitate participation in lessons. These strategies demonstrated teacher initiative and responsiveness to learner needs, although their effectiveness varied depending on resource availability and teacher expertise.

6.1.6.5 Interrelated Systemic, Instructional, and Social Factors

The effectiveness of curriculum adaptations was influenced by the interplay of systemic, instructional, and social factors. Limited resources, inadequate teacher training, and social reliance on peers collectively affected how fully LwVI could participate in learning activities.

6.1.6.6 Partial Success of Inclusion

The inclusion of LwVI was partially successful. Teachers' efforts, peer support, and resource teacher interventions enabled meaningful engagement, but gaps in training, structured planning, and resource provision prevented full and equitable participation.

These findings underscore the need for systematic support structures, professional development, and adequate resources to enhance the quality of inclusive education.

6.2 Conclusions

Based on the key findings and their alignment with the research questions, this study draws several conclusions regarding the adaptation of the national curriculum, instructional methods, assessment practices, and instructional materials for learners with visual impairment (LwVI) at Ghana National Inclusive Basic School. The findings further reveal the extent to which classroom practices align with the principles of Universal Design for Learning (UDL), which emphasize multiple means of representation, engagement, and expression.

6.2.1 Adaptation of the National Curriculum

The study concludes that teachers at Ghana National Inclusive Basic School make deliberate efforts to adapt visually demanding components of the national curriculum through verbal descriptions, simplified explanations, tactile demonstrations, and peer-assisted support. These strategies reflect attempts to provide multiple means of representation, consistent with UDL principles. However, curriculum adaptation remains largely informal, teacher-dependent, and inconsistent across subjects. There is limited evidence of systematic planning or structured curriculum redesign at the institutional level. This indicates a disconnect between Ghana's inclusive education policy framework and its practical implementation in classrooms.

6.2.2 Modification of Instructional Methods

Instructional adaptations include repetition, individualized support, collaborative learning, demonstrations, and peer tutoring. These approaches demonstrate teachers' commitment to fostering participation and engagement for LwVI, aligning partially with UDL's principle of multiple means of engagement. Nevertheless, the absence of specialized training in visual impairment pedagogy, limited access to structured guidelines, and large class sizes restrict the depth and consistency of these adaptations. As a result, instructional effectiveness varies across lessons, and engagement is often dependent on teacher creativity rather than institutional design.

6.2.3 Adaptation of Assessment Practices

Assessment modifications at Ghana National Inclusive Basic School primarily involve procedural accommodations such as extended time, oral clarification of questions, and transcription of braille responses. While these practices promote access, they reflect accommodation rather than transformation of assessment systems. There is limited evidence of diversified assessment formats that allow LwVI to demonstrate knowledge through multiple means of expression, as advocated by UDL. Consequently, although access is partially provided, full assessment equity and learner independence are not consistently achieved.

6.2.4 Adaptation of Instructional Materials

Teachers frequently rely on improvisation, using real objects, tactile materials, braille sheets, and writing frames to support learning. These efforts demonstrate

commitment to inclusion; however, shortages of tactile graphics, assistive technologies, accessible digital content, and standardized adapted textbooks significantly constrain effective implementation. The limited availability of structured instructional materials undermines the consistent application of UDL principles in visually intensive subjects such as Mathematics, Science, and ICT.

6.2.5 Systemic Barriers to Inclusion

The study further concludes that systemic barriers—including inadequate pre-service and in-service teacher training, insufficient staffing of specialized personnel, large class sizes, limited funding for assistive resources, and time constraints—significantly affect the quality of curriculum adaptation. These structural challenges indicate that inclusive education at Ghana National Inclusive Basic School is sustained largely through individual teacher commitment rather than coordinated institutional support.

From the findings, it is concluded that inclusion for learners with visual impairment at Ghana National Inclusive Basic School is being implemented; however, it remains partial and inconsistently applied. Although teachers exhibit commitment, creativity, and a willingness to adapt instructional strategies, the continued reliance on improvisation and individual effort does not adequately guarantee instructional equity or sustained learner achievement.

The study further concludes that achieving meaningful inclusion goes beyond physical access to genuine participation and academic success requires stronger institutional alignment with Universal Design for Learning (UDL) principles. Systematic curriculum planning, structured professional development, and adequate resource

provision are essential. Therefore, coordinated support from the Ghana Education Service, the Special Education Division, curriculum developers, and school leadership is necessary to ensure that curriculum design proactively accommodates learner diversity rather than responding to challenges after they arise.

6.3 Recommendations

In response to the findings of this study, the following recommendations are proposed to enhance the inclusion of learners with visual impairment in Ghana National Inclusive Basic School and to promote instructional practices aligned with Universal Design for Learning (UDL) principles:

6.3.1 Research Question 1: Adaptation of Curriculum Content

The study found that teachers mainly use verbal explanations and simplified diagrams to adapt visually demanding content.

Recommendations:

- The Ghana Education Service (GES) should organize periodic, school-based training focused specifically on practical strategies for describing visual content clearly and using low-cost tactile materials.
- Teachers should be encouraged to include brief verbal descriptions of all visual information during lessons to support multiple means of representation, as promoted by UDL.

6.3.2 Research Question 2: Modification of Instructional Methods

Instructional adaptations depend largely on individual teacher effort.

Recommendations:

- School heads should schedule regular meetings between subject teachers and the resource teacher for joint lesson planning.
- Teachers should consistently apply structured peer tutoring and guided demonstrations, which require minimal financial resources but improve learner engagement.

6.3.3 Research Question 3: Adaptation of Assessment Procedures

Assessment adjustments are mainly limited to extra time and braille transcription.

Recommendations:

- Teachers should incorporate oral questioning and practical tasks as complementary assessment methods where appropriate.
- Schools should ensure timely preparation and marking of adapted assessments to support learner independence.

6.3.4 Research Question 4: Adaptation of Instructional Materials

Teachers rely heavily on improvised materials due to resource constraints.

Recommendations:

- District Education Directorates should prioritize the gradual supply of essential materials such as braille paper and basic tactile diagrams.
- Teachers should be supported to develop simple, low-cost teaching aids using locally available materials.

6.4. Areas for Future Research

To build on the findings of this study and deepen understanding of curriculum adaptation for learners with visual impairment in Ghanaian inclusive basic schools, future research could explore the following areas:

- Investigate curriculum adaptation practices across multiple inclusive basic schools in different regions of Ghana to enhance generalizability, using qualitative or mixed-methods approaches.
- Examine the effects of systemic factors, including class size, instructional time, and teacher training, on the implementation of Universal Design for Learning (UDL) principles, employing cross-sectional surveys or longitudinal studies.
- Assess the impact of assistive technologies and digital tools on learners' access to curriculum content and independent learning, using experimental or quasi-experimental designs.

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APPENDIX A
INTRODUCTORY STATEMENT

Dear participant,

This interview forms part of my doctoral research entitled: “*teachers’ adaptation of the curriculum for learners with visual impairment in Ghana National Inclusive Basic School*” for the degree of Philosophy of Doctorate at the University of Education, Winneba.

This study aims to explore the teachers’ adaptations of the curriculum for learners with visual impairment in your school. The findings of the study will benefit schools, teachers, learners, and curriculum developers. You are kindly requested to complete this interview questions honestly and frankly as possible and according to your personal views and experience. No foreseeable risks are associated with the completion of this interview which is for research purposes only. The interview is between 40 to 45 minutes to complete. You are required to indicate your gender, qualification, year of service and area of specialization to contribute to a more comprehensive analysis. All information obtained from this interview will be used for research purposes only and will remain confidential. Your participation in this study is voluntary and you have the right to skip any question if so desired, or to withdraw from answering without penalty at any stage. Permission to undertake this study has been granted by the University of Education, Winneba. By completing this interview is an indication that you have agreed to participate in this research.

Yours sincerely,

Cynthia
(Ph.D. Student)

Abekah

Okwan

APPENDIX B

**SEMI-STRUCTURED INTERVIEW FOR TEACHERS AT GHANA
NATIONAL INCLUSIVE BASIC SCHOOL**

Section A Background Information

1. Gender.....
2. Qualification:
3. Years of service:
4. Area of specialization:

MAIN QUESTION

1. How do teachers adapt the curriculum to meet the needs of learners with visual impairment in the inclusive classroom?

Prompts

- a. How do you adapt curriculum content to support learners with visual impairment in your class?
- b. How do you modify visually intensive content (e.g., diagrams, charts, graphs)?
- c. Can you describe a specific lesson where you successfully adapted the content for LwVI?

- d. What are some of the challenges in adapting the visual components of the curriculum?
- e. What can be done to promote the adaptations of the content of the curriculum for learners with visual impairment in the inclusive classrooms?
- f. What are some of the other issues about content adaptation you would like to mention?

2. How do teacher modify instructional method to teach the visual components meet the needs of learners with visual impairment in the inclusive classroom?

Prompts

- a. What instructional methods do you mostly use in the inclusive classroom?
- b. How do you implement the instructional method mentioned to meet the needs of the learners with visual impairment?
- c. What teaching strategies do you apply to promote effective delivery of the methods used?
- d. How do you ensure learners with visual impairment are engaged during teaching and learning?
- e. What are some of the challenges in adapting the instructional method to meet the needs of the learners in the inclusive classroom?
- f. What do you do suggest to promote instructional adaptations in the inclusive classroom?

3. How do teachers modify assessment procedures for learners with visual impairment?

Prompts

- a. How do you assess learners with visual impairment on the visual components of the curriculum in the inclusive classroom? Please elaborate.
- b. What assessment options do you use in assessing learners with impairment?
- c. How do you provide feedback to the learners with visual impairment?
- d. What are some of the challenges in assessment procedure adaptations?
- e. What do you suggest to reduce the challenges?
- f. What other information would you want to add?

4. How do teacher modify instructional materials to meet the needs of learners with visual impairment in the inclusive classroom?

Prompts

- a. What are some of the instructional materials do you use to teach the visual components of the curriculum to meet the needs of learners with visual impairment in the inclusive classroom?
- b. How do you ensure learners with visual impairment use the instructional materials as expected?
- c. How do you ensure fairness while maintaining academic standards?
- d. What are the challenges associated with the instructional material used to meet the needs of the learners with visual impairment?

- e. What do you suggest to reduce the challenges in adapting the instructional materials?
- f. What other issues would you like to add on adapting the instructional materials to meet the needs of learners with visual impairment

5. What challenges do you face when adapting your teaching and the curriculum to meet the needs of learners with visual impairment?

Prompts

- a. What difficulties do you encounter when modifying visually intensive content such as diagrams, graphs, equations, or practical demonstrations?
- b. What challenges do you experience when using adapted teaching strategies (e.g., descriptive teaching, peer support, hands-on activities) in your classroom?
- c. What problems do you face in accessing, preparing, or improvising adapted instructional materials such as Braille, tactile resources, or assistive technologies?
- d. What challenges arise when adapting tests, examinations, or practical assessments for learners with visual impairment?
- e. How do factors such as large class size, limited instructional time, or pressure to complete the syllabus affect your ability to adapt effectively?
- f. How do training, collaboration with resource teachers, and institutional support influence the challenges you face in curriculum adaptation?

APPENDIX C

SEMI-STRUCTURED INTERVIEW FOR RESOURCE TEACHERS

GHANA NATIONAL INCLUSIVE BASIC SCHOOL

1. Gender:
2. Qualification:
3. Years of service:
4. Area of specialization:.....

1. How do general teachers adapt the visual components of the curriculum for learners with visual impairment, and what role do you play in supporting these adaptations?

Prompts

- a. How do you support teachers in adapting curriculum content for learners with visual impairment?
- b. How do you assist in modifying visually intensive content (e.g., diagrams, charts, graphs, equations)?
- c. Can you describe a specific situation where you supported a teacher in adapting a lesson successfully?
- d. What challenges do teachers face in adapting visual components of the curriculum?

- e. What strategies do you use to guide or mentor teachers in content adaptation?
- f. What other issues related to curriculum content adaptation would you like to mention?

2. How do teachers modify instructional methods to teach visual components, and how do you support them?

Prompts

- a. What instructional methods do general teachers commonly use in the inclusive classroom?
- b. How do you guide teachers in implementing inclusive teaching strategies for learners with visual impairment?
- c. What strategies do you recommend to improve learners' participation and engagement?
- d. How do you support teachers during practical or visually oriented lessons?
- e. What challenges do teachers experience in adapting instructional methods?
- f. What suggestions do you have to strengthen instructional adaptations in the inclusive classroom?

3. How are assessment procedures adapted for learners with visual impairment, and what support do you provide?

Prompts

- a. How do teachers assess learners with visual impairment on visual components of the curriculum?
- b. What alternative assessment formats are used (e.g., Braille, oral, practical)?
- c. What role do you play in preparing or transcribing assessment materials?
- d. What challenges occur in adapting assessment procedures?
- e. How can assessment practices be improved to ensure fairness and independence?
- f. What additional information would you like to share regarding assessment adaptation?

4. How are instructional materials adapted to meet the needs of learners with visual impairment?

Prompts

- a. What instructional materials are used to teach visual components to learners with visual impairment?
- b. How do you prepare or source Braille, tactile, or assistive materials?
- c. How do you ensure learners use adapted materials effectively?
- d. What challenges are associated with preparing or accessing adapted materials?
- e. What improvements are needed in the provision of instructional materials?
- f. What other issues would you like to add regarding material adaptation?

5. What challenges do you face as a resource teacher in supporting curriculum adaptation for learners with visual impairment?

Prompts

- a. What difficulties do you encounter when supporting teachers in modifying visually intensive content?
- b. How does workload or staffing affect your support role?
- c. What challenges arise in collaborating with general teachers?
- d. How do resource limitations affect your effectiveness?
- e. How do institutional policies or time constraints influence adaptation practices?
- f. What systemic changes are needed to strengthen support for learners with visual impairment?

APPENDIX D

SEMI-STRUCTURED INTERVIEW FOR LEARNERS WITH VISUAL IMPAIRMENT

GHANA NATIONAL INCLUSIVE BASIC SCHOOL

Background Information

1. Gender:
2. Class/Grade:
3. level of Visual Impairment
4. Number of years in this school:

1. Curriculum Content

Main Question:

1. How are lessons with diagrams, drawings, graphs, or other visual materials made understandable to you?

Prompts

- a. What subjects are most difficult because they use visual materials?
- b. How do teachers explain diagrams or pictures during lessons?
- c. What examples show when a lesson was clearly adapted for you?
- d. What challenges arise when teachers do not adapt visual content?
- e. What strategies help you understand visual topics better?
- f. What additional support would improve your understanding of visual lessons?

2. Instructional Methods

Main

Question:

2. How do teaching methods in your classroom support your participation and learning?

Prompts

- a. What teaching methods help you learn best?
- b. How do teachers describe what they write on the board?
- c. What role does group work or peer support play in your learning?
- d. How are practical lessons made accessible to you?
- e. What challenges occur during teaching activities?
- f. What changes would improve your classroom participation?

3. Assessment Procedures

Main

Question:

3. How are tests and assignments adapted to help you show what you have learned?

Prompts

- a. What formats are used for your tests (e.g., Braille, oral, practical)?
- b. How is extra time or additional support provided during exams?
- c. How are diagram-based questions handled?
- d. What challenges arise during assessments?
- e. What type of feedback helps you understand your performance?
- f. What improvements would make assessments fairer and more accessible?

4. Instructional Materials

Main

Question:

4. How do learning materials support your understanding in class?

Prompts

- a. What materials (e.g., Braille books, tactile diagrams, assistive devices) are available to you?
- b. How are these materials explained or demonstrated before use?
- c. What challenges occur when materials are not available?
- d. How do assistive tools help your learning?
- e. What difficulties arise when materials are delayed or insufficient?
- f. What additional materials would improve your learning experience?

5. Challenges in Learning

Main

Question:

5. How do challenges in the classroom affect your learning experience?

Prompts

- a. What difficulties arise in visually intensive subjects?
- b. How does class size influence your participation?
- c. What challenges occur during practical lessons?
- d. How does time allocation affect your understanding of lessons?

- e. What support from teachers or peers strengthens your learning?
- f. What changes would improve your overall learning experience?

APPENDIX E

CLASSROOM OBSERVATION GUIDE

Name of the School:

Grade observed:

Subject observed:

Date: Starting time:Ending time:

.....

Classroom observation: The practice in inclusive classroom with learners with visual impairment

Content

Adaptations	Comments
Breaking complex concept into flexible concept	
Taken learners with visual impairment into consideration when planning teaching and learning activities.	
Explains the new concepts in the lesson with examples.	
Experiential learning	
Clear directions	

Oral description	
Reduction of copy work	
Summarizes the main points at the end of the lesson.	

Instructional methods

Adaptations	Comments
Differentiate instructions to address the content in multiple ways.	
Hands on experiences	
feedback during practice activities	
Verbalization of writing	
Extra time for responses in class	

Assessment procedures

Statement of practice	Comments
Assessment Methods used	

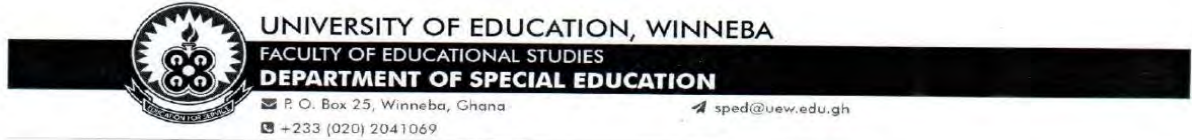
Teachers observe the learners during their group work	
Teachers ask each group various questions?	
Extends time for tests and assignments	
Descriptive response	
Provide learners with visual impairment with equal opportunity to demonstrate what they have learned in the classroom	

Instructional Materials

Adaptations	Comments
The use of teaching materials, for example, visual and Audio devices and tactile materials	
Encouraging the use of learning devices	
Adapting written texts	
Use of assistive technology	
Planned a variety of presentation modes and assignments, textual, verbal, and visual, so as to accommodate the visual, audio and tactile learners	

APPENDIX F

LETTER OF INTRODUCTION



14th February, 2023

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

LETTER OF INTRODUCTION: MRS. CYNTHIA ABEKAH OKWAN

I write to introduce to you, **Mrs. Cynthia Abekah Okwan** a PhD. student of the Department of Special Education with index number 202139801

She is currently working on her thesis on the topic: **"Teachers' Adaptations of the Curriculum to include Learners with Visual Impairments in Ghana National Inclusive Basic School."** She needs to conduct interview and do an observation in your school.

I would be grateful if you could give her the needed assistance.

Thank you for the consideration and assistance.

Yours faithfully,

.....
MRS. FLORENCE AKUA MENSAH
(Ag. Head of Department)

