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The Implementation of Universal Basic Education in a School in Nigeria

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<u>Walden University</u>

College of Education

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Romanus A. Igweonu

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Walden University
2021

Abstract

The Implementation of Universal Basic Education in a School in Nigeria

by

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EDS, Walden University, Minneapolis, MN., 2015

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BA, BMS College, Enugu, EN., 1992

BA, SJMS College, Ikot-Ekpene, CR., 1988

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Education Policy, Leadership, and Management

Walden University

August 2021

Abstract

The Nigerian government has been concerned in recent years with students' achievement gaps in basic science. Currently, there is not enough research on the perspectives of administrators and teachers concerning their practices and experiences of Universal Basic Education (UBE) programs and their influence on students' science achievements. In this basic qualitative study, the perceptions of three administrators and eight basic science teachers in a selected school were explored regarding their practices and experiences utilizing the UBE program to bridge achievement gaps among ninth grade students in basic science. The conceptual framework was based on the Fullan change theory that assumes that every school reform and educational improvement should meet the conditions of stakeholders for continuous improvement in practice. The two major research questions that guided this study focused on the perceptions of the administrators and teachers concerning the program practices and strategies employed which influence ninth grade students' basic science achievement. The data were collected through interviews. The interviews were transcribed, coded, and thematically analyzed. The findings indicated that administrators and teachers perceived that their program practices enhanced the ninth grade students' basic science achievements. Additional findings indicated that the program strategies employed helped students in meeting expectations in basic science. This study has the potential to contribute to positive social change by identifying strategies to increase scientific literacy of the students in southeast Nigeria as well as improve administrators' and teachers' accountability for other program initiatives in the Nigerian education system.

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Dedication

I dedicate this dissertation to my late parents, Comrade Romanus and Christiana Igweonu, whose educational service in the southeast of Nigeria supported the cause for equal education for all children in Ebonyi State. Also, I dedicate this dissertation to the educators and UBE stakeholders who continuously advance strategies to educate all children as well as support them to gain lifelong skills.

Acknowledgments

This capstone project is possible thanks to scholars such as Dr. J. Don Jones, my committee chair. I will always remember Dr. Jones for his wise and careful guidance during the period of this academic project. I would like to thank Dr. Donald Wattam, my methodologist, who left no stone unturned to ensure the integrity and quality of this project. I appreciate your wonderful support. I also wish to thank the Walden University Research Reviewers, Dr. Paul Englesberg, and Dr. Narjis Hyder, who ensured that this academic project aligned with Walden University's academic integrity and vision for social change. Dr. Lee Stadtlander, Dr. Morris Bidjerano, Dr. Marydee Spillett, and other Walden University research quality and abstract review experts, thank you for being there. I want to thank Dr. Sarah Everts for her valuable contributions and vital support. Thank you, Mr. Britt Thompson, my editor, and all Walden University dissertation editors for your supports. I want to thank Dr. Kim Winkelman, Dr. Tina Dawson, and other Walden University faculty, and instructors; Megan Herrley, and other student success and support services, for their wonderful support in the program.

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Chapter 1: Introduction to the Study

Despite the Universal Basic Education (UBE) program initiated to improve student achievement, basic science achievement disparities have lingered in some rural secondary schools in Nigeria. For 2009 and 2010, the basic science achievement record in Ebonyi State, Nigeria, was 34% and 35%, respectively (Nwafor, 2012). Akani (2016) indicated 45%, 39%, and 34% basic science achievement status in Ebonyi State for 2011, 2012, and 2013, respectively. Enemarie et al. (2018) found that disparities in basic science achievement predicted science achievement disparities in the senior sciences. In this study, I explored the perceptions of teachers and administrators regarding their practices and experiences that used the UBE program and helped ninth grade students meet the achievement standards in basic science.

I conducted this study because of the gap in knowledge regarding the perceptions of basic science teachers and administrators concerning the practice and use of the UBE program to minimize basic science achievement gaps in test scores of ninth grade students. It was unclear how the basic science teachers and administrators in a school perceived the effects of the UBE program on the achievement gaps in basic science.

This study has the potential to contribute to positive social change in the selected school. The exploration of the perceptions of the basic science teachers and administrators regarding basic science achievement may lead to better strategies for bridging the achievement gaps to meet the global, national, state, and local expectations for basic science achievement for the ninth grade students in the selected school.

This chapter comprises the background of the study, problem statement, purpose of the study, research questions, conceptual framework, nature of the study, definitions of concepts, assumptions, scope and delimitations, limitations, and the significance of the study. This chapter concludes with the summary of the main points and transition to the next chapter.

The Background section includes a summary of research literature related to the scope of the study topic and the gap in knowledge, as well as reasons the study was needed. The Problem Statement consists of the research problem and evidence that the problem was current, relevant, and significant to the education system. In the Purpose of the Study section, I include the study paradigm and the reason for the study as well as the determination of how basic science teachers and administrators perceived the influence of the UBE program on the basic science success of the students in ninth grade in the selected school. I then state the research questions, which are How do teachers and administrators perceive the use of UBE program as administrators and teachers minimize the achievement gap in basic science in the ninth grade? and What strategies are teachers and administers using to support students in meeting proficiency in basic science while addressing the Millennium Development Goal in basic science?

In the Conceptual Framework section, the concepts that ground the study are identified, defined, and described. The logical connections among the elements of the framework include how the theory linked to the research and major research questions. The Nature of the Study section provides a concise rationale for the selection of the design. I briefly describe the concepts explored, summarize the methodology, and detail the methods employed to gather and arrange the information. The Definitions section includes definitions of key terms and terms with multiple meanings that I employ in the study. The explanations connect the terms to other academic studies or research. The Assumptions section helps to clarify the study's perspectives that were assumed but had not been confirmed in the field of knowledge. I also describe the reasons the assumptions were necessary for the context of the study. The Scope and Delimitations section includes analysis of the aspects of the research problem addressed in the study and reasons the specific focus was chosen. Additionally, I set the boundaries of the study and identify the population that I included and excluded. I then describe the limitations of the study related to design and methodology, as well as issues related to the limitations of transferability and dependability, while also addressing biases that could influence the study outcome, as well as reasonable measures that addressed the limitations. In the Significance section, I describe the potential contribution of the study to the education system in Nigeria, namely, that it may promote the understanding of better strategies for bridging the basic science achievement gap. I also discuss the implications for improved basic science achievement of the ninth grade students in the selected school and the country. The chapter concludes with a summary of the main points and transition to Chapter 2.

Background

Studies have indicated that several factors contributed to gaps in students' proficiency in basic science (Abubakar & Njoku, 2017; Ayodele, 2019; Nwafor & Umoke, 2016; Oleribe & Taylor-Robinson, 2016; Pepple & Ogologo, 2017). Although

Oleribe and Taylor-Robinson (2016) blamed economy for global gaps, Ayodele (2019) blamed Boko Haram terror situation for the gaps in the states in Nigeria. Pepple and Ogologo (2017) attributed gaps in science achievement to Niger-Delta crisis in Rivers state, which influenced basic science achievement of schools in the state due to destruction of learning resources. Scholars have discovered that culture and school type influenced achievement of some private schools in Northern Nigeria (Abubakar & Njoku, 2017).

Although some scholars have discovered global, national, and state-level gaps in basic science achievement (Abubakar & Njoku, 2017; Ayodele, 2019; Nwafor & Umoke, 2016; Oleribe & Taylor-Robinson, 2016; Pepple & Ogologo, 2017), others have suggested resources from the UBE program which helped to minimize gaps (Ige & Hlalele, 2017; Nwafor & Umoke, 2016; Ozowuba, 2018). Although Ntibi recommended the supply of essential learning materials to create positive attitude for learning (Ntibi & Edoho, 2017, p. 83), scholars are increasingly interested in the importance of computers in learning. Omiko and Oketa (2018) have indicated that computer assisted instruction (CAI) impacted learners' success in mathematics more than scheduled teaching and traditional instructional methods.

Ige and Hlalele (2017) adopted the pretest-posttest, control group, quasi-experimental design to find the effects of computer-aided teaching technologies and strategies on students' academic achievement in Ondo State, Nigeria. Ige and Hlalele found a realizable effect of treatment on students' success. The students who were taught with the aid of computers demonstrated higher achievement than the mixed teaching plan team and the regular team. Shamir et al. (2018) explored the effectiveness of comprehensive computer-adaptive learning was explored in two different school districts in Texas and Florida during the 2015-2016 school year. The experimental groups used CAI, while the control group used few or no CAI programs. The result showed that the use of a CAI learning program in a classroom setting had a significant impact on student academic achievement. Although some scholars (e.g., Anil et al., 2018) indicated that technology-assisted education influenced the learners' grades significantly, other scholars indicated that academic achievement increased due to computer-supported instruction, which increased retention and student performances in the science subjects (Gambari, & Yusuf, 2017). The findings revealed that applying teaching aids in learning had a noticeable impact on learners' academic outcomes. Researchers concluded that relationship between teaching aid and computer-assisted instruction and students' academic achievement (Ige, & Hlalele, 2017; Omiko & Oketa, 2018). However, other scholars investigated the link between instructor quality and learners' academic success (Gimba et al., 2018; Ogbaji, 2017).

The relationship between teacher interest and students' academic achievement is known (Tella, 2017). Tella (2017) examined the link between teacher work desire, disposition, and learners' academic success in primary school mathematics. The research sample comprised 254 elementary school instructors and 120 elementary school students. The researcher used multiple regression analysis to analyze the data collected in the study. The findings of the study indicated that instructor productivity and disposition had links with students' achievement scores. The author concluded that teachers' self-efficacy and interest were the best predictors of pupils' academic achievement in mathematics. The author inferred that achievement in the UBE subjects such as mathematics and the basic sciences would increase if the qualified teachers had both an interest in and esteem for the subject. Although Tella concluded that teachers' self-efficacy predicted academic achievement in Mathematics, the author did not discover the influence of teachers' self-efficacy on basic science achievement. However, NimotaJibolaKadir and AbiodunAkanbiGafar (2018) discovered the influence of head teacher role on the basic science achievement of students in the Northcentral zone of Nigeria. Researchers recommended that headteachers should continue supervising, supporting, and motivating science to achieve SDG in science education (NimotaJibolaKadir & AbiodunAkanbiGafar, 2018, p.28).

Additional findings indicated that students' and teachers' attitudes and perceptions influenced basic science achievement in some schools (Perry et al., 2016). The scholars' recommendations for basic science improvement strategies in school included active involvement and professional training opportunities (NimotaJibolaKadir & AbiodunAkanbiGafar, 2018; Omiko & Oketa, 2018). These studies are relevant to the research as they provide clues for assessing the perceptions of basic science teachers and administrators regarding the UBE program resources and instructional material and technology resources that influence basic science achievement. Also, these studies provide insights into possible participant perceptions regarding the influence of the quality and disposition and experience of the teachers on the basic science achievement of the ninth grade. Finally, the studies provide understanding of the effect of students' and teachers' attitudes and perceptions of basic science achievement in some schools.

Problem Statement

A problem exists in the Nigerian government education program. Specifically, the problem concerns the basic science achievement gaps that exist in the regions of the country. To meet the United Nations' MDG as well as minimize achievement gaps in the regions of the country, the Nigerian government endorsed UBE (Aja et al., 2018; Ejere, 2011). However, achievement gaps in basic science have persisted at the national, regional, and state levels (Oleribe & Taylor-Robinson, 2016; Onanuga & Saka, 2018). Despite the UBE program, students in a rural secondary school in Nigeria were not proficient in basic science. The school proficiency rate in Ebonyi State, in basic science for 2009 and 2010 was 34%, and 35% (Nwafor, 2012), respectively, while the 2011 through 2013 basic science scores in Ebonyi State were 45%, 39%, and 34%, respectively, for students at or above proficiency (Akani, 2016). The proficiency levels in science differed in many states of the country. Though gaps in the basic science scores across the states showed achievement disparities among the ninth grade students (Gimba et al., 2018), there was a gap in the literature regarding the perceptions of teachers and administrators regarding the practice and use of the UBE program to help ninth grade students in meeting the basic science achievement standards. It was unclear how the teachers and principals in a school perceived the influence of the practice and use of the UBE program on the achievement gaps in basic science.

Purpose of the Study

The purpose of this study was to explore the perceptions of teachers and administrators regarding their practices and experiences used in the UBE program to help ninth grade students meet the achievement standards in basic science. The face-to-face interviews were used to explore the perceptions of the teachers and administrators regarding their experiences used in the UBE program to bridge achievement gaps in the selected school, which may increase the understanding of better strategies that bridged the achievement gaps and met the MDG goal.

Research Questions

The questions examined in this study were the following:

1. How do teachers and administrators perceive the use of the Universal Basic Education (UBE) program as the administrators and teachers minimize the achievement gap in basic science in the ninth grade?
2. What strategies are teachers and administrators using to support students in meeting proficiency in basic science while addressing the Millennium Development Goal in basic science?

Conceptual Framework

The foundation for this study was Fullan's (2007) change theory, which had been used extensively in several school improvement reforms in diverse settings (Brooks & Gibson, 2012; Chen, 2008; Ebbeck & Chan, 2011; Saiti, 2012; Webber & Scott, 2010). This theory assumed that reform and educational improvement strategies addressed the conditions of stakeholders for continuous improvements and included similar ways of changing the stakeholders, culture, and setting. The administrators and teachers in a setting were stakeholders who understood the culture and practice that sustained students' proficiency levels and understood how the UBE program affected proficiency in basic science in a school setting. Hence, the Fullan change theory guided this study and provided insight into the perspectives of instructors and administrators who used the UBE strategy and increased the proficiency level in basic science in a ninth grade learning context. The Fullan change theory guided how the UBE program strategy corresponded to the ways that changed the teachers' and administrators' culture and practice in a setting and increased the proficiency level of the ninth grade students in basic science in a school setting.

A similar change theory that could have guided this study was Rogers's (2003) diffusion of innovation (DOI) theory, which claimed that stakeholders adopted new ideas in categories due to their perception and the influence of surrounding factors over some time. The influencing factors included

- the factors that influenced the change,
- the decision strategy to implement the new idea,
- the stakeholders' orientation,
- the implication of change for the stakeholder or community, and
- the information strategies used during the change process.

Rogers's (2003) DOI claimed that change disseminated across periods via certain groups and culminated with stakeholders who accepted and implemented a new idea in their environment. Rogers asserted that factors such as comparative opportunities, which are agreeable, tangible, visual, complex, but experimental influenced the spread of change in an environment. The relative advantage referred to how a new idea was better than an old practice. Compatibility referred to how the new idea was easy for the stakeholders. Complexity referred to the possible constraints that challenged the stakeholders of change. Trialability referred to how sustainable the change was. Finally, observability referred to tangible change outcomes.

Rogers's innovation theory had been used to increase stakeholders' understanding of adopting change (Dingfielder & Mandell, 2011; Murray, 2009; Rogers, 2003) and implementing school programs (McCormick et al., 1995); included technology instruction (Lundvall, 2010; Peslak et al., 2010). Sherry and Gibson (2002) argued that the problem with applying Rogers's change theory to schools was that a school was not the single social system within which Rogers's innovation took place. The central school system had subsystems that included teachers within the classroom, schools, and districts. The Fullan (2007) change theory was used to conceptualize the shared understanding of the achievement gap and the UBE program strategies that sustained the continuous practice that bridged the achievement gap and supported educational equality in a setting.

Nature of Study

In this basic qualitative study, I explored the perceptions of the teachers and administrators regarding their practices and experiences used in the UBE program to help ninth grade students meet the achievement standards in basic science. I also explored the teachers' and administrators' practices used in the UBE program strategy to bridge the achievement gaps in basic science. The perspectives of teachers and administrators and how they helped students in the ninth grade to meet the achievement standards in basic science was explored. According to Yin (2017) and Merriam (2009), the basic qualitative study was adaptive to the conditions and perceptions of the stakeholders in a school setting and other environments. A basic qualitative study focuses on perspectives and interpretations of the stakeholders involved in discovering a situation or event influencing or changing peoples or behaviors in a setting (Merriam, 2009). In this study, I explored administrators' and administrators' perspectives on program practices and strategies that minimize the achievement gap in basic science in the ninth grade in the selected school. Also, exploring the perceptions of teachers and administrators who supported ninth grade students in meeting basic science expectations would provide knowledge to other educators who support learners in meeting the science achievement and MDG outcomes in other settings.

Finally, the major sources of data included interviews conducted with the administrators and basic science teachers. I collected data from the basic science teachers and the administrators in the selected school and analyzed it thematically per groups of participants' data. The codes, categories, and themes which were aligned to Research Questions 1 and 2 refer to the administrators' and teachers' perspectives on program practices and strategies that influence basic science achievement in the school.

Definitions

Educology of science: Knowledge about the process of teaching and studying science in some setting (Ango, 2002).

Final-year senior secondary students (FYSSS): Students in their last year of senior secondary education (students in the 12th grade). In Nigeria, the students in this grade are called Senior Secondary School 3 (SSS3). The students in this class complete with an exit exam called West African Senior School Certificate Examination (WASSCE; Ozowuba, 2018).

Junior Secondary School Certificate Examination (JSSCE): The state examination students must pass to qualify to enter high school (Nwafor, 2012).

Millennium Development Goal (MDG): A global development program centering on providing basic education, removal of poverty; enhancing gender equality as well as encouraging global teamwork for improving environments (Abbott et al., 2015).

Senior School Certificate Examination (SSCE): A college requirement examination for students aspiring to further their education in any higher institution of learning in Nigeria. It is usually taken by students who have completed high school level courses. Also, the exam predicts college readiness for students who pass it.

West African Examinations Council (WAEC): The management council that organizes the SSS3 exit exam, which is usually conducted in May and June for regular students or November and December for external students.

Universal Basic Education (UBE): An education policy supporting Nigeria to achieve the education for all (EFA) strategies for eliminating illiteracy and increasing opportunities for education for the Nigerian child of school-going age (Opoh et al., 2015).

Assumptions

I assumed that the basic science teachers and administrators in the selected school provided objective information that responded to the interview questions. I also assumed that these participants willingly provided information about the ninth grade students' basic science achievement records. Additionally, I assumed that the basic science teachers and administrators in the selected school provided accurate information about the basic science teaching and learning and grading practices and used the UBE learning resources in their classrooms. Another assumption was that the participants shared their perceptions regarding the influence of these grading practices in the basic science achievement of the ninth grade students in the selected school. An assumption was also that the participants shared their perceptions regarding the influence of global and national assessment standards on the basic science achievement of the ninth grade students in the selected school. I assumed that the basic science teachers and administrators in the selected schools shared their familiarity with current basic science teaching and learning and grading practices and that they used the UBE resources. Also, I assumed that these individuals shared their perceptions on the influence of changes in the basic science teaching and grading practices on the basic science achievement of the ninth grade students in the selected school. Finally, I assumed that the basic science teachers and administrators shared their perceptions regarding the influence of the global, national, state, and local assessment standards on the basic science achievement standards of the ninth grade students in the selected school and used the UBE resources.

Scope and Delimitations

This basic qualitative study focused on the perceptions of basic science teachers and administrators in the selected school regarding the practice and use of the UBE program that helped the ninth grade students to meet the basic science achievement standards. In this study, I explored the current practice of teaching, learning, and grading basic science alongside global, national, state, and local students and how these teaching practices were familiar to basic science teachers and administrators as well as how these practices influenced basic science achievement of ninth grade students in the selected school. Although the basic science teachers and administrators in the selected school might have shared experiences and provided basic achievement records from previous years, the basic science achievement records shared were limited to 3 years. Participants' memories of their experiences older than 3 years may not have been accurate. The relevance of the most recent and current experiences of the basic science teachers and administrators in the selected school that was prioritized was vital because some participants might have left the school at an earlier stage of the UBE implementation. This study was delimited to the most recent and current practices of teaching, learning, and grading of basic science and used the Fullan (2007) school improvement theory that supported the interview responses of the participants who were familiar with the program practices and provided relevant information concerning the recent and current practice of teaching and learning and grading basic science in the selected school.

This study did not focus on the teaching, learning, and achievement records of other UBE subjects, but instead focused only on the teaching, learning, and basic science achievement records and the experiences of the basic science teachers in a selected school. The study focused on the influence of the achievement standards and factors and the basic science teachers' quality knowledge dispositions, and their perceptions of how these standards, factors, and dispositions influenced the basic science achievement of the ninth grade students in the selected school. Additionally, the study focused on the influence of global, national, state, and local teaching, learning, and grading factors on the basic science achievement of the ninth grade students in the selected school.

Limitations

This basic qualitative study was limited to the basic science teachers' and administrators' freewill involvement and explored the perspectives of the participants that were not representative of the whole. The participants who were inclined to complain or emphasized only the positive might be more inclined to be interviewed or participate in discussions regarding basic science teaching, learning, and grading experiences. Some participants had interview preferences that included face-to-face, email, Skype voice conferencing, Skype video conferencing, or telephone conferencing. Some participants might have had reservations regarding the face-to-face interview collection strategy. Hence, I relied on participants' preferences to avoid adversely affecting the objectivity of the study findings. However, I developed strategies which reduced the effect of this limitation, and validated information via member checking.

Other limitations included the interview timing and the participants' time preferences with which they shared the achievement records and included availability for face-to-face interviews or discussions. A connection failure or social distancing laws related to the COVID-19 pandemic might have limited face-to-face or online interviews. However, the participants might have been mobilized by mobility credit, phone credits, or free accommodation to enhance interview convenience and the environment. Though the contextual approach of this study provided in-depth data, the limitations of available time and access might have failed to bring important issues to the surface. Nevertheless, I collected data until saturation occurred. The familiarity factor might have constituted some bias due to closeness with some of the participants. Hence, member checking was used to triangulate interview data and included the interview transcript review that demonstrated the trustworthiness of the interview. Also, the interview protocol and procedures enhanced the objective collection of interview data. The interview protocol was communicated via informed consent and explained before the start of the interview. I affirmed participant consent before the start of the interview.

Significance

The study documented the perceptions of teachers and administrators who were in the UBE program regarding achievement gaps in basic science in the ninth grade. The results of the study provided understanding to teachers and administrators concerning achievement gaps that were bridged with the UBE program and therefore increased the proficiency level in basic science for students in the ninth grade. The results of the study provided understanding to teachers and administrators on methods by which to increase accountability for the UBE program sought and minimized achievement gaps to meet the MDG goals. Understanding the perceptions of the principals and teachers regarding the achievement gaps may improve practices for program initiatives that supported educational equity in the school districts in the states of Nigeria.

Furthermore, this study enhanced the nation's plans to meet the national Education for All (EFA) goals and supported the development of staff. Teachers and administrators may discover other impediments to quality education in reading and science from the results of the study.

Summary

In Chapter 1, I described the implementation of UBE in Nigeria. Also, the chapter described how basic science teachers and the administrators perceived the UBE tools and resources used to bridge the basic science achievement gaps among the ninth grade students in the selected school.

In Chapter 2 of this study, I review and synthesize current peer-reviewed literature concerning program practices and their influences on student achievements as well as strategies used to support students' science achievements. I also describe the literature search strategy used to find peer-reviewed articles published within the last 5 years. The synthesis of literature includes details specific to the problem and purpose of the study and the research questions.

Chapter 2: Literature Review

Basic science achievement gaps have lingered in rural secondary schools in Nigeria despite the efforts of the Nigerian government to minimize them (Akani, 2016; Ejere, 2011; Nwafor, 2012; Pepple & Ogologo, 2017). Though the reported gaps in the basic science achievement across the schools in Rivers states had been reported (Pepple & Ogologo, 2017), the achievement scale for the rural schools in Ebonyi state averaged 35% for 2009 and 2010 (Nwafor, 2012) and 39% from the 2011 through 2013 (Akani, 2016) academic years for ninth grade students across the states. In this study, I explored the perceptions of teachers and administrators regarding their practices and experiences used in the UBE program to help ninth grade students meet the achievement standards in basic science.

In this chapter, I review current literature and scholarly peer-reviewed articles and journals including themes such as basic science achievement standards (Al Sultan et al., 2018; Jackson, 2017; Matilda & Helen, 2019; National Bureau of Statistics, 2019). Other topics reviewed include basic science achievement gaps (Oleribe & Taylor-Robinson, 2016), basic science achievement factors (Andrews, 2017; Archibong et al., 2018; Ekwueme et al., 2016). The themes were synthesized with the use of basic science achievement benchmarks such as UBE goals and standards (Ekwueme et al., 2016; Ikoro & Ezeanyim, 2017; National Bureau of Statistics, 2019), and basic science achievement gaps (Abubakar & Njoku, 2017; Adams & Onwadi, 2020; Aduojo, 2018). These themes established relevance to the basic science achievement problem and provided useable plans for teachers and administrators to manage basic science achievement problems among ninth grade students in rural schools.

Literature Search Strategy

The literature search included a journal search such as *Journal of Achievement Testing* in the United States, and *Journal of Alberta Science Education*, as well as education databases such as Academic Search Complete, Education Research Information Center (ERIC), Education Source, Google Scholar, Research Starters – Education, Sage Encyclopedia, and Teacher Reference Center, Thoreau, Walden University Dissertations and Theses database. I used the following search terms to gather articles: *ninth grade students*, *achievement*, *achievement gaps*, *achievement or proficiency*, *achievement or standards*, *achievement standards*, *Africa*, *assessment*, *assessment standards*, *basic science*, *basic science education*, *Ebonyi state*, *elementary and secondary schools*, *human resources*, *junior secondary*, and *junior secondary 3.* Other search terms used included *material resources*, *Millennium Development Goal*, *national standards or achievement*, *national test score*, *Nigeria*, *Nigeria or Africa*, *policy standards*, *policy standards or achievement*, *science achievement*, *state standards or achievement*, *Sustainable Development Goal*, *teacher factors*, *teacher perceptions*, *teachers or educators or predictors*, and *Universal Basic Education.*

I limited the current and relevant articles to peer-reviewed scholarly articles and scholarly academic journals with publication dates that ranged from 2016 through 2019.

Conceptual Framework

The Fullan (2007) change theory guided the review of the literature. The Fullan change framework is relevant to school improvement and reforms such as academic attainment in basic science achievement in diverse settings (Brooks & Gibson, 2012; Chen, 2008; Ebbeck & Chan, 2011; Saiti, 2012; Webber & Scott, 2010). The Fullan change model assumes that school reform strategies or educational attainments such as basic science achievement correspond to the conditions and perceptions of teachers and administrators for continuous improvement including the stakeholders' culture, practice, and setting. For example, basic science teachers and administrators in a school setting are the stakeholders who understand the culture and practice of sustaining the ninth grade students' basic science achievement, as well as how the UBE program influences the ninth grade students' basic science achievement.

The Fullan change theory has been used in school reform in Taiwan (Chen, 2008), professional improvement in the digital age in Canada (Brooks & Gibson, 2012), addressing service quality issues in Europe (Stukalina, 2012), comprehensive internationalization in Latin America (Gacel-Ávila, 2012), and quality management in the Greek education system (Saiti, 2012). In a mixed method study, Wells (2012) used the Fullan theory to investigate the perspectives of superintendents on teacher leadership in the chosen schools in rural and suburban districts of the state. The Fullan change theory has been used to study preventive mental health at school (Macklem, 2014); initiating change in the primary education system in Singapore (Ebbeck & Chan, 2011); and mapping principal preparation in Alberta, Canada (Webber & Scott, 2010).

According to Fullan (2007), the critical components of change that influence stakeholders to effect large-scale results must address their diverse conditions for continuous improvement alongside the stakeholders' perceptions, practice, culture, and setting. Fullan implied that the convenience of work practice, culture, and setting empowers change agents who perceive that the available resources could produce great results.

Hence, the Fullan change theory guided this study and provided insight concerning the perceptions of teachers and administrators in a school setting regarding the use of the UBE strategy to increase attainment in basic science for the ninth grade students in a setting corresponding to the teachers' and administrators' basic science improvement culture and practice for sustaining basic science attainment.

Literature Review Related to Key Concepts

Factors Influencing Basic Science Achievement

Several factors influenced the basic science achievement in the schools. While scholars have indicated that achievement standards and gaps were the major factors that influenced basic science achievement (Al Sultan et al., 2018), other scholars found that achievement gaps were caused by lack of resources and some economic factors (Ogunode, 2019; Ololube, 2007). Other scholars argued that MDG, SDG, and UBE had influenced the basic science achievement significantly (Atomatofa et al., 2016; Enighe & Afangideh, 2018; Mihindo et al., 2017; Olasehinde-Williams et al., 2018).

Basic Science Achievement Standards and Gaps

Basic Science Achievement Standards

The standards on which the basic science achievement were based included the global goals - MDG, for science education, the SDG, and the national and state basic science education standards (Al Sultan et al., 2018; Ekwueme et al., 2016; Olasehinde-Williams et al., 2018). Exploring studies of basic science achievement standards provided insight into the standards science teachers and administrators use to help the ninth grade students meet the basic science achievement in the selected school, including their perceptions that those standards bridge the basic science achievement gaps.

Millennium Development Achievement Standards

Scholars have used the MDGs and other global evaluation standards and included the general diagnostic model (GDM; Kabiri et al., 2017), the International Large-Scale Assessments (ILSA; Addey et al., 2017), and framework science assessment (Marian & Jackson, 2017). The global evaluation standards determined the global and the international scale in basic science achievement (Addey et al., 2017).

Although scholars have used the MDG and global evaluation standards (Addey et al., 2017; Kabiri et al., 2017; Marian & Jackson, 2017), other scholars have argued that the lofty standards of the MDG were not realizable (Kumar et al., 2016) because the MDG assessment anticipated a high achievement which lowered students' scores on diverse cognitive levels (Le Hebel et al., 2017). However, the global evaluation standards determined the global and the international scale in basic science achievement (Addey et al., 2017) and guided and enhanced the MDG evaluation in basic science (Marian & Jackson, 2017).

Some scholars suggested that the ILSA was flexible and served multiple purposes that met the MDG standards such that local and national standards linked easily to the MDG (Addey et al., 2017). Scholars have indicated that the GDM was valuable and generated national large-scale assessment standards (Kabiri et al., 2017). Addey et al. (2017) suggested how ILSA resonated in the local basic science achievement standards for science teachers and administrators in the school. Kabiri et al. (2017) suggested ways to seek the level of difficulty basic science students had in meeting the international standards and national basic science achievement standards. Kumar et al. (2016) provided an understanding of science teachers' perspectives that considered the unrealizable MDG standards in the basic science attainment and how the SDG would improve those students' performances. Marian and Jackson (2017) suggested some proactive basic science achievement strategies for students. I also learned the perceptions of science teachers and the administrators regarding the influence of diverse national scores, as well as other international basic science assessment standards, in the basic science assessments of the ninth grade students. Finally, the studies provided clarity regarding the hindrances and reasons the MDG standards were not met including proactive strategies on how students' achievement in basic science were increased in the schools.

The MDG standards of evaluation have been grouped into Categories A, B, C, and D, which were used to evaluate scientific literacy standards and students' science achievement that included content and construct (Rusilowati et al., 2016). Category A assessed science knowledge; B assessed scientific thinking; C measured scientific investigation; and D measured science integration with technology (Rusilowati et al., 2016). Rusilowati et al. (2016) tested the level of difficulty for the attainment of scientific literacy and diverse aspects of scientific literacy. Students' mastery of science achievement was measured with students' scientific literacy ability. The result indicated that the overall literacy skill level was below 50% of the standards for all categories. Rusilowati et al.'s scientific literacy category evaluation suggested what process the science teachers and the administrator used and assessed to measure the students' scientific literacy. The authors provided insights into the structure of interview questions alongside the research questions, which sought the science teachers' and administrators' perspectives regarding the assessment standards that helped ninth grade students to attain the basic science MDG achievement standards.

Scholars indicated that the MDG–SDG reform process addressed possible challenges in the global scientific literacy reform agenda including political affiliation benchmark, quality assessment and conflicts among local, national, and global science achievement interests. Hence, studies had indicated how basic science achievement related to the MDGs, although scholars differed in approach and purpose. Although some scholars approached this topic from a qualitative standpoint, others have approached this it from a quantitative standpoint. Most of the scholars connected the basic science achievement to the EFA goal upon which the MDG originated (Addey et al., 2017; Al Sultan et al., 2018; Rusilowati et al., 2016).

Though Addey et al. (2017) argued that the MDG was the target for basic science achievement, other scholars indicated that cultural, social, gender, and economic challenges at the local level constrained MDG basic science achievement standards

(Oleribe & Taylor-Robinson, 2016). Hence, scholars recommended the need for improved international assessment (Rusilowati et al., 2016). Though Addey et al. (2017) recommended the ILSA standards because they linked all learning to global citizenship, Le Hebel et al. (2017) have indicated difficulties with Program International Scale Assessment (PISA) standards as Marian and Jackson (2017) recommended a framework for basic science assessment at an early age.

The studies in this section provided some insights on the perspectives of the basic science teachers and the administrators regarding the suitability of the local basic science learning and teaching to the global standard and science skills and how they influenced the basic science achievement of the ninth grade students in other parts of the world. Also, the studies suggested that researchers sought the perceptions of science teachers and administrators regarding assessment standards such as the PISA, Trends in International Mathematics and Scientific Studies (TIMSS), ILSA, and other global or international basic science assessment standards, which provided some insights that assisted ninth grade students.

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(2017) recommended the ILSA standards because they linked all learning to global citizenship, Le Hebel et al. (2017) have indicated difficulties with PISA standards as Marian and Jackson's (2017) recommended a framework for basic science assessment at an early age.

Sustainable Development Achievement Standards

Scholars have indicated that sustainable development standards are aimed at inclusive, free, and equitable education (Bakhshi et al., 2018; Jackson, 2017). Although Jackson (2017) compared the place of education in the MDG and the SDG., Mokoena, and Jegede (2017) argued the SDG replaced the MDG and maximized inclusive educational attainment for all utilizing the criteria that eradicated hunger as an indicator of educational attainment and progress. Though Mokoena and Jegede (2017) did not indicate the design of this study, it was relevant because it suggested how science teachers and administrators perceived the UBE policy structures that supported the rights to equality and education for ninth grade basic science students.

The SDG was part of the foreign policy that influenced the local and national education policies and included basic science education standards and assessment (Kelly, 2018). Kelly (2018) explored the influence of the SDG in standardized education, assessment, and curriculum and argued that local education was linked with global contexts (international organizations, outcomes-driven policy, and privatization). Kelly (2018) provided some understanding of how the basic science teachers and administrators assessed the cognitive or affective dimensions of students that enhanced inclusive quality education to increase student achievement. The studies suggested how science teachers and administrators in the setting linked local assessment practice to the global and SDG assessment standards and basic science curriculum practice for higher academic achievement.

The SDG 4, which covered quality science education (Mokoena & Jegede, 2017), included knowledge, skills, attitudes, and values, which enhanced academic freedom and learners' independence (Ekwueme et al., 2016) and supported artists in developing nations (Supporting young African scientists, 2018) with standards organized according to international organizations, outcomes, driving policy, and privatization (Barrett, 2017; Kelly, 2018). Whereas Mokoena and Jegede (2017) targeted equality and the right to education for all to maximize gender equality in South Africa's education system, Barrett (2017) explored the benefits of the SDG for Sub-Saharan Africa in science education that maximized achievement standards for students who aspired to specialist levels in secondary schools.

Researchers found that sustainable education involved motivating conditions for participating in core science subjects which improve the learners' skills, but cultural and gender differences challenged the approaches to educational improvements (Ekwueme et al., 2016, p.28). However, Kelly (2018) indicated that the assessment and the curriculum were globalized for science education considered how domestic education fit into global contexts, thus making participants aware of their roles in the achievement of the SDG standards for equality in science education. The studies suggest that SDG standards could benefit basic science achievement when globally accepted standards that are familiar to educators in all parts of the world were used, which also included South Africa, Sub-

Saharan Africa, and Nigeria. The studies further suggest how the local practices of science learning and assessment fit into the global context and enhanced the SDG goals for equality of education. Interviews were structured around basic science teachers' and administrators' perceptions about how the local curriculum and assessment standards fit the SDG standards and improved ninth grade students' science performance.

Other scholars indicated that the SDG standards were a framework for community development that included every child's right to basic science education (Akufo-Addo, 2018; Barrett, 2017; Benavot & Naidoo, 2018; Franck & Joshi, 2017; King, 2016; Ladan, 2018; Mokoena & Jegede, 2017). Benavot and Naidoo (2018) argued that inclusive education was the major SDG 4 standard that brought together all international stakeholders who outlined standards and indicators that assessed educational attainment supported by education governance expertise, implementation, supervision, and evaluation.

Although Akufo-Addo (2018) conceptualized the SDG standards that influenced Ghana's development of inclusive education to meet the SDG standards, scholars have used the framework that sustained basic science education because science was relevant for lifelong skills of the basic science students who specialized due to the global competitiveness job market (Barrett, 2017). Barrett (2017) used a review approach and reflected on the SDG impact for Sub-Saharan Africa's science education. Franck and Joshi (2017) found that the SDG initiative in Ethiopia involved community awareness and readiness, teacher experience and availability, and resource but noted that goals were not met due to lack of the factors mentioned. In a critical review analysis, King (2016) explored the tensions between national and global approaches for meeting the SDG 4 standards for inclusive education and training.

Recently, researchers conducting studies have employed diverse approaches, such as case study, critical review analysis, and analytic method that described the influence of the SDG standards on basic science achievement of students in different parts of the world (Akufo-Addo, 2018; Bakhshi et al., 2018; Barrett, 2017; Benavot & Naidoo, 2018; Ekwueme et al., 2016; Franck & Joshi, 2017; Jackson, 2017; Kelly, 2018; King, 2016; Ladan, 2018; Mokoena & Jegede, 2017; Supporting young African scientists, 2018). These studies suggested that governance, supervision, and evaluation influenced SDG standards and students' basic science achievement in diverse parts of the world. The studies identified the influence of quality inclusive education, which met the SDG standards and indicated how political, environmental, and social support systems empowered or weakened the SDG standards and raised or lowered the basic science achievement of students, both globally and locally. Hence, the studies enriched the interview questions that sought basic science teachers' and administrators' perspectives on the political, social, and environmental support systems and the use of UBE tools that met the SDG standards for quality science education and higher basic science achievement for ninth grade students. The studies also improved the understanding of how basic science teachers and administrators complied with the SDG standards as they used the UBE tools that supported basic science educational attainment for all ninth grade students, which included students with disabilities, students from low-income families, students from developing countries, and students in the selected school.

National Basic Science Achievement Standards

Evaluators who assessed the basic science performance of students used the national grading standards which included letters A to F, percentile scores of 0 - 100, Credit points of 1-5, and grade qualifications (National Bureau of Statistics, 2019). Although National Bureau of Statistics (2019) found the number of students with higher scores across the states of Nigeria were 48.15%, Ada et al. (2021) found that national assessment standards were applied in the assessment of Basic science and technology curriculum in 72 public and private schools in Nigeria. Chiekem (2015) concluded that grading standard supplied information about students' learning progress.

Researchers found that national assessment of science students in other countries were enhanced by global measures such as TIMSS, PISA (Shi et al., 2016; Stephens et al., 2016). Stephens et al. (2016) discovered global assessment factors in the national science assessment standards for middle school students in the United States.

Some scholars have indicated that a policy and standards debate influenced the national standards in science achievement (Lerman & Adler, 2016). Lerman and Adler (2016) utilized the international/national graph analysis approach and examined the influence of national government policies and changes that influenced basic science assessment standards and curricula at the national and global levels. However, Roby et al. (2016) found disparities in the attainment of the educational standards in some Sub-Saharan African countries due to socio-economic and child-rearing cultural factors. The scholars surveyed eight-year country records of five African countries to address questions about how African children of diverse orientations are participating in inclusive education. The scholars found that the disparities in equal education access among the five countries surveyed was due to physical, economic, gender, and cultural orientations of students (Roby et al., 2016, p. 116).

The studies suggested that factors such as general policies, international measurements, and economy influenced the national basic science assessment standards that affected basic science achievement. The perspectives of basic science teachers and administrators in the selected school were sought regarding how the above-mentioned factors impacted the academic performance of learners in the area. Basic science teachers and administrators provided information about how they used the UBE resources and managed those factors that maximized the learning outcome of the ninth grade students in the selected school. Also, I gained some understanding from these studies of how factors such as lesson delivery, teachers' motivation, infrastructures, and socio-economic or cultural factors affected the national basic science achievement standards. Hence, researchers gleaned understanding from these studies of how basic science teachers and the administrators could manage the UBE tools and resources, which included lesson delivery, teacher motivation, infrastructure, and socioeconomic or cultural factors that met the national basic science achievement standards and maximized basic science achievement for ninth grade students.

The selected peer-reviewed articles in this section provided insights into the links between the national and the international basic science assessment standards (Shi et al., 2016) and the basic science instructional delivery and assessment practices, which included the understanding of the political, social, and cultural influences on national basic science achievement (Lerman & Adler, 2016; Roby et al., 2016). The studies provided insight into the basic science teachers' and administrators' perspectives in the selected school regarding the UBE program assessment practices and policies and the effectiveness of the UBE program, which helped the ninth grade students who met the national standards in basic science.

State-Level Basic Science Achievement Standards in Nigeria

Some scholars explored the state's basic science achievement standards and used assessment types, and styles to determine students' performances in basic science (Adodo, 2013; Matilda & Helen, 2019). Adodo (2013) used the two-tier multiple choice assessment model to determine students' learning progress in basic science and technology in Nigeria. Matilda and Helen (2019) found that formative assessment of junior secondary basic science classrooms in Edo state, Nigeria effected students' achievements in basic science in the area. Scholars recommended constant formative classroom evaluations which promote students' academic achievements (Matilda & Helen, 2019, p. 188). Although Matilda and Helen (2019) discovered the effect of classroom assessment on students, academic achievement in basic, researchers found the connection between the evaluation of basic science curriculum to students' basic science in the school regions of Nigeria (Nwafor & Umoke, 2016). Atondo et al. (2019) found that continuous evaluation of mathematics scores predicted students' achievement in Basic education mathematics in Benue State, Nigeria but did not predict achievements in basic science subjects. However, Adebule (2017) discovered the relationship between assessment in Mathematics and Basic science in Ondo state, Nigeria.

The studies provided an understanding of how basic science teachers and administrators could use the UBE tools that supported the assessment standards to maximize the basic science achievement of ninth grade students in the selected schools.

Global Basic Science Achievement Gaps in Nigeria

Scholars indicated the global literacy gaps in some schools in Nigeria were due to economic limitations (Oleribe & Taylor-Robinson, 2016). Oleribe and Taylor-Robinson (2016) indicated that Nigeria lagged in the global partnership ventures that targeted reducing illiteracy and poverty by 2015. Oleribe and Taylor-Robinson’s (2016) findings revealed that school costs and inadequate resource management confronted educators who had limited UBE tools for eradicating illiteracy and meeting the MDG goals for education. Oleribe and Taylor-Robinson (2016) recommended that Nigeria address its economic problems to advance to the MDG targets for education. Oleribe and Taylor-Robinson’s (2016) study provided some understanding of how resources and the economy influenced learning and caused global gaps, hindering the reduction of illiteracy in Nigeria. The interview questions sought the perceptions of basic science teachers and administrators regarding the influence of resources and the economy on the basic science achievement of ninth grade students in the selected area and their perspectives on the effectiveness of the UBE program resources that enhance basic science achievement.

Although Oleribe and Taylor-Robinson (2016) indicated economic causes for achievement gaps in education, Ayodele (2019) indicated the implications of unsafe learning environments in the academic achievement of school children in Nigeria. Ayodele recommended government support for safe school climate involving all interest groups (Ayodele, 2019. p.30). Ayodele provided insights regarding the importance of safe school climate in students' academic growth and provided understanding for teachers and administrators who use program tools and strategies in the schools of Nigeria to support students' science achievement. Researchers have also conducted studies describing the economic and social issues that were partly responsible for the academic achievement gap (Ayodele, 2019; Oleribe & Taylor-Robinson, 2016).

National Basic Science Achievement Gaps

Scholars have indicated that national achievement gaps exist in the basic sciences due to crises and socioeconomic factors such as the Niger-Delta crises in Rivers State(Pepple & Ogologo, 2017), and violent attack of school children which force more children in the northern part of Nigeria out of school (Ayodele, 2019). Additionally, scholars have indicated that significant gaps exist in the attainment of national basic science standards that differed across the regions of Nigeria due to special, environmental, and political reasons (Aduojo, 2018; Atomatofa et al., 2016). Although Aduojo (2018) found significant differences in the science achievement of students in Kogi state due spatial abilities. Atomatofa et al. (2016) found disparities in students' basic science achievement due to classroom learning environments. Based on these findings, researchers recommended that educators should create constructivist environments in the basic science classrooms.

Some scholars found that collective efficacy and group composition effects (GCE) bridged student achievement gaps in the U.S. (Goddard et al., 2017), while others indicated that school situations affected student achievement in basic science (Cohodes, 2018). Gagnon and Mattingly (2018) discovered that achievement disparities in the U.S. rural LEAs were influenced by ethnic differences. Therefore Mathis et al. (2016) recommended a federal mandate which support accountability and the legislation that maintained a test-based accountability system for many public schools every year.

The studies provided some understanding regarding the influence of spatial ability and environments (Aduojo, 2018; Atomatofa et al., 2016), as well as policy and learning practices on academic achievement (Bowman et al., 2018). Researchers found that demographics (Herrera et al., 2017), background (Kotok, 2017), marginalization and ethnic factors (London, 2018), socio-economic factors (Gagnon & Mattingly, 2018), and collaborative and intervention strategies (Goddard et al., 2017) influenced academic achievement among students.

State-Level Basic Science Achievement Gaps in Nigeria

Some researchers indicated that similarities for the state and national basic science achievement gaps in Nigeria existed between the proprietorship (private) school model and gender (single sex) type model (Abubakar & Njoku, 2017; Adams & Onwadi, 2020). Adams and Onwadi (2020) found that computer assisted instructions influenced basic science achievement, Abubakar and Njoku (2017) adopted a survey design to discover the influence of school type and practices on students achievements. Researchers attributed achievement gaps between ninth grade students from Almajiri school and ninth grade students from Sultan Bello Secondary school, Sokoto, to school model factors. Findings indicated major disparities between the achievement of students of Almajiri integrated model school Sokoto (private school), and Sultan Bello Junior secondary school. Therefore the researchers concluded that the students from the Almajiri Model school need to improve and recommended collective support for students' participation in the regular school (Abubakar & Njoku, 2017, p.62). Adams and Onwadi (2020) found that CAI influenced basic science achievement in Gwagwalada, Abuja, Nigeria and recommended that teachers use computer based instructions in their classrooms.

The studies in this section suggested that factors such as school type, students' participation in the educational program, and teachers' involvement with the technology and basic science curriculum influenced students' achievement. Researchers gleaned some understanding regarding the UBE tools basic science teachers and administrators could use to increase the involvement of the students in the educational program in some school settings, as well as how teachers and administrators could use the UBE program to bridge the achievement gap (Abubakar & Njoku, 2017; Adams & Onwadi, 2020).

Basic Science Achievement Factors

Scholars have indicated factors that influenced basic science achievement such as MDGs, SDGs, and the UBE (Andrews., 2017; Archibong et al., 2018; Atondo et al., 2019; Ekwueme et al., 2016; Ogbaji, 2017; Olasehinde-Williams et al., 2018). The UBE program learning supports enhanced learners' achievement to meet the MDG (Ogbaji, 2017; Olasehinde-Williams et al., 2018). Although scholars such as Andrews (2017) and Archibong et al. (2018) indicated the facilitative roles which the MDG played in the basic science achievement, other scholars indicated that the sustainable development goal

(SDG) sustained diversity and inclusive participation and more opportunities for improvement (Ekwueme et al., 2016).

Millennium Development Goals

Recent studies have indicated that the MDG played facilitative and catalytic roles which improved education in Africa and around the globe (Enighe & Afangideh, 2018; Ikoro & Ezeanyim, 2017). Enighe and Afangideh (2018) indicated that the success of the MDG enhanced the instructors' skills in instructional techniques as they strove to meet the MDG targets for education in Nigeria. Ikoro and Ezeanyim (2017) found that the MDG enhanced basic education in Nigeria but recommended the inclusion of global items in the Basic education curriculum which support graduates to contend global challenges. Although s Enighe and Afangideh (2018), and Ikoro and Ezeanyim (2017), indicated the influence of the MDG on reading and Basic education in Nigeria, the scholars did not specify the MDG influence on Basic science. Onanuga and Saka (2018) concluded that a joint support in other subjects such as STEM promoted the MDG for basic science in Ogun State, Nigeria. Andrews (2017) found that issues such as facility, assessment, supervision and organization of resources challenged the MDG for education in Africa.

Some scholars indicated the influence of the MDG agenda in basic science achievement (Enighe & Afangideh, 2018; Onanuga & Saka, 2018), and other scholars indicated the basic minimum standards for the MDG were not reached due to poor implementation (Bakhshi et al., 2017), underrepresentation of women in science and technology (Goy et al., 2018), and inadequate funding (Baloyi & Makhubele, 2018;

Rambla et al., 2017; Yogo, 2017). Scholars recommended practices for reaching the MDG such as equal participation in the STEM (Goy et al., 2018); constant monitoring of STEM subjects (Onanuga & Saka, 2018) and the use of quality global educational opportunity measures (Enslin & Tjiattas, 2017). Other scholars recommended MDG actualization measures such as combined educational governance and funding including international and national, regional, and local education leaderships committed to the MDG agenda (Rambla et al., 2017). Yogo (2017) recommended increased international funding as effective strategy for reaching the MDG.

The studies provided insight into the perspectives of basic science teachers and administrators in the selected schools regarding the use of the UBE program that enhanced educational access and the right assessment of the basic science subjects including other how educational access which could help ninth grade students meet the MDG in basic science.

Sustainable Development Achievement Goals

Researchers found that teachers and administrators who aspired to meet the SDG requirements for education developed approaches that ensured quality and inclusive education (Abigail & Felix, 2019; Bello, 2020; Ekwueme et al., 2016; Nakidien et al., 2021). Although Ekwueme et al. (2016) indicated that education for sustainable development helped in solving diversity problems in the education sector and basic science, Abigail and Felix (2019) recommended reforms for the SDG which provided facilities and equipment for learners with disability to participate in regular school activities. Abigail and Felix concluded that the SDG4 targets for inclusive and equitable education would be actualized when physically challenged learners were engaged in a regular school setting with learners supports (Abigail & Felix, 2019, p. 11). Nakidien et al. (2021) found that the attainment of SDG slowed down in Africa due inadequate human resources, shortage of experienced instructors and group supports. The researchers recommended the involvement of all interest groups towards reaching the SDG targets (Nakidien et al., 2021).

Findings indicated that the involvement of mobile technology in the SDG programs such as “Adopt a school program, STEM camps for girls,” had implications for science improvement for students in several states in Nigeria (Bello, 2020, p. 569). Bello (2020) employed a qualitative design in a case study approach; sampled 15 participants from Lagos state, Nigeria such as the Etisalat officials, government officials from Lagos state Universal basic education board, headteachers, and principals, and students who adopted the mobile programs. The researcher collected additional data from journals and newspaper reports about other schools from other states of Nigeria such as Abuja, Lagos, Kaduna, and Kano. The results show that Etisalat mobile technology included online STEM platforms which promote science education. Bello (2020) recommended the application of Etisalat mobile technology towards the SDG for education.

Though scholars indicated that the SDG was an academic achievement factor because it set priorities in its goals for equal and quality education (Bello, 2020; Ekwueme et al., 2016; Kusimo & Chidozie, 2019; Nakidien et al., 2021), wide disparities persisted between the regular learners and learners with disability (Kusimo & Chidozie, 2019). Therefore, the scholars recommended provision of equipment and facilities

(Kusimo & Chidozie, 2019), mobile technologies (Bello, 2020), involvement of all interest groups in supporting and training instructors for the SDG education targets (Nakidien et al., 2021). The researchers provided insights into the influence of the SDG on the students' academic achievement which suggested that the SDG agenda enhanced priorities for quality and inclusive education and provided capacity for increasing students' academic achievements.

Universal Basic Education

Scholars have indicated that the UBE program included targets for basic science achievement because the UBE program National and State offices adopted global declarations which promoted basic education for all to reduce achievement disparities (Okoro, 2014). Researchers found that the UBE program included material resources, (infrastructure, and funding), and human resources for the basic science program (Bello, 2020; Ogunode, 2019; Olasehinde-Williams et al., 2018; Olayinka, 2016).

Material Resources

Scholars have indicated that information technology-supported data that influenced basic science targets for the MDG (Bello, 2020; Lay & Chandrasegaran, 2016; Mihindo et al., 2017). Bello (2020) found that Etisalat mobile technology improved basic science achievement in Nigeria. Mihindo et al. (2017) discovered that computer-based teaching improved science achievement in Nakuru, Kenya. Ogbaji (2017) investigated teachers' viewpoints on teaching resources for social studies in the middle school in Calabar, Nigeria but Lay and Chandrasegaran (2016) investigated the influence of school resources on middle school students' science success in science in Malaysia and

Singapore. Although Ogbaji (2017) discovered that social study instructors perceived teaching resources were relevant for productive instruction and learning in Nigeria, researchers found that school resources were crucial for improving the basic science achievements of students (Lay & Chandrasegaran, 2016), which has implications for the science achievement of students in Nigeria (Bello, 2020).

Infrastructure. Researchers found that facilities and equipment influenced science achievement in Nigeria (Agbidye, 2015; Anunobi et al., 2017; Ogunode, 2019; Ojeje & Adodo, 2018). Ogunode (2019) found that inadequate infrastructure and science teachers challenged students' achievement in the STEM subjects in the junior secondary schools in FCT, Nigeria. Results show that shortage of buildings, laboratories and science teaching and learning facilities influenced learning in Delta state (Ojeje & Adodo, 2018). Agbidye, (2015) discovered that infrastructural challenges influenced teaching of basic science in Nigeria and recommended provision of equipped science buildings with science and computer laboratories (Agbidye, 2015, p. 5). Anunobi et al. (2017) concluded that computer packages with web-based courseware supported teaching and learning of activity-based science subjects.

The findings of the studies regarding infrastructure have implications for the basic science achievement of the ninth grade students in Nigeria (Atomatofa et al., 2016; Pepple & Ogologo, 2017). Scholars found that creative environments of learning increased students science achievement in Delta State, Nigeria which addressed one of the research questions that compared basic science achievement outcomes for creative learning environment and teacher-based learning environment (Atomatofa et al., 2016, p.1476). Researchers sampled two junior and two secondary classes which were affected by the Niger Delta crises and 16 junior secondary schools from four counties in Rivers State who were not affected by the Niger Delta. Basic science achievement test (BSAT) instrument was used to test 400 students from the affected and unaffected secondary schools. The results show that students whose schools were not destroyed during the crises performed better than students whose schools were destroyed despite the equal distribution of instructional materials (Pepple & Ogologo, 2017, p.73). Therefore, the scholars concluded that the destruction of buildings and infrastructural resources in Rivers State related to the basic science performance of the students in the area.

Funding. Scholars indicated that funding barriers influenced achievement in basic science because the basic minimum standards for the UBE objectives were not reached due to inadequate resources (Ogunode, 2019; Ololube, 2007; Osarenren-Osaghae, & Irabor, 2018; Oviawe, 2020). Ogunode (2019) investigated the challenges facing the implementation of the science program in the Federal Capital Territory (FCT) secondary schools in Abuja, Nigeria and found that inadequate funding challenged the science education program in the FCT. Ololube (2007) found a relationship between funding and standard of science teacher education. Osarenren-Osaghae and Irabor (2018) reviewed the literature regarding education funding, universal basic education, and teacher education and found limitations in education goals due to lack of support mechanisms. Hence, Oviawe (2020) recommended funding strategies involving government and all other stakeholders. Other studies confirmed the relationship between funding and students' achievements in the sciences (Baker et al., 2016; Corrales & Peters, 2017). The studies on funding and material resources have implications for students' academic outcomes in Nigeria, which include basic science achievement.

Human Resources

Scholars have indicated that teachers are role models for students' academic attainment (Akpan & Ita, 2015; Ayeni, 2020; Olasehinde-Williams et al., 2018). Ayeni (2020) found a relationship between administrators' supervision of learning practices, teachers' professional improvement and students' academic improvement in Ondo State, Nigeria. Akpan and Ita (2015) investigated the relationship between teachers' professional training and quality of universal basic education in Lagos state, Nigeria. The study found that teacher training opportunities and teacher participation in seminars and workshops related to the quality of UBE in Lagos state (Akpan & Ita, 2015, p. 73). Olasehinde-Williams et al. (2018) investigated teacher resources and knowledge as factors that influenced learners' academic success. The study compared teachers' competence with learners' outcome. The sample included 72 instructors selected from the 32 secondary schools in Kwara state, Nigeria, and their students. The quantitative collected via tests and observations were analyzed. The result showed competent teachers influenced learners' academic success. Scholars concluded that teacher knowledge was relevant to students' academic achievement (Olasehinde-Williams et al., 2018, p. 87).

Studies on human resources were significant and suggested that teachers' knowledge and quality (Enwelim, 2016; Gimba et al., 2018) as well as teachers' involvement in the curriculum including their teaching approach (Aduojo, 2018; Ogonnaya et al., 2016; Osokoya, 2013), had a significant influence on the basic science achievement of students. Therefore, researchers concluded that educators and teachers are significant human resources because they predict learners' outcome by their dispositions of knowledge, quality, and teaching methods. The research found that the low quality of science teachers influenced the low performance of students in basic science in Niger State and Cross River State (Gimba et al., 2018). Researchers found that teacher quality was a significant factor for massive failures in basic science (Gimba et al., 2018, p.41). Although scholars such as Gimba et al. (2018), indicated that teacher quality influenced basic science achievement of students in Bosso, Niger State, Enwelim (2016) found that teacher characteristics were linked to students' academic achievement in Aniocha North of Anambra State, Nigeria. Enwelim (2016) used a correlational study and determined the relationship between specific teacher characteristics and student achievement. The instruments used included a questionnaire and the students' scores in the sciences. Four hundred 10th-grade students from 10 schools in Aniocha county were selected. Kendall Tau's data analysis was used to analyze data. The results showed that instructors dispositions had a relationship with student achievement (Enwelim, 2016, p.112).

Scholars indicated that educators and teachers predicted learning outcomes via their involvements with curriculum and their teaching approaches (Aduojo, 2018; Ogonnaya et al., 2016; Osokoya, 2013). Researchers found that variations in teaching methods including ethno-science instructional and concept mapping instruction and technology based-teaching approaches influenced science achievements (Aduojo, 2018; Ogonnaya et al., 2016; Osokoya, 2013). Aduojo (2018) investigated the effects of teaching methods on basic science achievement of ninth grade students in Kogi state of

Nigeria and found a significant difference between students taught by process oriented instructional strategies and students taught by lecture methods. Ogonnaya et al. (2016) investigated the effects of concept mapping on students' achievement in basic science in Ebonyi state. The result showed that students instructed with concept diagram performed better in basic science than students who were instructed with the regular science teaching method. Researchers from Ogun state, Nigeria found that teachers who taught their students with science practicals supported the students to performed better than their peers who were taught with traditional teaching methods (Omilani et al., 2019). The studies on human resources and teaching methodology have implications for basic science achievement of the ninth grade students in the school of Nigeria.

Summary and Conclusion

In this chapter, I reviewed current literature and scholarly peer-reviewed articles and journals which included themes such as basic science achievement standards (Al Sultan et al., 2018; Jackson, 2017; Matilda & Helen, 2019; National Bureau of Statistics, 2019), basic science achievement gaps (Abubakar & Njoku, 2017; Adams & Onwadi, 2020; Aduojo, 2018; Atomatofa et al., 2016; Oleribe & Taylor-Robinson, 2016), and basic science achievement factors (Andrews., 2017; Archibong et al., 2018; Ekwueme et al., 2016; Ogbaji, 2017; Olasehinde-Williams et al., 2018). Additionally, I reviewed and synthesized themes with basic science and UBE goals (Bello, 2020; Ekwueme et al., 2016; Ikoro & Ezeanyim, 2017; Ogunode, 2019; Olasehinde-Williams et al., 2018; Olayinka, 2016).

Factors such as the MDGs, SDGs, UBE, and other socio-economic and ethnic factors influenced the academic achievement of students at the global, national, and local levels. Studies indicated that teachers were predictors of academic achievement (Aduojo, 2018; Ogonnaya et al., 2016; Osokoya, 2013). However, little or nothing was known about the perceptions of basic science teachers and administrators in a selected school about how the UBE program tools and other influencing factors were used to maximize the basic science achievement of ninth grade students in the selected school. The literature themes established relevance to the basic science achievement problem and provided interview prompts that sought the perceptions of the basic science teachers and administrators about the factors that influenced basic science achievement among ninth grade students in the selected rural school.

In Chapter 3 of this study, I describe how I used an interview instrument structured and based on the research question, literature and the Fullan (2007) framework to collect data that I analyzed by thematic coding to understand the perceptions of basic science teachers and administrators regarding the practice and the use of the UBE program, which increased the ninth grade students’ basic science achievement in a selected school.

Chapter 3: Research Method

The purpose of this basic qualitative study was to explore the perceptions of teachers and administrators regarding their practices and experiences using the UBE program in helping ninth grade students meet the achievement standards in basic science. In this chapter, I explain the rationale for the research, my role as researcher, the participant selection logic, the strategies for collecting information, and the data analysis plan. I also demonstrate the trustworthiness of the information collected and describe the ethical models that guided the study.

Research Design and Rationale

The research questions that guided this study and determined the approach of the research were as follows:

- How do teachers and administrators perceive the use of the Universal Basic Education (UBE) program as the administrators and teachers minimize the achievement gap in basic science in the ninth grade?
- What strategies are teachers and administers using to support students' meet proficiency in basic science while addressing the Millennium Development Goal in basic science?

I used a basic qualitative study design for this study. The perceptions of the teachers and administrators regarding the practices and experiences that used the UBE program to meet basic science achievement standards were sought via interviews. The interview responses provided data regarding how teachers and administrators were supporting the students in ninth grade to meet achievement standards in basic science.

The design of this study was based on the responses of basic science teachers and administrators regarding their practices, experiences, and perceptions using the UBE program tools to bridge achievement gaps in the selected school, as well as their experiences using the UBE program tools that supported the ninth grade students in meeting proficiency in basic science.

The responses of the basic science teachers and administrators during the interview supported the constructivist paradigm, which included the research questions indicated above. Fullan's (2007) school improvement model assumed reform and educational improvement strategies addressed the stakeholders' conditions and corresponded to their usual practice, culture, and setting. Also, Merriam (2009) and Yin (2017) agreed that a basic qualitative study was adaptive to the conditions and perceptions of the stakeholders in a school setting and other environments. The basic qualitative study has been chosen as suitable for studying a school program. The basic qualitative study approach also included rich and valuable information on practical and concrete life experiences collected as data in a natural setting (Guba & Lincoln, 1981; Merriam, 1998, 2009; Stake, 1978; Yin, 2012). According to Merriam (2009), basic qualitative studies were relevant to research designs that supported school programs and other learning innovations in a setting. Studies have indicated that basic qualitative studies provided an understanding of the factors of the setting studied (Guba & Lincoln, 1981).

This basic qualitative study was conducted in a selected school in the Southeastern region of Nigeria. The selection of this site was purposeful and considered the fact that the school in this location used the UBE program. Basic science teaching and learning occurred in this location, which included the presence of ninth grade basic science students, as well as basic science teachers and administrators, and availability of data.

Contact with participants who worked in the selected school enhanced opportunities that provided updated information about the basic science achievement status in the area. Marshall and Rossman (2010) indicated that quality information for a basic qualitative study needed a selection method that was guided by events, settings, actors, and artifacts. Yin (2012) and Merriam (2009) indicated that a basic qualitative study explored live events that were real and practical in nature. Hence, I assessed information about the UBE tools used to increase basic science achievement in the ninth grade classroom. Also, Stake (1978) confirmed that the study setting was the major focus of a basic qualitative study.

In this study, I explained the meaning that people made from their life experiences and how they interpreted their experiences in their setting. According to Patton (2002), social constructivism assumes the individuality and uniqueness of one's world view. Hence, the paradigm favored a study that described the life experiences of those who built knowledge from concrete life situations. The interactions with the basic science teachers and administrators who built knowledge from their life situations in a selected school enriched the context of this study. However, this approach might have restrained generalizing findings and data from one context to other settings. Though several approaches could be used, a basic qualitative study was the best fit with the research questions seeking the perspectives of administrators and teachers concerning practices influencing ninth grade students' basic science achievement as well as strategies, which administrators and teachers used in supporting ninth grade students meet expectations in basic science and MDG.

A qualitative design expert has described the phenomenological study as an inquiry that focused on participants' common experiences about a certain phenomenon of study (Creswell, 2013). Although a phenomenological approach led to the knowledge of the essence of the learning experience gained from examining the practices of several participants with similar UBE experiences, the UBE resources were used to bridge the basic science achievement gap. A narrative approach focus on the life of one basic science teacher or administrator who used the UBE program to bridge the basic science achievement gap for ninth grade students. This approach used interviews and basic science score sheets. A narrative approach might have been limited due to the participants' disposition. Also, conflicts concerning the study's ownership might have occurred, and validation might have been difficult.

Ethnography involves the observance of extensive fieldwork. There might not have been enough time for an ethnographic approach because the extensive data this approach generated cannot be gathered remotely, as would be necessary for this case study. Also, ethnographic study would have required extensive, prolonged contact and more time to answer the research questions. Ethnography was not a suitable approach because this qualitative case study did not focus on culture but on a school setting.

One scholar indicated that grounded theory generates a general description (theory) of process and action or interaction that comes from the perspectives of participants (Creswell, 2013). Still, the large number of participants involved posed challenges for the saturation of data. This basic qualitative study explored the unique individual experiences and enriched the knowledge about the use of the UBE resources to improve the basic science achievement of the ninth grade students in the selected school. A quantitative approach was not an option because this basic qualitative study emphasized the perceptions and experiences of basic science teachers and administrators regarding the impact of the UBE program on the basic science achievement (which was not experimentally examined or measured) of students. Scholars have indicated that qualitative studies that were inductive focus on specific situations or settings of people, not on quantity or numbers (Creswell, 2013; Maxwell, 2013).

Role of the Researcher

The role I played as the researcher in this study included the selection of a site, the selection and review of the ninth grade basic science achievement documents, the recruitment and interviewing of participants who participated in an initial face-to-face interview, and member checking. Finally, I transcribed the data, which included the analysis, interpretation, and reporting of data.

Some scholars have suggested the importance of familiarity with the study site and recommended the possession of a critical mind and good dispositions with the interviewee (Miles et al., 2014). Also, Miles et al. (2014) recommended maintaining a positive mindset to interpret the participants' responses. Miles et al. also suggested the researcher make their presence and research purpose clear to the interviewees, who needed to know the study intent, and how I managed the data collected. The informed consent helped establish clarity of purpose for the research and explained the data management details. Also, the interview protocol and procedure included all ethical and professional best practices for the collection and management of data. According to Maxwell (2013), the bias-free approach improves trust when researchers' communication of their research intentions, are clear to participants. Maxwell also indicated that researcher–participant relationships affected both the researcher and the participants in many ways during data collection.

The familiarity with the research site might have been an issue; I lived and worked in the community where this school is located. Hence, knowledge of some of the interested participants might be unavoidable, but I did not foresee any conflict. Therefore, the bias was addressed. Levin et al. (1986) highlighted the importance of reflexivity in social change in a social setting that involved experienced and knowledgeable participants. According to Creswell (2013), reflexivity assumed "that the writer is conscious of the biases, values, and experiences that he or she brings to a qualitative research study" (p. 243). Maxwell (2013) recommended that qualitative researchers should declare their strong beliefs, of which they were aware, because these beliefs might blur their objectivity in the research. I addressed reflexivity by maintaining a journal, which reflected my roles as researcher. Janesick (2011) indicated that the maintenance of "a comprehensive reflective journal to address the researcher's self is critical in qualitative work because the researcher is the research instrument" (p. 156). This journal contained field notes on the application of the interview questions with the participants. In this study, I recorded in the journal my tone, voice, and reflections during the telephone interviews, as well as the participants' response behaviors, which supported the interpretation of data collected during the interview. I kept the journal, which noted possible biases in the interpretation of data and was readily available to me if I needed to go back and check afterward.

I have no professional relationship with the participants, and none of the participants had any reporting responsibility to the office where I was serving. Additionally, I neither lived nor worked in the school at that time. Also, I listened to the participants who responded to the open-ended interview questions to minimize bias.

Methodology

I collected the data for this qualitative study by interviewing administrators and basic science teachers from the selected school. Therefore, the selection of participants for interviews from the selected site of the study was described. Other parts of this section that I described included instrumentation, data collection, participation and recruitment, and ethical procedures. Finally, I described the data analysis plan.

Participant Selection Logic

I used purposeful sampling to select eight basic science teachers and three school administrators for individual interviews. The participants were from the selected school in Southeast Nigeria. Patton (2002) claimed that small sample size was valuable and obtained in-depth and rich data for qualitative research because basic qualitative study research focused more on the credibility and capability of the selected participants and provided rich data which addressed the research questions to a greater degree than data obtained from a large number of participants with no knowledge or credibility (Patton, 2002). This basic qualitative study required a small number of participants from this selected school who had rich information on how the basic science teachers and administrators used the UBE program to bridge the basic science achievement gap among the ninth grade basic science students in the selected school.

The criteria for participant selection included that participants must be (a) Ninth grade basic science teachers or administrators and educators who are familiar with the ninth grade basic science learning and teaching which used the UBE program, (b) administrators or teachers who have worked or were familiar with the selected ninth grade basic science class for approximately three years or more, and (c) participants who currently teach basic science in the selected school. Participants included the UBE program ninth grade basic science teachers and the UBE program school administrators. The UBE program school administrators responded to questions regarding overall state basic science achievement that used the UBE resources; the ninth grade basic science UBE program teachers responded to the questions about the use of the UBE program resources, experiences, and practices which influenced the basic science achievement in the ninth grade. I contacted participants from the selected school via mail.

I contacted UBE school administrators before the other participants because the UBE school administrators had to approve access to the selected site. After the school administrator had granted access to the research site, I contacted the individual participants via mail. The content of the mails to the participants in the interview included the purpose of the data collection, the description of the consent form, the interview and member checking procedures, as well as the reason I selected them to participate.

The sample size of eight basic science teachers and three school administrators related to the qualitative sample size in a case study of this nature. Creswell (2013) indicated that qualitative studies used interviews for small sample size of participants. Since the goal of the study was to obtain rich data regarding the practices, experiences, and perspectives of basic science teachers and administrators who used the UBE program to bridge the achievement gaps, fewer participants who provided rich data to this effect sufficed for the saturation and sample size.

Instrumentation

The interview instrument and guide were constructed from the following major research questions:

- How do teachers and administrators perceive the use of the Universal Basic Education (UBE) program as they minimize the achievement gap in basic science in the ninth grade?
- What strategies are teachers and administers using to support students meet proficiency in basic science while addressing the Millennium Development Goal in basic science?

The interview questions (see Appendices A and B) were open-ended questions structured from research questions, literature, and the study framework and designed to explore the perceptions of the basic science teachers and administrators about using the

UBE program to bridge basic science achievement gaps in the selected school. The interview questions included basic science learning and overall learning practices in the school. Professionals and educators not related to the research site reviewed the interview protocols. The expert committee who reviewed the interview protocol included the retired UBE state chair, an administrator, a basic science teacher, and the chair and one member of the dissertation committee. The outcome of the expert review included the restructure of the interview instruments that categorized interview instruments into administrators' and basic science teachers' interview instruments. The interview instruments categorized thus were accepted because the instruments provided sufficient data that answered the research questions (Fusch et al., 2018; Stake, 1978). The open-ended interview questions that centered around themes such as basic science learning and teaching practices were constructed to seek the perceptions of the basic science teachers and administrators about how the use of the UBE tools could improve the basic science achievement of the ninth grade students in the selected school (see Appendices A and B).

Procedures for Recruitment, Participation, and Data Collection

Procedures for Recruitment

I approached the community partner so they could identify the school heads in the research site. The school administrator who granted access to the selected school was identified. The administrator was approached via mail to endorse the use of the school site and access to the participants. As soon as I obtained Walden Institutional Review Board (IRB) approval, I mailed descriptive invitation letters to the administrators and the basic science teachers. I sought their participation in an initial interview. The invitation letters included the consent forms, which were sealed and mailed to the administrators and teachers in the selected school.

The descriptive invitation letter that I sent to the administrators and teachers described the study intent, the participation criteria, the place of the interview, time of the interview, and the duration of the interview. The consent forms included explained the voluntary nature of the study, the confidentiality, data collection, and data management procedures, the description of member checking, and included my contact information.

The administrators and basic science teachers who volunteered to participate were scheduled for an initial interview at convenient locations and times in the school in private and comfortable places for the administrators and teachers. The initial interview lasted for one hour. The administrators and teachers that I interviewed indicated willingness to participate in an initial face-to-face interview and member checking in the consent form.

By the end of the initial interview, I informed participants of member checking, which involved their review of the transcripts of interview responses. I sent the transcripts to the administrators and teachers via mail and asked participants if they had any changes or corrections regarding their responses. Meeting for member checking was not required because member checking was done via mail.

The participants' consent was obtained on the day of the interview prior to the start of the interview. The consent forms were mailed with the invitation letter in advance of the day of the interview. I also confirmed participants' understanding of the consent form before consent was received.

Procedures for Participation

The participation procedure included the welcome of the participants, explanation of the purpose of the interview, discussion of the interview protocols, obtainment and confirmation of the signed informed consent, and the start of the interview. The participation procedure for the interview included the reminder for member checking in which I asked the participants to confirm the accuracy of their initial interview responses by mail. The participants participated in the interview for one hour while they participated in member checking for 45 minutes. The discussion about protocols and procedures and consent assured the free-will participation of all members. The participants had the freedom to continue or discontinue as their disposition allowed. Additionally, I assured participants of their rights using the IRB guidelines for informed consent. Participants' anonymity was maintained via use of pseudonyms. I respected participants' refusal to respond to sensitive interview questions or probes.

Participants had the right to exit the interview anytime they felt uncomfortable. There were discussions with the participants regarding how they indicated an intention to exit and discontinue the interview. The use of words such as "Excuse me" or "I am done here" (in the interview) was suggested. "Excuse me, restroom" or "Excuse me, stretching" was suggested for participants who needed to leave the interview but intended to come back soon to continue with the interview. Other possible and situational contingencies that challenged the interview process and the participants who needed to break off for a time and return to the interview were accommodated. Participants and I agreed to “contingency” as a word signal when the participant wanted to exit during the conversation for other reasons**.**

Data Collection Procedures

The data collection procedure included the interview of the administrators and basic science teachers. I assumed that the data collected from this set of individuals met the triangulation requirements (Fusch et al., 2018). The selected participants were scheduled for approximately 60 minutes interview each. I confirmed administrators’ and teachers’ understanding of the consent, and then obtained consent before the interview began. I also discussed the voice recording tool which I used to collect data during the interview. The voice recording tool was used to record the interview conversations before transcribing the data. The interview tools and protocols were discussed. I confirmed participants’ understanding of the interview tools and protocols and informed participants before the interview began that the initial interview would last an hour. At the end of the interview, I informed the participants transcripts would be provided to them via mail and that they would be asked if they have any changes or corrections, they needed to make about their interview responses (Member checking).

Interviewing the Administrators

This interview took approximately 60 minutes for each participant. I recorded data using the voice activator, which was compatible with Microsoft Word. The prospective interviewees were administrators who were the UBE program stakeholders who were familiar with the ninth grade basic science and the UBE program class in the selected school (Appendix 1). The participants in this interview were informed during the initial interviews about the need for a member checking that validated the participants' initial interview responses. I classified school principal and the ninth grade basic science headteachers as administrators. The administrators provided rich data regarding the basic science achievement of the ninth grade students as well as the UBE program tools used. The responses from the initial interview addressed the research questions.

Interviewing Basic science Teachers

The selected participants were scheduled for approximately 60-minutes of interviews each. I confirmed interview protocol and signed informed consent and explained the interview tools. The participants' availability for member checking was also confirmed. The interview began. The participants responded to the interview questions regarding their perceptions and experiences using the UBE program to support ninth grade students (Appendix 2). Also, the participants responded to how use of the UBE program tools impacted the basic science achievement of the ninth grade students. The teachers responded to how the ninth grade students were meeting the MDG in basic science. Finally, the interview ended, and I asked the participants if there were other information, they wished to share regarding how the ninth grade students could be supported to maximize the basic science achievement in the area. The concluding procedures included the appreciation of the participants' availability for the initial interview and confirmed availability for the member checking.

Member Checking

I used member checking to validate the data collected and approached the administrators and the basic science teachers who were interviewed via email to review the interview transcripts. I asked the participants if they had any changes or corrections about the interview responses they wanted to make. Participants and I discussed the purpose of member checking and its benefits. The convenience of the participants was discussed. I confirmed the participants' understanding of member checking and collected feedback on the interview transcripts from the participants.

Data Storage and Management

I stored both recorded and transcribed data as a Microsoft Word document. Miles et al. (2014) recommended the choice of computer-friendly tools that suited the scope of research. I am familiar with Microsoft Word, having used it in several research courses. The interview questions, which included the transcripts and other data sources such as codes, field notes, or journal entries, were uploaded into Microsoft Word. Microsoft Word was data friendly. Finally, I stored the data collected in a secured password-protected OneDrive.

Data Analysis Plan

I described the focus of qualitative data analysis and coded data segments for category, theme, and pattern development. Scholars such as Miles et al. (2014) suggested qualitative data analysis should include coding data segments from interview, jottings, and memos, into categories, themes, and patterns to build assertions. I analyzed the data collected with the interview tools (Appendices 1 and 2). I analyzed the data collected from the administrators and the basic science teachers in groups next to Research Questions 1 and 2. I classified the interview data regarding the perceptions of basic science teachers and administrators and their use of the UBE program which influenced basic science achievement in the ninth grade classroom into codes, categories, and themes. The codes, categories, and themes referred to the program practices of basic science teachers and administrators and included the strategies they used to bridge the basic science achievement gap among the ninth grade basic science students in the selected school.

I used the first and second cycles of coding to developed themes separately from the categories of responses of the two groups of participants (administrators and teachers) side by side with the two major research questions. The data analysis with the first cycle of codes, which identified common codes from the chunks of data that described perceptions of teachers and administrators regarding the UBE resources, teaching practices, and basic science achievements. The second cycle of codes included the alignement of the codes into categories and themes, which described the patterns as they linked to the major research questions and Fullan's (2007) school improvement concepts all of which refered to the basic science teachers' and the administrators' perceptions and experiences of using the UBE program to bridge the basic science achievement gap in their setting. Although the first cycle of codes involved identifying codes from the interview data of the teachers and administrators, the second cycle of codes involved grouping the codes into categories to identify the patterns and themes that linked to the major research questions (Miles et al., 2014).

The creation and organization of codes from data included reading, note-taking, and constructing codes. Creswell (2013) also indicated that categorical summaries could be handy to elucidate themes or patterns. Hence, Creswell recommended categorical summaries that classified data into codes and data. Therefore, I analyzed the data collected by the creation, link, and connection of files and codes in Microsoft Word that included interview data, notes, and codes, which were uploaded into the Microsoft document. Constant comparison of the data, as well as comparison with the research question and the conceptual framework, efficiently ran with the tabulating feature of Microsoft Word. Furthermore, I described the case and its setting, which included categorized summaries that highlighted themes or patterns.

Issues of Trustworthiness

Credibility

I ensured that strategies for internal and external validity helped to establish the credibility of this research. The strategies for internal validity included triangulation and member checking, while strategies for external validity included transferability, dependability, and confirmability.

Internal Validity

Some authors argued that qualitative research presented issues of generalizability because of the subjective assumptions of the researcher (Creswell, 2013; Patton, 2002). Qualitative research required objectivity and transparency to be credible. One of the challenges of this approach was the identification of the case. The scope of this research, therefore, became necessary; hence, the study was bounded by place. The basic qualitative study addressed basic science teachers’ and administrators’ perception of the use of the UBE program that bridged the basic science achievement gap among the ninth grade students in the selected school was the focus of this research. Another challenge was generalizability, but because this research required in-depth information and purposeful sampling, it became a challenge to gather adequate information about the program practices. Creswell (2013) recommended a data collection matrix that categorized the amount of information collected.

Triangulation. I collected interview data from sets of individuals such as administrators and basic science teachers who used the program to support ninth grade basic science students in the selected school. Patton (2002) recommended, “triangulation of data sources and analytical perspectives that increased the accuracy and credibility of findings” (p. 93), while Creswell (2013) argued that the validity of data was best assured when researchers used “multiple and different sources, methods, investigators and theories to provide corroborating evidence” (p. 251), Qualitative researchers triangulate when they use multiple sources to verify findings which enhance a deeper understanding of the phenomenon of interest (Patton, 2002). I triangulated data by comparing the themes identified from the administrators and teachers, including the description of the similarities and differences between the administrators’ and teachers’ perspectives regarding their program practices and program strategies used in minimizing achievement disparities among the ninth grade basic science students.

Member Checking. I used member checking to validate the transcripts and ensured the validity of the data collected. After the transcription of the interview, the transcripts were provided to the administrators and the basic science teachers, who were asked if they had any changes or corrections regarding their interview responses. I then collected the transcript feedback from participants. Member checking ensured that the participants' perspectives were well translated in the transcript. I also asked administrators and the basic science teachers if the transcript reflected their perspective. The participants had an opportunity to confirm the transcript or to assert that it differed with the record or to present reasons for the deferment. The participants had the opportunity to share what the transcript did not capture. Fusch et al. (2018) agreed that member checking is a methodological triangulation that adds depth to data collected via interview because member checking, which included the review of the interview transcripts, enriched the meaning the participants used to construct their perspectives.

External Validity

External validity referred to transferability, dependability, and confirmability. Transferability explained how the conclusions of the study were transferable to other settings. Dependability described the consistency and clarity of research segments, while confirmability referred to the sequence of data collection and exposed how data was processed, transformed, and displayed.

Transferability. Transferability demonstrated and described how the conclusion from the study was applied to other schools in the state. Creswell (2013) recommended a detailed and thick description that detailed the participants or setting understudy because this thick description provided enough clues for the research audience who applied recommendations to other settings. Transferability ensured and described details of the research participants that included the basic science teachers' and administrators' perceptions or knowledge regarding the use of the UBE program that bridged the basic science achievement gap in the area. I explained the participant selection procedure as well as the transfer of the roles of participants in one setting to another participant in another setting. Finally, I described the selected school in the school district, which served as the research site.

Dependability. I described strategies for dependability, which included how interviews and member checking led to consistency and clarity of the research segments.

Confirmability. Confirmability was ensured by the link of participants' responses to some precoded structures related to the conceptual framework. I assured consistency by linking of the interview questions to the central research question, which included the predictions linked to the participants' responses.

Ethical Procedures

I accessed the participants with the permission of the local school administration who were authorized to grant such access. The IRB permission covered this proposal. The IRB examined the tools and procedures for data collection and ensured the ethical requirements for the treatment of human participants were fulfilled. The IRB approval was given on April 28, 2020, when the tools and procedures for this interview met the requirements. The IRB approval number was 04-28-20-0085354, which followed the completion of the proposal. I described the treatment of human participants and ethical concerns related to data, as well as plans to address these concerns. Furthermore, I described data treatment and management of confidentiality issues and other ethical issues, including previous work environment, conflict of interest, and justification for the use of incentives.

Accessing the Participants

The community partner who identified the school leaders was approached by mail. The school leaders granted access to the site and identified the participants who were approached by mail to participate in an interview. I approached the participants after I received the Walden University IRB approval. After the approval was granted, I initiated the recruitment of participants sending descriptive invitation letters to the administrators and teachers (and included the consent form), which sought their participation in an initial face-to-face interview and member checking. The invitation letter described the study intent, the participation criteria, place of the interview, the time of the interview, and the duration of the interview. The consent form (enclosed in the invitation letter) explained the voluntary nature of the study, the confidentiality and data management procedures, and gave my contact information. The administrators and teachers who indicated a willingness to participate and signed the consent form were scheduled and interviewed. By the conclusion of the initial interview, I had informed the participants of member checking. I sent the interview transcripts by mail to the participants and asked if they had any changes or corrections regarding their responses. I anticipated that the participants would freely respond to the questions.

Treatment of Participants

Another ethical issue was contact with the participants and the disclosure of the purpose of the study. I discussed interview procedures with the participants as well as tools I would use during the interview. The benefits and effects of the interview were discussed. Afterward, the consent was received from the participant before the interview.

I documented participant consent and gave the participants copies for their records. The IRB reviewed the treatment of the research participants before permission was granted to apply the techniques.

Ethical Concerns and Plans for Addressing Them

Creswell (2013) recommended that researchers addressed the ethical issues in every stage of the research process. Stages in the research process included the pre study process, the start of the process, data collection, data analysis, the report of the data, and publication of the study. Creswell discussed how various types of ethical issues could be addressed in the various stages of the research process. At the data collection stage, one ethical issue was the avoidance of deception. The discussion of the purpose of the study and data usage addressed this issue.

Confidentiality. At the analysis stage, I identified the ethical issue of respect for the privacy of participants. I addressed this issue by assigning fictitious names to participants to maintain participants, anonymity. I kept the names of the administrators and the basic science teachers who were interviewed anonymous so that data was reported without potentially causing harm to the participants. I used composite stories that protected participants' identities to maintain confidentiality. Additionally, I coded the participants in the interview with pseudonyms such as A1, A2, A3; B1, B2, B3 etc., (Table 1, Table 2).

Data Treatment. I provided interview transcripts to the participants and asked whether they had changes or corrections regarding their responses. I then collected participants' feedback. After the publication, I offered to share a 2-page summary of the results verbally or in a presentation to the participants, the school community, or stakeholders. Additionally, I offered to share a 1-2-page summary of the result in any local educator conferences in the research area as well as with the local publications in the area that call for such documents. I stored the voice tape, the transcript, and the results in password protected Microsoft documents.

No other ethical issues occurred regarding previous work environment, conflict of interest, power differentials, and justification for the use of incentives. The administrators' and basic science teachers were properly informed with the informed consent, interview protocol and tools while they shared their experiences using the UBE program to support ninth grade basic science achievement. The information from administrators and basic science teachers regarding their experiences using the UBE program to improve basic science achievement produced rich data that helped inform other administrators and basic science teachers as well as other educators about how the program could be used to improve basic science achievements of ninth grade students and other science students in the area.

Summary

In this chapter, I described the methodology used for the qualitative case study design, the rationale for the research design, and my roles as the researcher. I also described the sample and data collection strategies that included the data analysis plan. I explained the trustworthiness of the data collected and the ethical procedure of this research which served and protected the rights of the research participants conforming to the requirements of Walden University's IRB.

In Chapter 4 of this study, I discuss the results of the findings of this study, including the influence of the participant setting and demographics of the data collection process. Other items that I discuss in the next chapter include the data analysis and evidence of trustworthiness, which include the results of the study as they addressed each research question, as well as tables and figures, which illustrated the results.

Chapter 4: Results

The purpose of this basic qualitative study was to explore the perceptions of teachers and administrators regarding their practices, support strategies, and experiences with the UBE program to help ninth grade students meet the achievement standards in basic science. I used telephone interviews to explore the perceptions of the teachers and administrators regarding their experiences with the UBE program in bridging achievement gaps. Additionally, I used telephone interviews to seek the administrators' and teachers' perceived strategies for supporting ninth grade students in meeting the MDG in basic science.This study is relevant because administrators and teachers are expected to be accountable for academic growth of their students. Therefore, exploring their perspectives on the use of the UBE program, including their practices and experiences and their influence on the science achievements of the students, has positive potential for improving the students' academic performance and administrators' and teachers' professional development, which improves the education system.

The following research questions guided this study:

RQ1: How do teachers and administrators perceive the use of the Universal Basic Education (UBE) program as the administrators and teachers minimize the achievement gap in basic science in the ninth grade?

RQ2: What strategies are teachers and administrators using to support students' proficiency in basic science while addressing the Millennium Development Goal in basic science?

The remaining sections in this chapter include the research setting, demographics, data collection, data analysis, evidence of trustworthiness, results, and summary.

Setting

The location of the school was a rural community in the Southeast of Nigeria consisting of compact settlements of families based on farming, trading, and ancestral origin. The sample size included three administrators and eight basic science teachers. Regarding the organizational conditions of the school, the selected school used the UBE program in basic science teaching and learning, which was the primary reason I selected it as part of this study. I noted some basic facilities and equipment that were lacking in the practical aspect of basic science. The selected school has three buildings for the students in the middle school. The ninth grade students used one building. There was one office for the lead administrator and a staffroom but no permanent science or computer lab. The science tools were packed in the lead administrator’s office and released when students or teachers needed them. The lack of basic science or computer lab could have influenced the results. The classroom is a traditional type where teachers move around instead of the students. There are three classes of ninth grade students, with each class comprising 50 students.

Demographics

There were 11 participants in the interview, including three administrators and eight basic science teachers. The participant administrators were two men and one woman. Two of the administrators are school heads, and one is a consultant administrator. Table 1 shows the administrators’ information, including their participant identifier, gender, years of experience, and date and duration of interview. The three administrators identified were Participant A1, A2, and A3.

Table 1

Participants' Information-Administrators

Participants	Gender	Years of experience	Date interviewed	Duration
A1	Male	20	06-16-2020	0.28hrs
A2	Male	13	06-09-2020	0.37hrs
A3	Female	18	06-24-2020	0.37hrs

The eight teacher participants were identified as B1, B2, B3, B4, B5, B6, B7, and B8. There were five male and three female teachers who participated in the interview. The teacher-student ratio varies across the years due to student population or availability of teachers. As shown in Table 2, the teacher demographics include the participants identifier, gender, years of experience, date, and duration of interview.

Table 2

Participants' Information-Basic Science Teachers

Participants	Gender	Years of experience	Date Interviewed	Duration
B1	Male	13	05-31-2020	0.58hrs
B2	Male	13	06-01-2020	0.45hrs
B3	Female	8	06-02-2020	0.50hrs
B4	Female	8	06-06-2020	1.05hrs
B5	Male	5	06-10-2020	1.I0hrs
B6	Male	11	06-11-2020	0.47hrs
B7	Male	10	06-12-2020	0.53hrs
B8	Female	12	06-19-2020	0.50hrs

The three administrators and eight basic science teachers who met the selection criteria indicated in the consent form were selected for participation in the study. The participants identifiers (A1–A3 and B1–B8) were pseudonyms used to describe each administrator and basic science teacher. Also, the administrators and basic science were selected based on their experience and involvement with the ninth grade basic science teaching and learning activities.

Data Collection

Following the purposeful sampling of three administrators and eight basic science teachers, I mailed a descriptive invitation letter that described the interview protocol to the administrators and basic science teachers in the chosen school, including the consent form. I interviewed each participant via telephone for approximately 1 hour. I obtained consent from the participants virtually before the start of the interview. Each administrator responded to 15 interview questions that included probing questions (see Appendix A). Each basic science teacher responded to 18 probing interview questions, which were analyzed as themes next to Research Questions 1 and 2 (see Appendix B). I used the voice activator and recorded the interviews. Then, I transcribed the interview after the completion of each interview. I completed each transcription in approximately 2 days. Transcription experts have agreed that manual transcription of recorded interviews involving listening to the full recording, transcribing the draft, picking the right tool, proofreading, and finding placeholder texts enhanced formatting data in shortcuts that save time (Indian Scribe, 2020; Opal Transcription Services, 2017). Member checking was performed virtually via email for approximately 45 minutes per participant, which lasted 2 weeks. I emailed the transcript to each participant after the interview asking each participant if there were changes or corrections regarding their interview responses and collected the feedback via email. If there were changes, the participant's feedback read, "Transcript needs corrections." If there were no changes, the participant's feedback read, “The transcript is okay.” Two administrators and seven basic science teachers’ feedback read, “The transcript is okay,” whereas one administrator and one basic science teacher’s feedback read, “Transcript needs correction.” The corrections were made on the transcript and emailed back to me.

Variations in Data Collection

Data collection variation from the original proposal plan occurred due to the COVID-19 pandemic. The face-to-face interviews described earlier in the approved proposal were modified to virtual and telephone interviews due to COVID-19 local restrictions and movement restrictions. The data collection variation issue was addressed by working with my chair, committee, and the Walden IRB office. The IRB had approved a virtual interview if the face-to-face interview did not hold. Upon approval, I explained to the participants in the descriptive invitation letters mailed to them concerning the adjustment to virtual interview. The option for virtual interview was included in consent form. All the participants who consented virtually to the virtual interview were interviewed. After the data collection, I recorded the data collection variation in the analysis section of this study as indicated in the Walden PhD dissertation checklist.

Data Analysis

As presented in Chapter 3, I used two cycles of codes to conduct the analysis. In the first cycle of codes, I identified common codes from the administrators’ and basic science teachers’ interview data. Table 3 describes the coded units from the administrators’ and teachers’ interview data by Research Questions 1 and 2. In Table 3, codes from the administrators' and teachers' interview data are listed according to the groups of participants and the corresponding research question.

Table 3

Codes From Data With Groups-Research Questions 1 and 2

Groups of participants	RQ 1 codes	RQ 2 codes
Administrators	Practices Practices Supplied technology kits Supplied program kits (approved textbooks, resource professionals, charts, and real objects) Placement of teachers	Strategies Strategies Knowledge Skill
	Professional training Advising teachers Engaging teachers	Mentoring Seminar, workshops, Training
	Monitor lesson plans Monitor scheme of work Monitor science teaching schedule Monitor assessments Checking learning standards Evaluate lesson plan Evaluating science performances Evaluate grading	Planning Monitoring Assessment Examinations Professional development Skill enhancement Conferences Workshops Program initiatives
	Achievement outcome / BECE Average scores across 2017 – 2019 Fair outcome and positive impact More pass and fewer failures	
Basic science teachers	Used technology kits Used program kits Textbooks Charts, and real objects and Computers	Support via professional skills and experience and degrees Skill applications:
	Training programs workshops and seminars	Teaching styles: illustration, encouragement, appreciation, award and reinforcement Assessment Styles: Grading categories Combining class and examination assessment scores
	Used science curriculum, Scheme of work, and WAEC syllabus	Program tools: schemes of work, grading tool kits, workshops, and textbooks Engagement strategies: experimentation, practical teaching, illustration, encouragement, appreciation, award and reinforcement, science project competitions and assessments
	Lesson plan usage Program curriculum Align lesson with examination content	Assessment strategies: Internal assessment, and assessment on science practical, class assignment and take-home assignment, in-course and examination assessments, Combining in-class and examination test results
	Learned skills, Effective and engaging teaching styles Experimental, illustrations, Demonstration and practical teaching Grading standards Grading categories, alphanumeric Grading scales Class and examination assignments Inadequate science instruments and materials Scarcity of computer Shortage of program supplies Lack of support Achievement disparity	Supported the curriculum adoption. Used available and handy program resources Teachers' Suggested more program resources

A second cycle of codes was then employed to group the identified codes into categories and patterns that link to Research Questions 1 and 2. This coding process involved forming categories from the coded units. After identifying the codes from the administrators' and teachers' interview data, I used the summative table of codes to form categories. I grouped the categories by the categories of participants (administrators and basic science teachers), and by Research Questions 1 and 2 (see Table 4).

Table 4

Codes to Categories With Groups-Research Questions 1 and 2

Groups of participants	RQ 1 codes	Categories	RQ 2 codes	Categories
Administrator	Practices Practices Supplied technology kits Supplied program kits (approved textbooks, resource professionals, charts, and real objects) and Placement of teachers	Program resources supply practices	Strategies Strategies Knowledge Skill	Knowledge and skill application strategies
	Professional training Advising teachers Engaging teachers	Professional advancement practices	Mentoring Seminar, workshops, Training	Mentoring and resources support strategies
	Monitor lesson plans Monitor scheme of work Monitor science teaching schedule Monitor assessments	Scheme of work and lesson plan monitoring practices	Planning Monitoring Assessment Examinations	Planning and monitoring strategies
	Checking learning standards Evaluate lesson plan Evaluating science performances Evaluate grading	Program evaluation practices	Professional development Skill enhancement Conferences Workshops	Professional development and skill enhancement strategies
	Achievement outcome / BECE Average scores across 2017 – 2019 Fair outcome and positive impact More pass and fewer failures	Basic science achievement outcome/BECE	Teachers' welfare Grading flexibility for rural schools; Science specialist, Parental involvement, Government support	Program initiative strategies
Basic science teachers	Used technology kits Used program kits Textbooks Charts, and real objects and Computers	Program tools application practices	Support via professional skills and experience and degrees Skill applications:	Profession and skill application strategies
	Training programs workshops and seminars	Professional advancement practices	Teaching styles: illustration, encouragement, appreciation, award and reinforcement Assessment Styles: Grading categories Combining class and examination assessment scores	The teachers' teaching method and assessment strategies
	Used science curriculum, Scheme of work, and WAEC syllabus	Program curriculum adaptation practices	Program tools: schemes of work, grading tool kits, workshops, and textbooks Engagement strategies: experimentation, practical teaching, illustration, encouragement, appreciation, award and reinforcement, science project competitions and assessments	Program tools support and student engagement strategies

Groups of participants	RQ 1 codes	Categories	RQ 2 codes	Categories
Basic science teachers (cont.)	Lesson plan usage Program curriculum Align lesson with examination content	Lesson plan adoption practices	Assessment strategies: Internal assessment, and assessment on science practical, class assignment and take-home assignment, in-course and examination assessments, Combining in-class and examination test results	The assessment and grading strategies
	Learned skills, Effective and engaging teaching styles Experimental, illustrations, Demonstration and practical teaching	Student engagement teaching practices	Supported the curriculum adoption. Used available and handy program resources Teachers' Suggested more program resources	Program's curriculum adoption and teaching initiative strategies
	Grading standards Grading categories, alphanumeric Grading scales Class and examination assignments	The grading and assessment practices		
	Inadequate science instruments and materials Scarcity of computer Shortage of program supplies Lack of support Achievement disparity	Perceived basic science achievement factors		

The next coding process involve the development of themes from the categories from the interview data. The common patterns discovered from the categories from the administrators' and teachers' interview data were grouped as themes per the two groups of participants next to the two major research questions. The categories from the administrators' data such as program resources supply, program kits supplies; professional advancement, professional trainings; scheme of work and lesson plan monitoring; program evaluation, lesson plan and basic science achievement outcome/BECE, were developed into themes including program resources supply practices, professional advancement practices, scheme of work and lesson plan monitoring practices; program evaluation practices, and basic science achievement review practices. The additional categories from the teachers' data such as program tools application and program kits, professional advancement and professional training, workshops and seminars, program curriculum adaptation, scheme of work, WAEC syllabus, lesson plan adoption; program curriculum, student engagement and teaching styles; the grading and assessment; grading standards and perceived basic science achievement factors were developed into themes such as program tools application practices, professional advancement practices; program curriculum adaptation practices, lesson plan adoption practices, student engagement and teaching practices, the grading and assessment practices, and perceiving basic science achievement factors. Theme development from the two groups of data were done by coding to address question 1 regarding the administrators' and teachers' perceptions of program practices which influenced the ninth grade students' basic science achievement. I used the coding table to explain how themes and participants excerpts linked with research question 1.

Table 5 shows the themes related to Research Question 1 and associated examples of excerpts from participant interviews. The table includes the groups of participants, themes, participant identifier, and participant excerpts.

Table 5

Themes With Participants' Excerpts-Research Question 1

Research Question 1: How do teachers and administrators perceive the use of the Universal Basic Education (UBE) program as they impact the achievement gap in basic science in the ninth grade?			
Groups of participants	Themes	Participant identifier	Participants excerpts
Administrators	Practicing and using program technology, kits, and resource professionals to enhance learning	A3	"I supply all the materials and invite professionals to handle the students in basic science subjects"
	Improving professionals with professional trainings and increasing students' achievement in the sciences	A3	"I also supply UBE professionals to teach the teachers how to teach students"
	Monitoring teaching and assessment practices to determine science achievement	A3	"The science subject appears 3 times in the timetable and teachers adhere to it"
		A1	"I use some testing questions during visit to class to know which stage the students are"
	Evaluating the teaching and grading practices to increase basic science achievement outcome	A3	"The grading process is categorized by having A, B, C, D, and F…for the final exam, which they call BECE"
	The evaluation of students' basic science achievement and outcome with BECE	A1	"Using the A, B, C, D scores the majority of the students fall into the B category."
		A2	"Ultimately, some students pass, and some fail, but the majority of the students pass."
		A3	"For the final exam, which they call BECE-Basic Education Certificate Examination, 30 got A; 30 got B; 40 got C, and 47 got D."
Basic science teachers	Practicing and using program technology, kits, and available resource to influence science learning and achievement	B1	"Yes, of course, we are using, I am using the UBE program resources in teaching the students"
	Using regular professional training of the teachers and their experiences to influence science learning and achievement	B7	"Like I said earlier on, we go on workshop, you know, almost every year"
	Increasing the students' understanding of science concepts using the basic science curriculum and scheme of work	B1	"I perceive the compulsory basic education curriculum that involves the teaching of computer to be okay"
		B3	"I use the textbook, the curriculum, and scheme of work"
	Adopting lesson plan aligned with program curriculum to reduce achievement disparities	B3	"In line with the curriculum, we write out what they're expected to know, or achieve"
	Teaching and engaging students using effective teaching styles to increase science interest and achievement.	B2	"I always use student centered or as problem solving method"
		B8	"In basic science, I use explanation, experimentation, and the use of marker"
	Assessing science achievement with various grading practices	B8	"I grade them according to state standards"
		B2	"Yes, my grading process is A, B, C, D and F"
	The review of more UBE program challenges to basic science achievement	B1	"The ability to handle the science equipment."
		B3	"Scarcity of program resources supplies to rural areas"
		B4	"Lack of science equipment and improper orientation"

Themes and Participants Excerpts: Research Question 2

The common patterns discovered from the categories from the administrators' and teachers' interview data were grouped as themes per the two groups of participants adjacent to research question 2 which sought administrators' and teachers' perceptions regarding program strategies which helped ninth grade students meet expectations is basic sciences. The categories from the administrators' data such knowledge and skill application and experience, mentoring and resources support, advising, providing and supporting; planning and monitoring, assessment and examinations; professional development, skill enhancement and professional training; program initiative strategies, improvement of welfare, and other supports were developed into themes such as knowledge and skill application strategies, mentoring and resources support strategies; planning and monitoring strategies, professional development and skill enhancement strategies, and program initiative strategies. The additional categories from the teachers' data such as profession and skill application and degrees earned; teaching methods, teaching method and assessment styles, program tools support and student engagement strategies, assessment and grading strategies; program's curriculum adoption and teaching initiative strategies were developed into themes such as profession and skill application strategies, the teachers' teaching method and assessment strategies; program tools support and student engagement strategies, the assessment and grading strategies; program's curriculum adoption and teaching initiative strategies. I used the coding table to explain how themes and participants excerpts linked with research question 2.

Table 6 shows the themes related to Research Question 2 and associated examples of excerpts from participant interviews. This coding process fulfills the requirements for describing themes, with quotations as needed to meet the qualitative study expectations for an inductive process.

Table 6

Themes With Participants' Excerpts-Research Question 2

Research Question 2: What strategies are teachers and administrators using to support students meet proficiency in basic science while meeting the Millennium Development Goal in basic science?			
Groups of participants	Themes	Participant identifier	Participants' excerpts
Administrators	Demonstrated expertise with supporting teachers and students with program resources	A1	"I am familiar with the basic teaching and learning because as an administrator I manage the basic science teaching and learning materials…and provide the materials to teachers and students always"
	Encouraging and supporting teachers and students with program resources	A1	"I supported by supplying to them the materials and encouraging them to use the materials"
		A3	"I am supporting by advising basic science teachers, teach the students with concrete materials"
	Regular monitoring and assessment of teaching and learning basic science	A2	"We grade teachers how they were able to deliver their lessons to the students"
	Improving science teaching and learning by advancing professional training opportunities	A3	"I also supply UBE professionals to teach the teachers how to teach students"
	Improving science learning with positive work environment, inclusion and adequate program resources supply	A3	"I invite professionals to handle the students in basic science subjects especially the JSS3 students who are preparing for their final examination"

Groups of Participants	Themes	Participant identifier	Participants' excerpts
Basic science teachers	Supporting students with program resources and professional skills	B2 B7	"I learned a lot of strategies to be used in the teaching of the students" "I learn new things. I go on workshops and then we have new ideas and knowledge from different professionals in teaching the subject"
	Teaching and assessing students with effective teaching and grading styles to improve achievement	B3 B3	"I use chalkboard, blackboard, demonstration method, explanation, reinforcement and help when they do practicals" "I give them assignment, take home assignment, give them class work….during exams, grade them …pass or fail"
	Increasing achievement in science by engaging students with assessments using the scheme of work, program tools and skills	B6 B7 B8	"After teaching them in the workshop, when the teacher returned to the school, they use the method to teach the students" "I join theory with practical in the use of examples to support the students in basic science" "I use demonstration, explanation, questioning and answering"
	Increasing science achievement by combining class assessment and examination test scores	B4	"The grade strategy which helped the students to pass were the in-course and examination assessments"
	Adopting the program's curriculum to improve science achievement and increase interest in the sciences	B3	"I use the textbook, the curriculum, and scheme of work"

Miles et al. (2014) group coding into first cycle and second cycle coding which are used to analyze interview data into codes categories and themes. Whereas the first cycle of coding involves breaking chunks of data into codes, the second cycle coding are used to group the codes into categories and patterns. I manually coded a start list of codes which generated other codes inductively in the first cycle of codes, which were arranged in the table of codes. I employed pattern coding in the second cycle coding by grouping similar codes into categories to describe threads in administrators' and teachers' accounts of program practices and strategies used in supporting basic science learning. I used the table of categories, codes, and themes in the result section to describe the links between the categories, codes and themes. The result included common codes, categories, and themes which were developed from the administrators' and teachers' interview data describing their perspectives of program practices and experiences and their influence on ninth grade students' basic science achievement. Also, the result described the perspectives of administrators and teachers concerning program strategies used and their perceptions of how the strategies helped 9 grade students to meet expectations in basic science.

Managing Discrepancies

I discussed administrators' and teachers' responses to research questions 1 and 2 using categories and themes to highlight their similarities and differences including their relationship and relevance to ninth grade students' basic science achievement. Additionally, I considered some unique responses from administrators and teachers which did not relate to the categories and themes within the major research questions if they were relevant to the basic science achievements of the ninth grade students.

Evidence of Trustworthiness

I demonstrated the trustworthiness of this study and checked for credibility, transferability, dependability, and confirmability.

Implementations or Adjustments to Credibility

The credibility of this research included the check for internal validity, which included triangulation. The assessments for external validity included transferability, dependability, and confirmability. Regarding triangulation, I focused on the thematic comparisons of the responses and perceptions of administrators and teachers regarding common program practices and strategies used to support students meet expectations in basic science. I discussed the differences and similarities in responses and perception of administrators parallel to research questions 1 and 2. The discussion of differences and similarities of responses and perceptions which addressed question 1 focused on program practices which influenced basic science achievement. Also, the discussion of the differences and differences of responses and perceptions which addressed question 2 focused on the program strategies which supported basic science achievement. Qualitative researchers confirmed that triangulation of data by multiple sets of individuals such as the administrators and basic science teachers met the triangulation requirements (Fusch et al., 2018). Other qualitative experts have indicated triangulation of data sources increased the accuracy and credibility of findings and provided collaborative evidence that best assured data validity (Creswell, 2013; Patton, 2002).

Implementations or Adjustments to Transferability

I collected rich and detailed information, including program practices, strategies, resources, and curriculum, which I described in the interview summary and results and which provided context for similar settings. The recommended strategies for improving the ninth grade students' basic science achievement, which supported them in meeting the MDG, can be applied to other schools in the southeast of Nigeria and other schools in the country. Almost all the participants indicated that the federal government initiated the program's national and state character, which the state government implemented. Hence, the administrators and basic science teachers in the selected school indicated that an adequate supply of program materials would produce similar results in most of the similar contexts. The results and findings from administrators' and basic science teachers' responses to research questions 1 and 2 may apply to other similar education settings in the schools in Nigeria.

Implementations or Adjustments to Dependability

I ensured and aligned the research purpose, research questions, and design in this study's segments. I maintained this consistency in the triangulation of data collected and guided by research questions 1 and 2. The two primary research questions consistently guided the data collection, data analysis, data analysis results, and data findings and aligned with the research purpose and design to ensure dependability.

Implementations or Adjustments to Confirmability

I linked the interview questions to the two major research questions and linked the administrators and basic science teachers' responses to some precoded structures related to the research questions. I indicated earlier that I ensured confirmability by linking participants' reactions to some precoded forms related to the research questions and the study framework. I documented the interview responses properly next to the two major research questions, codes, and categories generated themes, and ensured the findings were accurate.

Results

As indicated earlier, in the previous section, the results included the description of the perspectives of administrators and teachers regarding their program practices and experiences and their influence on ninth grade basic science achievement, including the description of their perspectives regarding the strategies they used in helping students meet basic science achievement expectations. I organized the results of the study in categories close by the two major research questions and used tables of categories, codes, and themes to describe the connection of data to the research questions addressing the study. The results for question 1 described the perspectives of administrators and teachers regarding their program practices and their influences on students' science achievement. The results for question 2 also described the administrators' and teachers' perspectives regarding program strategies used in helping students meet basic science expectations. The presentation of the results next to the two major research questions using categories, codes, and themes from the administrators' and teachers' interview data provided understanding regarding the administrators' and teachers' perceptions of program practices, experiences, and strategies and their influences on 9 grade students basic science achievements.

Research Question 1: Program Practices and Their Influences

Administrators

The interview results from the responses of the three administrators (A1, A2, and A3), are summarized in the following paragraphs next to themes such as:

- practicing and using program technology, kits, and resource professionals to enhance learning
- improving professionals with professional trainings and increasing students' achievement in the sciences
- monitoring teaching and assessment practices to determine science achievement
- evaluating the teaching and grading practices to increase basic science achievement outcome
- the evaluation of students' basic science achievement and outcome with BECE

I grouped the results of the responses from each administrator by research questions 1 and 2, adjacent to the themes, coded responses, and categories.

Practicing and Using Program Technology, Kits, and Resource Professionals to Enhance Learning. The administrators were asked how they perceived the use of UBE program as they impact the achievement gap in basic science. Most of the administrators indicated that the supply of program resources enhanced basic science and technology studies because textbooks and learning materials and other learning resources were provided. Participant A3 stated: "Yes, I am using the UBE program in basic science subjects because we have a basic science kit where science materials are kept for teaching purposes." Participant A3 managed and supplied other program resources including charts, approved textbooks, resource professionals, and real objects. Participant A1 supplied UBE textbooks, and materials and encouraged teachers and students to use the materials. Participant A2 said he made sure that every available materials and equipment provided by the UBE program board was supplied and explained to the teachers. However, Participant A2 indicated that shortage of program materials impacted learning and made it cumbersome for teachers to attend to all the students on time. The administrators' responses regarding the supply of program resources are familiar but differed on the type of materials supplied. Participant A1 encouraged the use of program textbooks and materials they supplied but Participant A3 provided resource professionals to support the use of program resources they supplied. Participant A2 supplied program resources and explained the use to the teachers and students. The administrators believed the supply of program resources and learning kits including proper placement and encouragement of teachers influenced the practical and theoretical aspects of basic science teaching and learning. However, Participant A2 noted that shortage of program resources made teaching cumbersome for the science teachers who needed to manage large class size. Although the administrators described the influence of program resources on basic science achievement, the participants did not explain how the program resources supply practice impacted the achievement gaps in basic science in the ninth grade. When asked about the impact of program practices on achievement gaps, they said the program practices raised science achievement.

Improving Professionals with Professional Trainings and Increasing Students' Achievement in the Sciences. I asked the administrators to tell me more about how the program impacted the achievement gap in basic science. The administrators indicated that the program enhanced the training of teachers who used the program and taught and improved students' results in the school. According to Participant A1, the program became an innovation that train professionals who helps students perform well in both internal and external examinations. Therefore, Participant A1 encouraged the teachers and students to use the program resources. Participant A2 indicated that when adequate program material is provided, including the explanation regarding the use of program tools, the achievement of students is assured. The administrators indicated that workshops, seminars, including explaining the program materials to the teachers and students are the program training practices which influence the science achievement. Participant A3 indicated the impact of the program on the students' achievements. Participant A3 stated,

> I am supporting students in ninth grade to meet proficiency in basic science by advising basic science teachers, teach the students with concrete materials, to teach them with chart, real objects, take them to excursion. I also supply UBE professionals to teach the teachers how teach students.

The administrators perceived that training opportunities which support teachers to use the supplied program resources within the required practices improved science learning and increased students' science achievements. However, they approached professional training differently. Participant A1 participated in professional training by encouraging teachers and students to use program resources. Participant A2 advanced professional training by explaining the use of program tools to the teachers and students, but Participant A3 provided resource professionals in the workshops and seminars to support teachers in the use of program resources. The administrators perceived that professional advancement would improve teachers' skills to impart science learning and bridge gaps in science achievement. Despite the administrators' perceptions that professional advancement improved teachers and students, the administrators did not describe the impact of professional development on the achievement gap of ninth grade students. This creates more opportunities for professional development which focus on bridging the achievement gap in basic science.

Monitoring Teaching and Assessment Practices to Determine Science Achievement. When the administrators were asked whether the UBE program was supporting basic science achievement in their school, the administrators indicated their monitoring practice of ensuring science lessons are planned around the program's scheme of work to enhance science teaching which improved student achievement. Participants A3 and other administrators adopted the planning and monitoring practices. Participant A3 asserted,

> The science subject appears 3 times in the timetable and teachers adhere to it. Assessment is done twice in a term before the last assessment which is the examination… I supply all the materials and invite professionals to handle the students in basic science subjects especially the JSS3 students who are preparing for their final examination.

Participant A2 stated,

> What I mean by this is that we grade teachers how they were able to deliver their lessons to the students, in other words, the teachers in the basic program, write his or her lesson note, weekly and bring out what is expected of them to deliver to the children, so at end of the week for instance they assemble their lesson note and their scheme of work to know how far they have been able to deliver basic topic that are required of them for the week, that is how we grade them.

Participant A1 stated: “We use the modern standard and make sure they learn according to standards in basic science.”

The administrators’ approaches to monitoring the lesson plans and scheme of work differed. Participant A3 monitored the schedule to ensure science lessons were done more regularly. Participant A2 monitored the teachers’ science lesson plans. Participant A1 monitored science learning standards but did not indicate how. The administrators’ perception regarding scheme of work and lesson plan monitoring was that the practice ensured the alignment of the teaching content to the examination content. The administrators perceived that scheme of work and lesson plan monitoring is relevant to improving basic science teaching and learning which increase students’ basic science achievement. The administrators’ perspectives of improving basic science learning by monitoring the scheme of work and lesson plan did not include their description of how this practice impacted the achievement gap in the ninth grade, which opens another opportunity for further research on monitoring practices that use scheme of work to determine basic science achievement gaps.

Evaluating the Teaching and Grading Practices to Increase Basic Science Achievement Outcome. The administrators were asked to describe how they determined a program outcome. The administrators described program evaluation practices influencing students' achievements such as assessing the teaching and learning standards, as well as evaluating the grading process, and grading standards. The teachers indicated that the practice of evaluating the teachers' lesson plan using the program's scheme of work helped them to track the progress teachers are making in helping students understand the science concepts. Additionally, the evaluation of grading practices helped the administrators review the program implementation progress and the students' improvements in the sciences. Participant A2 indicated that teachers' weekly lesson plans were evaluated. Participant A3 evaluates practices by checking and confirming that the basic science subjects appear three times in the weekly schedule and evaluates how the teachers adhere to schedule by evaluating assessments which are done twice in a term. Additionally, administrators perceived that program evaluation support basic science achievement to address the achievement gap issues and address research question 1. However, details about how program evaluation practices impacted the achievement gap were expected when the administrators were asked how they determined a program outcome. I expected the administrators to describe different types of evaluation practices, which produced different achievement outcome and which should have also explain the impact of different evaluation methods on the achievement gap. Hence, further studies on the influence of different methods of evaluations on the achievement gap is required.

The Evaluation of Students' Basic Science Achievement and Outcome with BECE. The administrators were asked to describe the UBE program outcome for basic science. Each of the administrators described the basic science achievement outcome. Regarding the outcome, Participant A1 indicated that the program outcome was positive because it encouraged the students to advance in basic science proficiency. "Using the A, B, C, D scores the majority of the students fall into the B category." Participant A1 added that computer science and technology in the program further enhanced the students' progress in basic science. Participant A2 suggested that the program has a positive effect but added, "Ultimately, some students pass, and some fail, but the majority of the students pass." Participant A3 described the basic science achievement outcome with the students' average scores in basic education certificate examination (BECE), across the years 2017, 2018, and 2019. Participant A3 stated,

> For instance, in 2017 the students were 147 registered for the final exam, which they call BECE-Basic Education Certificate Examination, 30 got A; 30 got B; 40 got C, and 47 got D; there was no failure. In 2018, 111 students sat for the final exam; 25 got A; 25.got B; 25 got C, and 36 D. There was no failure. Also, in 2019, they were 115 students; 114 took the exam and passed very well; one was absent, and there was only one failure. 30 got A; 30 got B; 30 got C; 23 D, one absent, and one failure.

The 2017 to 2019 BECE description in which the administrators described the alphanumeric grading of students across the years was relevant for describing the perceptions of the administrators regarding the evaluation practices and how alphanumeric evaluation practices indicated student achievement across the years.

Participant A2 said that students improved in science when grading categories and alphanumeric gradings scales were used. Participant A2 stated that the grading scales include A, B, C, D, and F. “A is between 80 - 100, for B, 70 - 80, for C, 60 - 79, and D is between 40 – 50. Participant A1 said that majority of the students’ scores were within the B categories. Participant A2 reported that majority of the students pass, conversely Participant A1 said most of the passes are in the B category. However, both administrators agreed that the program encourage students’ basic science achievement.

The administrators described the average scores across the years for ninth grade students in the BECE 2017 to 2019. The administrators’ descriptions of the A, B, C, and D scores mentioned above referred to the ninth grade students’ basic science scores in basic education certificate examination (BECE). However, Participants A1 and A3 reporting patterns of students’ achievement differed. Although Participant A1 indicated that majority of the passes were in the “B” (which is 70%-80%), Participant A3 reported majority of the passes in the C and D (which is 40% - 79%). The differences in the reporting seemed discrepant, but I managed the differences by aligning the responses to research question 1 which address disparities in students’ achievement across the years. Participant A1 generalized their BECE report three years before 2017, but Participant A3 detailed the BECE performance of students for 2017, 2018 and 2019.

Table 7 shows the summary of themes, coded responses and categories derived from the administrator interview data related to research question 1.

Table 7

Summary of Themes, Coded Responses, and Categories -Research Question 1: Administrators.

Research Question 1: How do teachers and administrators perceive the use of the Universal Basic Education (UBE) program as they impact the achievement gap in basic science in the ninth grade?		
Themes	Coded responses	Categories
Practicing and using program technology, kits, and resource professionals to enhance learning	Supplied technology kits Supplied program kits (approved textbooks, resource professionals, charts, and real objects) and Proper placement of teachers	Program resources supply practices
Improving professionals with professional trainings and increasing students' achievement in the sciences	Enhanced professional training Advising teachers to use program tools Engaging teachers in training practices	Professional advancement practices
Monitoring teaching and assessment practices to determine science achievement	Monitor lesson plans around program schemes Monitor science subjects in the schedule Monitor assessments	Scheme of work and lesson plan monitoring practices
Evaluating the teaching and grading practices to increase basic science achievement outcome	Checking learning standards Evaluate lesson plan with scheme and students performance Evaluating science performances with grading categories and grading scales Categories and scales combined. Scale A is a distinction; scale B is upper credit, scale C is lower credit, Scale D is pass, scale F is fail.	Program evaluation practices
The evaluation of students' basic science achievement and outcome with BECE	Achievement outcome / BECE Average scores across 2017 – 2019 Fair outcome and positive impact More pass and fewer failures	Basic science achievement outcome/BECE

The results show that that the administrators perceived that the practice and use of program technology, kits, and resource professionals enhanced learning and that the improvement of professionals with professional trainings increased students' achievement in the sciences. The participants perceived that the monitoring teaching and assessment practices helped improve students' science achievement. Also, the participants perceived that the evaluation of teaching and grading practices increased basic science achievement outcomes and the BECE.

The administrators' responses alongside the themes mentioned above addressed research question 1 and described how the program practices as well as grading process and standards influenced the ninth grade students' basic science achievements. The administrators described how grading styles used in assessing students' internal and external examinations combined to improve students' overall scores. The internal examinations refer to the weekly quiz, science projects and end of term tests, while the external examinations refer to the ninth grade students exit examinations called the Basic Education Certificate Examination (BECE). The administrators perceived that the program practices influenced the ninth grade students' basic science achievement but did not describe how the program practices impacted the gaps in basic science achievement. However, achievement disparities discovered from the discrepant report of the BECE by Participants A1 and A3 could align to research question 1 because the reports exposed the gaps in achievement across the years. The administrators did not present any published science scores of students in basic science over the years they reported due to lack of data. More studies are required to explore the published science scores of students across the years including administrators' perspectives of the program and bridging the achievement gap.

Basic Science Teachers

The results of responses of the eight basic science teachers to research question 1 are organized alongside the following themes:

- practicing and using program technology, kits, and available resource to influence science learning and achievement

- using regular professional training of the teachers and their experiences to influence science learning and achievement
- increasing the students' understanding of science concepts using the basic science curriculum and scheme of work
- adopting lesson plan aligned with program curriculum to reduce achievement disparities
- teaching and engaging students using effective teaching styles to increase science interest and achievement
- assessing science achievement with various grading practices
- reviewing more UBE program challenges to basic science achievement

Practicing and Using Program Technology, Kits, and Available Resource to Influence Science Learning and Achievement. The teachers were asked how they perceived the use of UBE program as they impact the achievement gap in basic science The basic science teachers used several aspects of the UBE program resources. Participant B1 used markers, board, reading books, textbooks, computers, practical books, and laboratory equipment. Participant B2 added that the program tool application bridged achievement gap because it helped the students to cope in their senior science classes. Participant B3 used textbooks, curriculum, and scheme of work. Participant B5 used computer, textbooks, and generator. Participant B5 believed that computer technology bridged the achievement gap because it introduced new skills to the students. Participant B6 used textbooks, pens, pencils, and exercise books which they believed impacted achievement gap because the use of resources increased the knowledge of students in science. Other program resources used were supplemental program textbooks, and teaching aids, workshop training, student allotted textbooks, and seminars. Participant B7 indicated professional training and workshops guided the teachers on the proper use of the program resources. Participant B8 added that the use of UBE program resources impacted the achievement gap because it improved the basic science learning and helped the students to understand the teacher. Hence the teachers included training, and capacity building workshops and professional training as program practices guiding the employees on how to use the program resources to impart knowledge to the students. The teachers described the several program tools they used to impart science knowledge to the students. The participants' perceptions of how the program impacted achievement gaps only referred to increased knowledge and science skills improvement but did answer how the use of the program tools impacted achievement gap in the ninth grade basic science. It was expected that the teachers' perception of the proper use of tools to impart science knowledge would connect to how they were used to bridge achievement gap in basic science among ninth grade students.

Using regular Professional Training of the Teachers and Their Experiences to Influence Science Learning and Achievement. I asked the teachers to tell me more about how the program is impacting science achievement gaps. Participant B7 indicated that the professional training and workshops practices were factors that increased basic science achievement because knowledge gained from the training helped teachers to understand better ways for using the program resources to help students meet expectations in science. Participant B7 stated:

> I have been exposed to both theoretical and practical aspect of basic science, even when I was in the University, and the UBE workshops, like I said earlier on, we go on workshop, you know, almost every year, the selected teachers go there, and we meet professionals in the field and who brush them and tell them to use new ideas to handle the students and impart knowledge to the students…. I go on workshops and then we have new ideas and knowledge from different professionals in teaching the subject… when you're teaching; is something I have learnt in that workshop. I still use it and is helping me.

Participant B6 added that their UBE training and orientation increased the teachers' experiences in adopting basic science teaching approaches. Participant B7 indicated professional training via workshops but Participant B6 indicated professional training via orientation. Although Participants B7 and B6 described professional training differently, the teachers' perception of professional training is germane because their perceptions described how the professional advancement of teachers improve teachers' skills used to increase students' knowledge of science and achievement. Although the teachers' perspectives of professional advancement were connected to the improvement of teachers and students, the participants did not explain how professional advancement impacted the achievement gap in basic science in the ninth grade. This creates an opportunity for more studies on other forms of professional trainings or workshops which focus on program practices that impact basic science achievement gaps in the school.

Increasing the Students' Understanding of Science Concepts Using the Basic Science Curriculum and Scheme of Work. I asked the teachers to tell me more about the influence of using the UBE program to teach basic science in their classes. The basic science teachers indicated that adapting to the curriculum while teaching the students helped them cover the scheme around science concepts which students are expected to understand. Participant B3 believed that students improved in science when teachers taught students with the program curriculum. Participant B5 stated:

> At least the students going through what the teacher taught them will make them to understand what the teacher teach them from the scheme of work…the scheme of work both the WAEC and other, the teacher use the WAEC syllabus and other scheme to teach the students. You know you cannot know what you did not read, you only know what you read and what you're taught so that is it. So, I think, I like the teacher that taught the students to set an exam for them; it will go a long way to improve achievement in basic science.

Participant B3 practiced and used the program curriculum, but Participant B5 indicated they used scheme of work and WAEC syllabus to adopt the program curriculum. Although Participants B3 and B5 differed in their curriculum adaptation practices the teachers perceived that adopting the program curriculum supported students' achievement in basic science. Though the teachers perceived that while adopting the program curriculum supported students' achievement in basic science, it was difficult to determine the impact of the curriculum adaptation practices on basic science achievement gaps because the teachers were not willing to further describe how each of the several curriculum or schemes used impacted the achievement gaps in basic science. There is need for more studies on the impact of each scheme on students' achievement gaps in science.

Adopting Lesson Plan Aligned with Program Curriculum to Reduce Achievement Disparities. The teachers described how they used the middle school examination (WAEC or BECE) syllabus alongside the program curriculum to prepare students for ninth grade basic science exit examination. Weekly lesson plans were adopted around the program schemes to ensure alignment of lesson content and examination content. Participant B5 indicated that achievement disparities occurred when the lesson contents and examination contents were not guided by the program schemes. However, Participant B3 indicated that adaptation of program curriculum in the science lessons supported students science achievements. The teachers agreed that weekly alignment of the lesson plans with the program's curriculum prepared the students for higher science achievement. Hence, lesson adaptation practices teachers addressed research question 1 because the teachers perceived that the adaptation practices supported science achievement, but the participants did not describe how lesson plan adaptation practices bridged achievement gaps in the ninth grade.

Teaching and Engaging Students Using Effective Teaching Styles to Increase science Interest and Achievement. I asked the teachers what they thought about using the UBE program resources to teach basic science. The teachers described several teaching styles learned from college and enhanced by the program which they used in teaching students. The student engagement and teaching practices included engaging students in learning with the computer, advancing student-centered learning, and using experimental method of teaching. Participant B6 engaged the students with explanation, demonstration, questioning and science writing projects. Participant B7 applied practical and theoretical teaching practices and used concrete examples to support students in science learning. Other teaching practices were illustration, and demonstration. Participant B8 stated:

> To support the students, meet proficiency in basic science is I use…explanation, experimentation, the use of marker…doing practical for them to make sure that the students understand what I teach them. I use demonstration, explanation, questioning and answering.

The teachers perceived that engaging students with different teaching styles was relevant to improving students' scientific knowledge to reduce gap in science achievement. I probed the participants further and asked if there were other implementation concerns such as basic science achievement concerns, but they described their engagement practices and how they improve students. Hence, it was difficult to determine how they perceived their engagement practices impacted basic science achievement gaps.

Assessing Science Achievement with Various Grading Practices. I asked the teachers how the grading process and grading standards influenced the achievement of their students. The teachers described grading and assessment practices such as grading categories, alphanumeric grading scales, internal assessment (e.g., weekly class quiz), including internal assessment on science practicals (science projects), all of which influenced basic science achievement of students. Participant B4 agreed that combining the class assignment and examination grades of students increased their basic science performances. Participant B4 stated,

> When I grade them, according to national grading standard through the knowledge I acquired… It improves the student's standard. The grade strategy which helped the students to pass were the in-course and examination assessments. It influences the students positively because, augmenting the in-course and the examinations at least even when the student does not perform very well in the examination, augmenting the in-course will help to pass the student.

Participant B7 stated,

> So, the students have a better chance of passing, unlike the other one and is helping the students to excel because the other one is three; once you don't get Alpha and Credit, the next one is a fail. So, this one, if you don't get A, and you don't get B, and you base on C before you go to D and F.

Participant B8 indicated the grading scales for distinction, upper credit, lower credit, pass and fail (A, B, C, D, and F) were used across three years, and some students got C, D, and others B. Participant B8 indicated that it was difficult for students to fail. Participant B8 stated, "At times somebody may have poor passes in the assignment or the test; then in exams if the person gets 20 out of 70, the person will still pass." The teachers perceived that grading and assessment were practices that influenced students' science achievement positively because the weekly test scores and examination scores were combined to improve the students' performances in science. However, the teachers did not indicate score comparisons within the grading and assessment which could have explained achievement gaps in basic science among the ninth grade students of the school.

Reviewing More UBE Program Challenges to Basic Science Achievement. I asked the teachers about their views on the barriers that hinder the basic science achievement of their students. The basic science teachers described the perceived challenges in achieving basic science success. The teachers described factors which enhanced higher achievement. Participant B6 said the UBE orientation increased his skill for teaching science. Participant B7 added that professional training which the UBE offered increased his capacity for teaching science. The teachers perceived that professional training, and the use of available program resources were positive factors in higher science achievement.

Conversely, the teachers described other factors which lowered achievement. The teachers perceived that inadequate human and material resources lowered science achievement. Participant B1 perceived the difficulty as “the ability of the students to understand the instruments, or the materials used in teaching them, and the ability to handle the science equipment.” Participant B3 blamed scarcity of program resources on lower science achievement; Participant B4 attributed poor performance to lack of resources and equipment. Participant B6 said scarcity of computers was a negative factor. Participant B7 opined that lack of program resources was the cause of lower achievement outcome. The teachers’ perceptions of the influence of the program practices which lowered or increased basic science achievement should have been concretized with gaps in achievements using the science scores to compare higher achievement with lower science achievement. The teachers assumed their perspectives of barriers hindering basic science achievement addressed the achievement gap issue, which research question 1 was seeking, but more studies are required to explore factors hindering basic science achievement. These studies should focus on gaps in achievement using science scores to compare lower achievement and higher achievement.

Table 8 shows the summary of themes, coded responses, and categories derived from the basic science teacher interview data related to research question 1.

Table 8

Summary of Themes, Coded Responses and Categories Research Question 1: Teachers

Research Question 1: How do teachers and administrators perceive the use of the Universal Basic Education (UBE) program as they impact the achievement gap in basic science in the ninth grade?		
Themes	Coded responses	Categories
Practicing and using program technology, kits, and available resource to influence science learning and achievement	Used technology kits used program kits (approved textbooks, resource professionals, charts, and real objects) and computers	Program tools application practices
Using regular professional training of the teachers and their experiences to influence science learning and achievement	Participated in professional training programs, workshops and seminars	Professional advancement practices
Increasing the students' understanding of science concepts using the basic science curriculum and scheme of work	Used science curriculum, program's scheme of work, and WAEC syllabus	Program curriculum adaptation practices
Adopting lesson plan aligned with program curriculum to reduce achievement disparities	Lesson plan usage Program curriculum Align lesson with examination content	Lesson plan adoption practices
Teaching and engaging students using effective teaching styles to increase science interest and achievement.	Learned skills, Effective and engaging teaching styles (applied, experimental, illustrations, demonstration and practical teaching	Student engagement teaching practices
Assessing science achievement with various grading practices	Grading standards, grading categories, alphanumeric grading scales, class and examination assignments	Grading and assessment practices
The review of more UBE program challenges to basic science achievement	Inadequate science instruments and materials Scarcity of computer Shortage of program supplies Lack of support Achievement disparity	Perceived basic science achievement factors

The teachers perceived that the practice and use of program technology, kits, and available resources influenced science learning and achievement. The data showed that the regular professional training of the teachers and their use of experiences in basic science, influenced science learning and achievement. The teachers perceived that their use of the basic science curriculum and scheme of work increased students' understanding of science concepts. The participants perceived that they reduced achievement disparities when they adopted the lesson plan aligned with program curriculum. Also, the participants perceived that their use of effective teaching styles to engage students increased the students' interest in basic science as well as increase science achievement. The participants perceived that the assessment of science achievement with various grading practices including the review of more UBE program challenges to basic science achievement provided information for bridging the basic science achievement gaps.

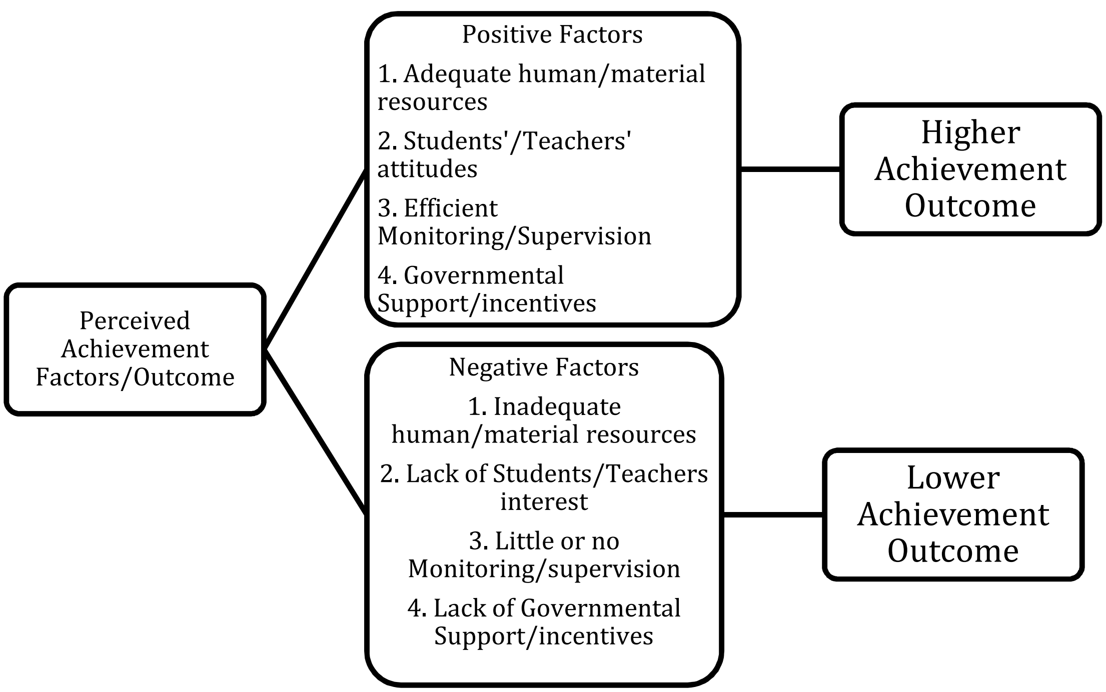
The teachers perceived that students' performances in the science subjects improved when teachers used a unified alphanumeric grading scale within a unified grading process and standards. Additionally, the data showed that assessment and grading practices helped teachers to understand the perceived program challenges and advance better grading and assessments methods to increase students' achievements in the science subjects.

The administrators and basic science teachers perceived some positive and negative achievement factors linked to themes that influenced the ninth grade students' basic science achievement. Figure 1 explain the perceived positive and negative aspects which linked to their practices and influenced students' science achievements. The perceived factors included adequate human and material resources; students' and teachers' attitudes toward the program and basic science; and efficient monitoring, supervision, governmental support, and incentives. The participants responded that these positive factors mentioned influenced higher basic science achievement and outcomes. Also, the participants perceived that negative factors such as inadequate human or material resources, lack of students or teachers' interest, lack of proper monitoring and supervision, and lack of governmental support or incentives resulted in lower basic science achievement and outcome. The perceived positive and negative basic science achievements of the administrators and teachers were relevant in explaining factors which influenced students' achievement.

Figure 1 shows the perceived basic science achievement factors explaining the perceived positive and negative aspects which linked with administrators and teachers' practices influencing students' science achievements including higher or lower achievement outcome.

Figure 1

Perceived Basic Science Achievement Factors/Outcome



The basic science teachers' responses alongside the themes mentioned above described how the program practices which they perceived influenced science achievement as well as address question 1 which asked about practices that minimized basic science achievement gaps among the ninth grade students.

The responses of the administrators and basic science teachers provided rich data which addressed research question 1 concerning program practices and experiences which influenced basic science achievement of the ninth grade students. I triangulated the responses of administrators and teachers alongside themes such as program resources supply practices, program tools application practices, professional advancement practices, and program curriculum adaptation practices, scheme of work and lesson plan monitoring practices, lesson plan adoption practices, and student engagement teaching practices. Other thematic comparisons between groups included program evaluation practices, the grading and assessment practices, the review of basic science achievement outcome/BECE, and perceived basic science achievement factors.

The program resources supply, and program tools application practices were thematic responses of administrators and teachers regarding usage of program resources which influenced science achievement of students. The administrators supplied the program resources, but the teachers used the program resources and tools supplied. Both administrators and teachers used program resources to influence students' achievement. The administrators managed and supplied program resources to teachers and students, but the teachers used the program tools in teaching the students. Participant A3 indicated that they supplied program resources such as science kits, curriculum, concrete materials, charts, real objects, field trip supplies, UBE professionals. Participant B1 said that they used markers, board, reading books, textbooks, computers, practical books, and laboratory equipment. Participant B3 used textbooks, curriculum, and scheme of work. Participant B5 used computer, textbooks, and generator. Participant B6 used textbooks, pens, pencils, and exercise books. Participant B7 indicated that professional training and workshops guided the teachers on the proper use of the program resources. The administrators indicated that they supplied all the available program resources, but the teachers indicated that the supplies of program resources were inadequate. Although the administrators' and teachers 'responses about program use and practices differed, both groups perceived that program resources influenced science achievement which addressed research question 1.

The responses of administrators and teachers regarding professional advancement differed in practices but agreed on the influence of professional advancement of science achievement. The administrators planned the professional trainings and workshops, but the teachers attended and participated in the workshops. Both administrators and teachers agreed that professional training and workshops improved the teachers' skills for teaching basic science. Participant A3 said the administrators supplied UBE professionals for the professional training as well as advice teachers. Participant B7 indicated professional training and workshops guided the teachers on the proper use of the program resources.

Regarding the program curriculum adaptation practices, the administrators supervised the use of scheme of work and lesson plan, but the teachers used the scheme of work and lesson plan. Participant A3 checked weekly schedule to ensure basic learning. Participant B3 adopted program curriculum, but Participant B5 indicated that they used scheme of work and WAEC syllabus to adopt the program curriculum.

The administrators perceived that scheme of work and lesson plan monitoring practices influenced science learning, but the teachers perceived that lesson plan adoption practices including the use of WAEC syllabus influenced science achievement. Both administrators and teachers perceived that program curriculum improved science learning.

Although the teachers perceived that student engagement and teaching were direct, administrators indicated an indirect engagement of students through their teachers. Participant B8 said teachers directly engaged students with different teaching styles, but Participant A3 said the administrators provided UBE professionals to teach students and teachers.

The program evaluation description of administrators extended beyond one class, but the grading and assessment description of each teacher focused on one class. Both administrators and teachers perceived that the combination of the weekly and the examination test scores of students increased the students’ scores in basic science.

The grading and assessment practices of teachers involved combing weekly and examination science scores to improve science achievement. Participant B8 indicated that scores were combined such to make it hard for students to fail but Participant A2 indicated that administrators assess teachers lesson plans every to ensure standards. Both administrators and teachers perceive that grading and assessment address research question 1 to minimize achievement gap.

The administrators' review of basic science achievement outcome/BECE indicated disparities in achievement outcome. Participant A1 indicated that majority of the passes were in the B but Participant A3 reported achievement with majority of passes in the Cand D range. The administrators reviewed the achievement per year, but the teachers assess the weekly and termly achievement outcome of students. Both weekly and end of term examination scores are connected to the BECE because Participant A3 indicated that weekly and end of term examination scores constitute 40% of the BECE score, while the remaining 60% is the BECE score.

The teachers perceived that some basic science achievement factors had positive or negative influence on students' achievement. Although Participant B6, and B7 perceived that professional advancement was a positive factor that influenced achievement, Participants B1, B3, B4 and B6 indicated that scarcity of program resources were negative factors which caused lower achievement outcome. However, administrators indicated that they provided available program resources. Participant A3 indicated that program resources were provided from the science kits available in the school but Participant A2 indicated that shortage of program resources challenged teachers from managing large class size of science learners. Both administrators and teachers perceived that scarcity of program resources has negative impact on science learning.

The common perception is that both administrators and teachers perceived that program practices and resources influenced science learning. The administrators perceived the supply of the program resources and professional influenced science achievement, but the teachers perceived that the use of the program resources and available science kits influenced students' achievement. The administrators and teachers described the program resources supply practices, professional advancement practices, scheme of work and lesson plan monitoring practices, program evaluation practices, program tools application practices, professional advancement practices, program curriculum adaptation practices, lesson plan adoption practices, student engagement teaching practices, and the grading and assessment practices, all of which enriched the study regarding the program practices and experiences of administrators and teachers and their influences on the ninth grade students' basic science achievement.

Discrepant Data

One of the discrepancies found in the administrators' responses was the report of the basic science achievement outcome of the students. Participant A1 indicated that the majority of the passes were "B" (which is 70%-80%), Participant A3 reported that majority of the passes were C and D (which is 40% - 79%). The differences in the reporting seemed discrepant. Both responses were to address research question 1 which asked about practices which influenced basic science achievement. I assumed that the disparities in the participants' reports of basic science achievement outcome aligned with research question 1, which sought data about achievement gaps and basic science achievement disparities.

The response of Participant B8 regarding combining weekly scores and examination scores to make it difficult for the students to fail seemed discrepant. I managed this discrepancy by discussing the combination of weekly scores and examination scores within the context of grading practices used in evaluating students' improvement in science knowledge which addressed question 1. The teachers perceived that their grading practices and experience influenced ninth grade students' basic science achievement.

Research Question 2: Program Strategies and Supports

I organized the results of the study using research question 2 and themes which described the program strategies the administrators and teachers used in helping students meet expectations in basic science.

Administrators

The following themes were used to describe the result of the study provided by the administrators.

- demonstrated expertise with supporting teachers and students with program resources
- encouraging and supporting teachers and students with program resources
- regular monitoring and assessment of teaching and learning basic science
- improving science teaching and learning by advancing professional training opportunities
- improving science learning with positive work environment, inclusion and adequate program resources supply

Demonstrated Expertise with Supporting Teachers and Students with Program Resources. I asked the administrators about the strategies they and their teachers used to support students in meeting expectations in basic science and MDG. The administrators described their expertise and how they combine their expertise with their management skills to strategize professional improvement and students' improvement in basic science. Participant A3 stated:

> I am very, very familiar with the materials because I am an insider and I provide every student in the school with the required textbooks. Since the year I started …we use the assessment record, if we assess them internally, they have 40% and in the junior WAEC they are assessed on 60%. When you add them together, everyone succeeds because it affects every child.

Participant A3, used knowledge and skills to support achievement in schools by advising teachers and encouraging students as well as training and assigning teachers to classes and equipping both teachers and students with resources which the teachers and students used in science learning. Participant A1 indicated the involvement of UBE professionals, and the timely supply of available program resources as part of the skill applications used to support learning. Participant A2 agreed that using the available program resources was a promising strategy. Although Participant A3 indicated familiarity with supply of program and assessment of progress, Participant A1 indicated with familiarity with timely supply of program materials. The experiences of the administrators in the supply of program resources were similar. Both administrators perceived that their leadership skills and experiences for supplying program resources and supporting teachers and students would reduce achievement gaps by increasing and improving teachers' and students' interest in the sciences. The administrators did not mention how the strategies they used helped the students in meeting expectations in the MDG and basic science.

Encouraging and Supporting Teachers and Students with Program Resources. Another strategy which the administrators said they used to support students in meeting expectations in the basic science and the MDG included mentoring and resources supply strategies. The administrators described their mentoring support strategies with advising, training and encouraging teachers and students to handle the program resources in a manner that increases students' achievement in the sciences. Participant A2 stated:

> It has somewhere provided students with some little morale of how to do some certain little things that have to do with science. Because of that of the study...the students bring out their intellectual capability of how the student is learning to show the people that this is what they have been learning.

Participant A3 described resources support strategies with supplying all available program resources including inviting professionals to support teachers and students in science teaching and learning. Program support resources included charts, real objects, the supply of UBE professionals, and field trips. The mentoring strategy used by Participant A2 focused on increasing the morale of students to embrace science learning, but Participant A3 focused on mentoring strategies that support both teachers and students in science learning. Both administrators indicated that mentoring and resource supply supported students to meet expectations in science learning. The administrators did not mention mentoring and resources supply strategies for supporting students in meeting the MDG in basic science. The participants assumed that students met the MDG when they met expectations in basic science. Also, the administrators did say what success indicators they used in reading the progress.

Regular Monitoring and Assessment of Teaching and Learning Basic Science. I asked the administrators whether they thought the program is supporting basic science achievement in their school. The administrators described their planning and monitoring strategies with planning workshops for teachers and assessing the teachers' lesson plan weekly to ensure alignment with the program curriculum as well as ensure the basic science subject appears three times in the timetable to which the teacher adheres. The administrators assessed the students to monitor science achievement progress. Participant A2 stated:

> We grade teachers how they were able to deliver their lessons to the students, in other words, the teachers in the basic program, write his or her lesson note, weekly and bring out what is expected of her or she to deliver to the children, so at end of the week for instance they assemble their lesson note and their scheme of work to know how far they have been able to deliver basic topic that are required of them for the week, that is how we grade them and to know how far they have been able to go with it. Then on the side of the students, through their assessment, weekly assessment, we are able to know which side he is doing well, which particular side he is doing poor, then we check the records of that and instruct the teacher.

The side to which Participant A2 is referring includes the practical or theoretical aspect of science as well as the weekly or examination tests and assessments.

Participant A3 ensured

> The science subject appears 3 times in the timetable and teachers adhere to it. Assessment is done twice in a term before the last assessment which is the examination… I supply all the materials and invite professionals to handle the students in basic science subjects especially the JSS3 students who are preparing for their final examination

Participant A2 based their monitoring strategy on supervising lesson plan, but Participant A3 monitored weekly science learning and weekly test and end of term exam schedules. The administrators perceived that planning and monitoring science teaching and learning as well as planning and monitoring teachers' science lesson delivery is germane to supporting ninth grade students in meeting expectations in basic science and MDG. It was difficult to understand their perceptions of meeting MDG or basic science expectations because they assumed both were the same. Further studies should explore the connection between the MDG and basic science achievement including supervision strategies.

Improving Science Teaching and Learning by Advancing Professional Training Opportunities. Another program support strategy which the administrators believed supported students in meeting expectations in basic science were the professional development and skill enhancement. The administrators described the professional development and skill enhancement strategies with their attending program workshops, seminars, and conferences to improve on skills for providing all available resources to improve teachers. Additionally, the administrators affirmed that participation of teachers in the available professional trainings improved their skill development in teaching science subjects. Participant A1 indicated that supporting the program with qualified UBE professionals who understand the program's scheme of work will improve teaching and learning and advance the ninth grade students to higher science achievement. Participant A3 indicated the involvement of program specialists in the professional training of teachers. Administrators perceived that professional development and skill enhancements are relevant to bridging science achievement disparities among ninth grade students because professional development and skill enhancement improved teachers' teaching skills for leading science learning activities of ninth grade students. However, it was difficult to understand which professional advancement strategies supported students in meeting either basic science or MDG expectations. It is important to separate the professional advancement and skill enhancement strategies for MDG from the strategies which helped students in meeting expectations in basic science. This area should be subject to further studies.

Improving Science Learning with Positive Work Environment, Inclusion and Adequate Program Resources Supply. I asked the administrators about other concerns or recommendations regarding the use of the program to enhance students' basic science achievement. The administrators explained the creative ways they have supported teachers and students to achieve higher success in basic science. The administrators suggested strategies for improving science teaching and learning including the improvement of teachers' welfare and incentives, and adequate supply of program resources and equipment. Participant A2 suggested grading students according to their levels and orientations by considering grading flexibilities for students in the rural areas. Participant A2 stated:

> I think students in the rural areas should be based over 50 or 70 so that when the time the students in the rural areas can score 50 0ver 70, the person will have the courage to do more.

Participant A2 believed their program initiatives including the consideration of grade flexibility for students in the rural areas would improve the science achievement of the students in the rural areas. Participant A3 advanced other program initiatives such as the involvement of a basic science specialist, adequate laboratory, government support to schools, parental awareness in supporting children to learn sciences, incentives to teachers, and basic science specialists. Although Participant A2 suggested the lowering score limits for students in the rural areas to support students meet expectations in basic science, Participant A3 indicated that the involvement of basic science specialist and provision of adequate program materials would support students to meet expectations in basic science. The response of Participants A2 regarding the lowering score limit to help students meet expectation was considered discrepant data which I managed in the in discrepant data section. Recommendations for strategies which support students in meeting the MDG are required in addition to the strategies for meeting expectations in basic science. Further, studies should explore administrators recommendations for strategies which support students meet MDG apart from strategies for meeting basic science achievement expectations.

Table 9 shows the summary of themes coded responses and categories derived from administrator interview data related to Research Question 2.

Table 9

Summary of Themes, Coded Responses and Categories-Research Question 2: Administrators

Research Question 2: What strategies are teachers and administrators using to support students meet proficiency in basic science while meeting the Millennium Development Goal in basic science?		
Themes	Coded responses	Categories
Demonstrated expertise with supporting teachers and students with program resources	Experienced and familiar with the teaching and assessment resources	Knowledge and skill application strategies
Encouraging and supporting teachers and students with program resources	Advising teachers and providing students with concrete materials such as chart, real objects, UBE professionals and field trips. Students were supported with human and material resources and basic science field trips.	Mentoring and resources support strategies
Regular monitoring and assessment of teaching and learning basic science	Basic science appears 3 times in the weekly timetable. Assessment is done 2 times before the exam in a term. Assessment with internal and external exams.	Planning and monitoring **strategies**
Improving science teaching and learning by advancing professional training opportunities	Attending program workshops, seminars, conferences Involving teachers in professional trainings	Professional development and skill enhancement strategies
Improving science learning with positive work environment, inclusion and adequate program resources supply	Improving the teachers' welfare, Grading flexibility was suggested for rural schools. Involvement of basic science specialist, good laboratory, government support, parental awareness and incentives to basic science specialists.	Program initiative strategies

The administrators perceived that the strategies described were effective strategies that improved teachers' instructional approaches, which in turn advanced the ninth grade students to higher science achievement. The administrators' perceived that students' science achievement increased when administrators demonstrated expertise and used skills to mentor teachers and students. Also, the participants perceived that their encouragement and support of teachers and students with program resources including their regular monitoring and assessment of teaching and learning basic science, improved science teaching and learning. The data showed that the advancement of professional training opportunities improved science learning with positive work environment.

Basic Science Teachers

The teachers described their perceptions of the program strategies they used in supporting students to meet expectations in basic science alongside the following themes:

- supporting students with program resources and professional skills
- teaching and assessing students with effective teaching and grading styles
- increasing achievement in science by engaging students with assessments using the scheme of work, program tools and skills
- increasing science achievement by combining class assessment and examination test scores
- adopting the program's curriculum to improve science achievement and increase interest in the sciences

Supporting Students with Program Resources and Professional Skills. I asked the basic science teachers what strategies they used to support students in meeting the

MDG expectations in basic science. The teachers said they supported students with professional skills and experiences gained from their college degrees and professional training. Participant B2 stated:

> In terms of teaching like I know when I was in college of education, and I was doing my teaching practice, I did a lot, and I felt I was in the right track, but when I was in the University studying then I learned a lot of strategies to be used in the teaching of the students.

Participant B1 supported: “I became a science teacher because I studied sciences. In the school I am teaching, I am a staff there; a basic science staff, and I teach basic science.”

The teachers supported the students’ combining knowledge of sciences with diverse teaching strategies including Heuristic method, illustration, explanation, demonstration, questioning, explanation, practical, and theoretical teaching approaches. Other teaching styles included experimentation and applied teaching styles gained from professional conferences and workshops.

The teachers perceived that knowledge and applied skills helped students to meet science expectations because this strategy involved the use of diverse teaching skills which increased students’ knowledge of science concepts. The students’ understanding of science concepts is relevant to reducing the achievement gap in basic science. However, the teachers did not provide information regarding the skill and application strategies for the MDG and how the students are meeting the MDG expectations.

Teaching and Assessing Students with Effective Teaching and Grading Styles. I asked teachers to tell me more about using the program to teach and assess students in the basic science class. Participant B1 indicated that their teaching and assessment experiences enhanced their teaching methods. Participant B2 stated, “Doing my teaching practice, I did a lot, and I felt I was in the right track, but when I was in the University studying, then I learned a lot of strategies to be used in the teaching of the students.” Participant B3 indicated that their methodology of teaching including demonstration, explanation, and reinforcement, illustration, encouragement, appreciation, award, reinforcement, and appreciation. Participant B4 indicated that the professional training and workshop offered in the program enhanced their experience and methods of assessing the students with grading categories and alphanumeric grading scales of A, B, C, D, and F alongside the program’s grading standards. Participant B4 stated:

> When I grade them, according to national grading standard through the knowledge I acquired…. It improves the student’s standard. The grade strategy which helped the students to pass were the in-course and examination assessments. It influences the students positively because, augmenting the in-course and the examinations at least even when the student does not perform very well in the examination, augmenting the in-course will help to pass the student.

The teachers perceived that teaching method and assessment strategies helped students meet expectations in basic science because the teachers experienced improvement in the students’ science grades when they combined students’ class and examination test scores to meet the national science grading standards. The teaching and grading strategies which meet the national science standards are relevant for reducing the basic science achievement disparities among the ninth grade students. The teachers' connection of MDG and workshops described a culture of ongoing training and improvement of teachers who support students to meet global goals in basic science. The teachers perceived that constant training and workshop as well as applying them in teaching students were strategies which helped students in meeting MDG in basic science.

Increasing Achievement in Science by Engaging Students with Assessments Using the Scheme of Work, Program Tools and Skills. Participants B7, and B8 noted that the program tools including schemes of work, and grading scales as well as program practices like weekly class assignments, take-home assignment, in-course, and end-of-term examinations, accelerated students' achievement in basic science. The teachers engaged and supported the students in meeting the MDG in science with teaching strategies, including experimentation method, practical teaching, illustration, encouragement, appreciation, award and reinforcement, science project competitions. The teachers affirmed that the UBE program resources were used properly when supported with professional training and workshops. Participant B6 stated:

> In the MDG program, teachers are called upon to come for the workshop, when the teachers went for the workshop, they provide them with textbooks. After teaching them in the workshop, when the teacher returned to the school, they use the method to teach the students.

The teachers perceived that supporting students with program tools, as well as teaching them with diverse teaching styles, helped students in meeting the MDG and science achievement expectations because teachers experienced that students' knowledge of science increased when students were taught with effective teaching styles using the program tools.

Increasing Science Achievement by Combining Class Assessment and Examination Test Scores. The basic science teachers enumerated the assessment and grading strategies, including internal assessment on science practicals; class assignment and take-home assignments; numerical/alphanumeric grading; and the in-course and examination assessments, which were used to improve students' as well as to increase their interest in basic science. Participant B4 stated:

> When I grade them, according to national grading standard through the knowledge I acquired…. It improves the student's standard. The grade strategy which helped the students to pass were the in-course and examination assessments. It influences the students positively because, augmenting the in-course and the examinations at least even when the student does not perform very well in the examination, augmenting the in-course will help to pass the student.

Participant B2 agreed that assessment and grading strategies such as internal assessment (weekly quiz), and assessment on science practical (science project); class assignment and take-home assignment, in-course and examination assessments, and combining in-class and examination test results, accelerated students' success in basic science.

Participants B2, and B4 shared grading and assessment strategies which seem to look different but the weekly assessment and assessment of science projects which participant B2 shared, are embedded in the national standard which participant B4 indicated. The teachers did not mention the connection between grading and assessment strategies to the MDG. The grading and assessment strategies for the MDG in science were missing, but the teachers assumed that meeting basic science expectations is the same as meeting the MDG in basic science.

Adopting the Program's Curriculum to Improve Science Achievement and Increase Interest in the Sciences. The basic science teachers adopted the program's curriculum because it supported students' success in the basic science. Participant B1 indicated the practical nature of the program made the science learning easier for students' understanding. Participant B1 stated: "The UBE program impacts the achievement gap in the ninth grade because of the compulsory basic education curriculum that involve teaching of computer to the pupils.' Participant B2 agreed the proper use of the program's curriculum with other program resources, enhanced the positive nature and practical aspects of the program. The teachers agreed that professional training resources and the availability of the learning resources made science teaching easier and increased the students' comprehension of the science contents. Participant B8 noted the rationale for adopting the program's curriculum was because the program resources helped students to improve their level of scientific understanding. Participant B1 suggested program resources needed to support their continuing adoption of the program curriculum.

Table 10 shows the summary of themes, coded responses and categories derived from the teacher interview data related to Research Question 2.

Table 10

Summary of Themes, Coded Responses, and Categories-Research Question 2: Teachers

Research Question 2: What strategies are teachers and administrators using to support students meet proficiency in basic science while meeting the Millennium Development Goal in basic science		
Themes	Coded responses	Categories
Supporting students with program resources and professional skills	Support via professional skills and experience and degrees Skill applications: Heuristic method, illustration, explanation, demonstration, questioning, explanation, practical, and theoretical teaching	Profession and skill application strategies
Teaching and assessing students with effective teaching and grading styles to improve achievement	Teaching styles: illustration, encouragement, appreciation, award and reinforcement Assessment Styles: grading categories and alphanumeric grading scales of ABCD and F; combining class and examination assessment scores	The teachers' teaching method and assessment strategies
Increasing achievement in science by engaging students with assessments using the scheme of work, program tools and skills	Program tools: schemes of work, grading tool kits, workshops, and textbooks Engagement strategies: experimentation, practical teaching, illustration, encouragement, appreciation, award and reinforcement, science project competitions and assessments	Program tools support and student engagement strategies
Increasing science achievement by combining class assessment and examination test scores	Assessment strategies: Internal assessment, and assessment on science practical, class assignment and take-home assignment in-course and examination assessments, combining in-class and examination test results	The assessment and grading strategies
Adopting the program's curriculum to improve science achievement and increase interest in the sciences	Practical and positive nature of the program supported the curriculum adoption. Availability and handy program resources that improve students Teachers' suggestions for more program resources	Program's curriculum adoption and teaching initiative strategies

The basic science teachers' responses provided data which addressed research question 2 and described the program support strategies used in helping the ninth grade students in meeting basic science achievement standards. The teachers perceived that the support of students with program resources and professional skills, teaching, and assessing students with effective teaching and grading styles increased achievement in science. The participants perceived that their engagement of students with assessments which aligned with the scheme of work, program tools and skills increased science achievement. The data showed that achievement increased when the participants combined students' class assessment and examination test scores. Also, the teachers perceived that their adoption of the program's curriculum improved science achievement and increased students' interest in the sciences. Participant BI perceived the program curriculum minimized achievement gaps. Participant B2 supported the view that the program enhanced the practical nature of the science learning. Participant B8 agreed that the program curriculum helped students improve their knowledge of science.

The administrators and basic science teachers addressed research question 2 by describing the strategies they were using to support students to meet expectations in basic science and MDG. The administrators' and teachers' descriptions of their perceptions regarding the strategies they used to support students in meeting expectations in basic science, and MDG provided rich data for the study regarding the strategies for reducing basic achievement disparities among the 9 grade students in the schools.

The administrators and basic science teachers described the strategies they used in helping students to meet expectations in basic science and MDG. The thematic similarities and differences concerning the administrators' and teachers' perceptions of program strategies used in helping students meet expectations in basic science and MDG are described alongside themes such as knowledge, professional and skill application strategies, professional development and skill enhancement strategies, mentoring and resources support strategies, planning and monitoring strategies, program initiative strategies, teaching method and assessment strategies; program tools support and student engagement strategies, and the assessment and grading strategies.

The use of applied knowledge, profession and skill as strategies which supported students in meeting basic science expectations were described by administrators and teachers in similar of different ways. Both administrators and teachers perceived their knowledge and skill applications supported the students in meeting meet expectations in basic science. However. There were differences in the administrators' and teachers' application strategies. The administrators used their experiences with their supply strategies, but the teachers used their experiences with the tools supplied to teach the students. The administrators' and teachers' perceptions regarding the knowledge and skill application strategies were similar in their expertise and skill usage to support students but differed in practice. The administrators described how they used their expertise to support teachers and students, while the teachers described how they used their expertise to support students.

Regarding professional development and skill enhancement strategies, administrators responded in similar and different ways. The administrators perceived that professional and skill enhancement equipped teachers to support the students meet expectations in science, but the teachers perceived those professional skills were to support students meet expectations; hence, there is theme agreement here.

Regarding mentoring and resources support strategies administrators and teachers reported in similar and different ways. Participant A2 indicated that mentoring was to empower students to learn science, but Participant A3 used a mentoring approach which empowered both teachers and students. Although administrators used mentoring and program supply strategies, the teachers used teaching and strategies to support the students in meeting expectations in science.

The planning and monitoring strategies for supporting science learning differed for Participant A2 and A3. Participant A2 focused on planning and monitoring strategy of monitoring the teachers' weekly lesson plans, but Participant A3 monitored science learning and exam schedules. Although the administrators monitored science learning progress by checking the lesson plans and science learning and exam schedules, the teachers monitored students' progress by their weekly science scores. Although administrators perceived that their planning and monitoring science learning supported higher science achievement, teachers perceived that assessment of students' science learning with weekly and end of term examination were strategies that supported science achievement.

The assessment and grading strategies used by administrators and teachers were similar and different. The teachers assessed students weekly for each of the class, but the administrators assess students' achievement progress via the annual BECE reports. Both administrators and teachers use the letter grades of A, B, C, D, and F in grading students for weekly, end of term and BECE. The weekly tests and end of term of exams are connected. Participant A3 indicated that the score limit for BECE was 60%; whereas the score limits for the internal examinations was 40%. Participant A3 said that both scores were combined to support students' achievement. Participant B4 agreed that augmenting the in-course and examination scores increase students' achievement. Therefore, both administrators and teachers perceived that assessment and grading strategies helped students meet expectations in science.

Regarding program initiative strategies, both administrators and teachers perceived that program initiatives and strategies supported students in meeting expectations in basic science. The administrators described how program planning initiatives strategies supported students, but teachers described other teaching initiatives used in supporting students meet expectations in basic sciences.

The teaching methods were different for administrators and teachers within the program. Participant A2 explained the program tools to the teachers, but Participant A3 invited program professionals to support professional training of teachers. The administrators' teaching engagement focused basically on the teachers, but teachers used different teaching methods to teach the students. Participant B3 used demonstration, explanation, illustration, encouragement, and reinforcement. Both administrators and teachers perceived that teaching strategies supported science learning and helped students meet expectations in science.

The use of program kits to support and engage students were described differently for Participant B7, B8, and B6. Participant B7 and B8 described program tools used in engaging students such as scheme of work and grading but Participant B6 indicated that workshop and textbooks were program tools which they used in supporting students. Participant A3 indicated that administrators provided resource professionals to support professional training. Both administrators and teachers perceived that program tools supported the engagement of students in science learning, but they differed in the application and focus of tool supports.

Summary

Based on the themes documented, which addressed the research question 1, the administrators perceived that program practices, such as the use of program technology, kits, and resource professionals; professional trainings; monitoring of teaching and assessment practices; evaluation of teaching and grading practices; increased basic science achievement outcome all contributed to increases in student performances in the BECE. Additionally, the teachers perceived that practices such as the use of program technology, kits, and available resources influenced science learning and achievement. Other program practices which the teachers perceived influenced students' basic science achievement included regular professional training of the teachers and their use of experiences in basic science, use of the basic science curriculum and scheme of work, adoption of lesson plans which aligned with program curriculum, the engagement of students with effective teaching styles, the assessment science achievement with various grading practices, and the review of more UBE program challenges to basic science achievement. Research question 1 focused on the administrators' and teachers' perspectives regarding program practices and experiences which influence basic science achievement to minimize gaps among the ninth grade students. I compared the perspectives of administrators and teachers next to themes under research question. I discovered similarities and differences in the perceptions of administrators and teachers concerning program practices which influenced the science achievement of students.

Despite the similarities and differences in the perspectives of administrators and teachers, the participants provided data regarding program practices which integrate with the UBE program to increase science achievement and reduce achievement disparities among the ninth grade students. The disparities in the BECE reports of administrators across the years aligned with research question 1, which asked about achievement gaps in basic science in the ninth grade. However, the perceptions of administrators and teachers regarding the impact of the program practices on the achievement gaps of ninth grade students lacked documentary evidence due to lack of recent data of published science scores of ninth grade students across the schools of the state and country of Nigeria. Scholars had indicated achievement gaps in basic science for 2009, 2010, 2011, 2012, and 2013 in percentile representations of 34%, 35%, 45%, 39%, and 34% (Akani, 2016; Nwafor, 2012). The documented science scores of students for 2014, 2015, 2016, 2017, 2018, and 2019 were not accessible. Hence, the results for research question 1 were based on the interview data from the participants which described their perceptions of different program practices which raised science achievements of students, which they believed reduced achievement gaps. I compared the responses of administrators and teachers next to themes. I discovered similarities and differences in the perceptions of administrators and teachers concerning program practices which influenced the science achievement of students.

The administrators and the basic science teachers provided data which described program support strategies and resources that helped students in meeting the MDG goals in basic science. Although the administrators perceived that program support strategies helped students in meeting expectations in basic science, the teachers perceived that program support strategies helped the ninth grade students in meeting expectations in basic science. Research question 2 focused on the program support strategies which the administrators and teachers perceived helped ninth grade students meet expectations in basic science and MDG. I compared similarities and differences concerning the administrators' and teachers' perceptions of program strategies used in helping students meet expectations in basic science and MDG. I analyzed the participants' perceptions alongside themes such as knowledge, professional and skill application strategies, professional development, and skill enhancement strategies, mentoring and resources support strategies, planning and monitoring strategies, program initiative strategies, teaching method and assessment strategies, program tools support and student engagement strategies, and the assessment and grading strategies. The similarities and differences of participants' perspectives were compared in themes under research question 2. Despite the similarities and differences in the perspectives of participants, the administrators and teachers perceived that professional development, planning, monitoring, skill and tool application, teaching and student engagement, as well as assessment and grading strategies were effective strategies that improved teachers' instructional approaches which advanced the ninth grade students to higher science achievement. The administrators' perceptions indicated students' science achievement increased when administrators demonstrated expertise and used skills to mentor teachers and students, planned and monitored teaching and learning activities, and involved teachers in professional trainings. The teachers perceived that the application of their professional and program skills increased students' basic science achievement. Also, teachers perceived that their teaching and assessment styles including the combination of the class assessment and examination test results influenced the students' achievement in basic science. Additionally, teachers perceived that students' interest in basic science increased when they engaged students with effective teaching styles using the program tools. Although the administrators' and teachers' perceptions differed within the thematic analysis, the two groups of participants perceived those program strategies supported the ninth grade students in meeting expectations in basic science. The administrators and teachers provided data aligned to research question 2, which integrated with the UBE program strategies and initiatives that helped students meet expectations in basic science and MDG. Although the administrators and teachers did not identify specific strategies for the MDG the participants assumed that meeting basic science expectations is the same with meeting the MDG in basic science.

Chapter 5 includes an introduction describing the study's purpose and nature and the summary of findings. This chapter contains the interpretation of findings, the study's limitations based on trustworthiness, recommendations for further research, and implications.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this basic qualitative study was to explore the perceptions of teachers and administrators regarding their practices and experiences used in the UBE program to help ninth grade students meet the achievement standards in basic science. The exploration of the perceptions of three administrators and eight basic science teachers regarding their experiences used in the UBE program to bridge achievement gaps and their perceived strategies to support ninth grade students in meeting the MDG in basic science, as well as providing rich data for implementing future program initiatives for improving science learning and increasing science achievement of students.

I designed the study as a basic qualitative study. Merriam (2009) and Yin (2017) indicated a basic qualitative study was adaptive to the stakeholders' conditions and perceptions in a school setting and other environments. Stake (1978) confirmed that the study setting was the major focus of a basic qualitative study. The two research questions that guided this study focused on the administrators' and teachers' program practices and experiences in minimizing ninth grade students' science achievements gaps, and program support strategies they used in helping students meet expectations in basic science and MDG. Basic qualitative study experts affirmed that rich data for a basic qualitative study required a method guided by practices, settings, events, and experiences (Marshall & Rossman, 2010). The administrators described program practices that influence students' science achievements such as the practice and use of program technology, kits, and resource professionals; improvement professionals with professional trainings; monitoring teaching and assessment practices; the evaluation of teaching and grading practices; and the evaluation of students' basic science achievement and outcome with BECE. Similarly, the basic science teachers described practices that influence students' science achievements including the practice and use program technology, kits, and available resources; regular professional training of the teachers; use of basic science curriculum and scheme of work; adoption of lesson plan aligned with program curriculum; use of effective teaching styles, assessment and various grading practices; and the review of more UBE program challenges to basic science achievement. I analyzed data collected by coding chunks of responses from the administrators and basic science teachers and then aligning them with Research Questions 1 and 2.

The interview results for Research Question 1 reflect the perceptions of the administrators and basic science teachers regarding program practices and experiences which influenced the ninth grade students' basic science achievement. The results included the description of program practices such as program resources supply, professional advancement, scheme of work, lesson plan monitoring, and program evaluation practices, all of which the administrators and teachers believed influenced the basic science achievement of students. The results confirmed that administrators supplied program technology, kits, and resource professionals to enhance science learning and improve professionals with training to increase students' achievement in the sciences. The administrators monitored teaching and assessment practices to determine science achievement and evaluated the teaching and grading practices to increase basic science achievement outcomes.

Additional program practices that the teachers believed influenced students' science achievements were program tools application practices, professional advancement practices, program curriculum adaptation practices, lesson plan adoption practices, student engagement teaching practices, and the grading and assessment practices. The teachers used program technology, kits, and available resources to influence science learning and achievement. The teachers also used their regular professional training and experiences to influence science learning and achievement. The teachers used their curriculum and lesson plan adoption practices with the program's scheme of work to increase the students' understanding of science concepts. The teachers believed the alignment of lesson plan with the program's scheme of work to reduced achievement disparities. Additionally, the teachers perceived that engaging student with effective teaching styles increased students, interests in basic science. The teachers perceived that the grading and assessment practices they used increased students' science achievements.

The interview results for Research Question 2 provided data about the administrators' and basic science teachers' perceptions of program support strategies that helped the ninth grade science students in meeting expectations in basic science and MDG. The administrators and teachers perceived that some students were meeting expectations in basic science when they supported students with program support strategies, such as knowledge and skill application strategies, mentoring and resources support, planning and monitoring, professional development and skill enhancement strategies, and program initiative strategies. The relevance of the administrators' support of the ninth grade students and teachers with program resources to minimizing science achievement gap is affirmed by the administrators' monitoring and assessment of the teaching and learning of basic science. The administrators perceived that these support strategies improved science teaching and learning and advanced professional training opportunities, which improved the learning and teaching environment and increased the students' basic science achievements.

The teachers used professional and skill application strategies, teaching method and assessment strategies, tool support and student engagement, assessment and grading, and curriculum adoption and teaching initiative strategies to help students meet expectations in basic science and MDG. The teachers believed that supporting students with program resources and professional skills improved students' achievement when they taught and assessed students with effective teaching and grading styles. Also, the teachers perceived that students' achievement in science increased when they engaged and assessed students with the program's scheme of work. Additionally, the teachers perceived that students met expectations in basic science when they combined the students' class assessment and examination test scores. Finally, the teachers believed that they improved science achievement and increased students' interest in basic sciences with their adoption of the program's curriculum.

Interpretation of the Findings

I interpreted the findings as measured against Research Questions 1 and 2 and examined the meaning of the findings using the literature and Fullan's (2007) framework. I also described opportunities for extending knowledge and analyzed them alongside peer-reviewed literature in Chapter 2 within the conceptual framework to ensure interpretations did not exceed data findings and scope.

Program Practices and Science Achievement

The findings indicated that administrators' and teachers' perceptions of the connections between program resources and basic science achievement were positive because the use of program resources involved the use of program technology, kits, and resource professionals which enhanced learning. Literature has affirmed the relevance of similar teaching and learning resources in the academic improvement of students in the sciences (Atomatofa et al., 2016). Based on the findings of the study and literature, the use of the program resources provided administrators and teachers some professional opportunities which involved the use their professional training skills to increase students' achievement in the sciences. The findings provide understanding for educators who seek opportunities to improve students' academic performances in other subjects. Also, the findings indicated that administrators monitored teaching and assessment practices and evaluated the teaching and grading practices of teachers by examining the basic science achievement outcomes. The literature supported that evaluating and assessing learning practices are notable for both professional and students' academic performances (Ayeni, 2020; NimotaJibolaKadir & AbiodunAkanbiGafar, 2018).

Similar literature has confirmed the relevance of monitoring teaching and assessment practices to determine science achievement (Atondo et al., 2019). Atondo et al. (2019) found that regular grading and monitoring of students' academic progress predicted students' achievements in Benue State, Nigeria. Chiekem (2015) affirmed that grading practice helped to determine progress towards national education standards in Delta State, Nigeria. Literature affirmed that grading practices share information regarding areas of progress as well as areas needing improvement (Chiekem, 2015, p. 28). The findings in this study indicated that administrators monitored teaching by assessing the teachers' lesson plans weekly to ensure the lesson plans aligned with the program's scheme of work. Other findings in the study indicate that administrators and teachers determined science achievements by assessing and comparing students' science achievements over the years.

Literature affirmed that evaluating the teaching and grading practices of teachers has influenced basic science achievement outcomes in Nigeria (Ayeni, 2020). Kabiri et al. (2017) found that students performed relatively well when GDM grading was used to evaluate how middle school students in Iran were meeting expectations in science. The findings in this study supported the conclusion that administrators have used grading standards to evaluate the teaching and learning as well as determine the basic science achievement outcome over the years. The findings in this study confirmed that knowledge is extended when administrators evaluate the teaching grading practices understanding better practices for improving science teaching and learning.

Additional findings confirmed that teachers aligned lesson plans with the program's science curriculum because the teachers believed the alignment of lesson plan with the program's curriculum increased students' understanding of science concepts and reduced science achievement disparities. Other findings affirmed the view that teachers engaged students with effective teaching styles because the teachers perceived such engagements increased the students' science interest and achievement. Also, findings illustrated that teachers assessed students with several grading practices and combined weekly test and examination scores to increase students' science achievements.

Literature also supported the view that using a program's available resource and instructional guides have influenced science learning and achievement (Mihindo et al., 2017; Ogbaji, 2017). Ogbaji (2017) found that instructors perceived teaching resources as relevant for productive instruction and learning. Mihindo et al. (2017) found that the Computer Based Studies (CBS) teaching approach made a positive and significant contribution to the science achievement of the students. The findings in this study revealed that teachers have used program technology, kits, and available program resources to influence science learning and students' science academic achievements.

The findings in this study uncovered that regular professional training of the teachers and their experiences influenced science learning and achievement. Akpan and Ita (2015) confirmed that professional development of teachers has influenced the quality of basic education in Lagos State, Nigeria. Findings in the literature reinforced the importance of the professional development of teachers in the students' academic outcomes (Akpan & Ita, 2015, p. 73). Fullan (2007) provided insight about continuous improvement of stakeholders who participate in professional training within familiar culture and practice influence positive school improvement in a school setting. The professional training empowered the instructors within the UBE program who perceived that available program resources could produce positive results.

The literature also verified that using the basic science curriculum and scheme of work and adopting lesson increased students' understanding of science concepts. The findings of this study made known that teachers planned and aligned lesson plans around the program's curriculum to reduce achievement disparities. Usen (2016) affirmed that teachers incorporated the available school resources such as the scheme of work which promoted the academic growth of students. Using the basic science curriculum and scheme of work and adopting lesson plans aligned with program curriculum improved learning when teachers consider curriculum related lesson plans which reduce achievement disparities.

The findings in this study indicated that teachers taught and engaged students with effective teaching styles which they believed increased students' science interest and achievement. Literature verified the influence of teachers and their teaching styles on the basic science achievement of the students in the school (Samba et al., 2020). Other findings in the literature have established that variations in teaching methods, inquiry-based, traditional, including technology-based teaching, influenced science achievements (Gao & Wang, 2016; Samba et al., 2020; Tas & Balgalmis, 2016). Teachers perceived that teaching with methodologies such as demonstration, explanation, and reinforcement, illustration, encouragement, appreciation, award, reinforcement, and appreciation, increased students' interest in science learning. The findings of this study bolstered the view of the teachers' perceptions regarding the use diversified teaching methodologies to increase science learning and science achievements.

Literature also suggested that assessing science achievement with several grading practices supported students' science achievements (Shi et al., 2016). Additional literature verified that individual state results and the classroom assessments included the international benchmarks interpretation for the state and national basic science achievement standards (Chiekem, 2015; Matilda & Helen, 2019, p. 188). The findings in this study strengthened the view that the teachers' perceptions that grading practices such as combining the weekly class assessment and examination result scores helped students succeed in basic science learning. Fullan's (2007) change theory guided this study in which administrators and teachers shared their understandings regarding program practices which minimized achievement gaps in basic science.

Program Support Strategies and Science Achievement

The findings confirmed that knowledge is extended by demonstrated expertise for supporting teachers and students with program resources, encouraging, and supporting teachers and students with program resources, regular monitoring and assessment of teaching and learning basic science, improving science teaching, and learning by advancing professional training opportunities, and improving science learning with positive work and learning environments**.**

The interview findings brought to light the fact that the administrators and teachers were experienced and familiar with the program teaching and assessment resources used in the weekly and examination assessments to improve the ninth grade students' basic science achievement. Fullan's (2007) conceptualized the school improvement which occurs when the change agents are familiar with the organizational practices and conditions. The continuous improvement which is advanced through the professional training and workshops mentioned by the administrators and teachers aligned with the Fullan (2007) change theory because Participant A1 agreed that professional advancement was a new change within the familiar UBE program to which Participant A3 added improves teachers who help students improve in basic science. The teachers perceived that the professional training within the program improved their skills. Participants B7 and B6 described how their professional training and orientation support the skills they used to support students to improve in the sciences.

Hence, Fullan (2007) provided insight into the perspectives of administrators and teachers in the school setting regarding the influence of professional training in familiar program practices within the UBE program on teachers' science skills and students' science achievement. The Fullan school change model affirmed that professional development within culture, practice and setting sustain a change that improve professionals and learners. Fullan's change theory was used to conceptualize the shared understanding of the achievement gap and the UBE program strategies. The shared understanding of the administrators and teachers regarding the influence of professional development and program resources based on Fullan's change theory means that administrators and teachers described the positive influence of available program resources or the negative influence, which the scarcity of resources may contribute to the achievement gap among the ninth grade students.

The professional training and workshop within the program align with Fullan (2007) empowerment of change agents within work practice, culture, and setting because the shared belief of the administrators and teachers regarding the positive influence of training within the program empowered them as change agents who perceive that the available resources could produce positive results. The administrators and teachers perceived that professional training empowered teachers who used their improved skills to teach basic science to increase scientific knowledge and bridge achievement gaps among the ninth grade students. Fullan (2007) agreed that school improvement strategies which occur within the culture, practice, and stakeholders' experiences in a setting yielded a positive outcome. The introduction of the UBE program in 1999 ushered in a culture of change that focused on mass literacy and increased scientific knowledge. The UBE program came with national, and state program agencies such as National Universal Basic Education Board, and State Universal Basic Education Board (SUBEB), which were committed to supporting and improving learning. This culture of change and school improvement fit into the global MDG of reducing illiteracy and increasing scientific literacy. This means that the administrators' and teachers' use of familiar program practices, experiences, and strategies, all influenced their perceptions of improved ninth grade students' basic science achievements. Additionally, the study increased administrators' and teachers' accountability for program initiatives that enhanced the ninth grade students' scientific literacy.

The literature confirmed that administrators' time management and familiarity and experiences with instructional schedule in the school influenced students' performances in science in Ondo, Nigeria (Ayeni, 2020). Other literature findings showed that teachers with a sufficient depth of knowledge and a profound depth of subject content influenced students in acquiring more science concepts and thus advancing in science achievement (Gimba et al., 2018; Olasehinde-Williams et al., 2018). The findings of the study indicated that administrators and teachers perceived using familiar program strategies helped students in meeting the MDG and basic science expectations.

Literature affirmed that encouraging and supporting teachers and students with program resources such as the scheme of work or science curriculum improved science achievement (Lay & Chandrasegaran, 2016). The findings in this study illustrated that administrators encouraged and supported teachers with program resources to improve science learning. Other findings in this study suggested that teachers have used supplementary program textbooks, student allotted textbooks, pencils, exercise books and pen to influence students' science achievement. The findings in this study also confirmed that students' understanding of science concepts improved when administrators and basic science teachers support teachers and students with relevant supplementary program resources.

The literature supported the view that teachers' incentives and motivation influenced instructor dispositions and influenced learners' science achievements (Abazaoglu & Aztekin, 2016). The administrators and teachers perceived that teaching and learning of science improved when science learning was supported with positive work and learning environments. Additional findings brought to light that students were supported with professional skills, program resources, teaching and assessment, and effective teaching and grading styles all which administrators and teachers perceived improved achievement, and increased students' achievement in science. The literature supported the conclusion that adequate program resources and professional training increased students' performances in science subjects (Mihindo et al., 2017; Olasehinde-Williams et al., 2018).

The findings of the study indicated that teachers adopted professional training and used effective teaching styles to support students' science learning and achievement. This means that the program provided opportunities for educators to consider other in-service training possibilities for increasing achievement in other subjects. Literature affirmed that teaching and assessing students with effective teaching and grading styles improved achievement (Aduojo, 2018; Ogonnaya et al., 2016; Osokoya, 2013). Also, the teachers perceived that using the scheme of work, program tools increased students' interest in science. Other findings indicated that teachers combined students' test scores to support science achievement. Teachers said in their interviews that they combined weekly class assignment scores with the examination result scores to support students' science achievement. Based on the literature, it was concluded that the adoption of program's curriculum improved science achievement and increased students' interest in the sciences (Aduojo, 2018; Ogonnaya et al., 2016).

Limitations of the Study

This study's major limitations included lack of triangulation with other data sources (observation of student scores, evaluation of curriculum), in addition to interviews. Qualitative experts confirmed that triangulation of data from two groups of participants meet the requirement in a qualitative study (Fusch et al., 2018). Another limitation included a change in the data collection format due to the COVID-19 pandemic. The planned face-to-face interviews changed to virtual interviews, and the frequency of data collection depended on the participants' dispositions. An additional limitation included lack of documentary evidence due to the unavailability of recent data based on published science scores of ninth grade students across the schools of the state and country of Nigeria. Also, I could not access science scores of ninth grade students as described by the administrators and teachers due to COVID-19 lockdown regulations at the time of the interview.

To overcome these limitations, I obtained the approval of the IRB to use the virtual interview format. I ensured and informed the participants in the descriptive interview invitation letter regarding the virtual interview options if the face-to-face interview could not occur as planned. I confirmed that the virtual interview conversations were recorded and documented alongside themes and research questions. I offered call credit to all administrators and basic science teachers who ensured the participants' equal participation in the virtual interview. The objectivity of the data collected was supported by the administrators' and teachers' involvement in the member checking. Participants received the transcript and were asked if they had any corrections or adjustments to make regarding their interview responses.

Another limitation of the study was the delay during the member checking process due to longer time it took some participants to power their internet and upload their responses. Most of the participants who had no computers or internet access to upload their feedback were supported with funds sufficient to buy data cards. The member checking process involved the three administrators and the eight basic science teachers who confirmed that their interview responses were accurately recorded. I shared the summary of interview results with the chair and the committee who confirmed that the documentation complied with Walden University standards and specifications.

Finally, most of the administrators and teachers were reluctant to reveal negative outcomes and challenges that might cause embarrassment or criticism, so deeper details regarding the achievement disparities were not described. Subsequently, an issue of credibility of participants' responses included the possibility that administrators and teachers may have responded based on what they thought was the right answer and what I wanted or what the participants felt was acceptable. Probe questions were used within the agreed interview protocols as much as participants were comfortable to discover the perceptions of administrators and teachers regarding students' achievement outcome.

Recommendations

Based on the rich data from the administrators and basic science teachers regarding their combined program practices which influenced students' achievements and program support strategies used in helping students meet expectations in science and MDG, recommendations for further studies were made. The recommendations include exploring other program practices related to other aspects of academic achievements and challenges in reaching proficiencies such as gender gap, socioeconomic differences, ethnic and language differences, gaps in teacher preparations and credentials. Based on the findings of the study, educators may discover disparities in achievement and may need to develop further strategies for minimizing this achievement gap in basic science. The consideration of the socioeconomic differences by the teachers and administrators who aspire to minimize the achievement gap may provide opportunities for educators to understand the social and financial background of the students and how these factors could be managed when they challenged the attainment of the basic science standard. The administrators' and teachers' understanding of students' ethnic and language differences may provide opportunities for learning common ground teaching strategies that increase students' comprehension of science concepts. Other recommendations involve uses of program resources which enhance the learning of other subjects.

Another learning opportunity includes assessing other professional training opportunities that empower educators who increase students' interest and achievement in other subject areas and other science learning settings. Administrators and teachers may learn how to manage science education programs in diverse classroom settings. Another learning opportunities might include exploring other program monitoring, and evaluation possibilities for improving learning and increasing students' achievement in other subjects. Administrators and teachers may learn to compare the achievement trends of students with the TIMSS to understand how students are meeting global goals. The TIMSS scaling has been used to discover better achievements standards for science and technology (Shi et al., 2016; Stephen et al., 2016).

Another learning opportunity might include exploring other practices and uses of lesson plan and use of scheme of work which to increase students' understanding of other subjects and concepts. More professional training on the use of science curriculum may increase educators' understanding of curriculum segments such as the theory, practical, technology, and field learning segments. Using these methods, educators may discover similar curriculum applications in other subjects to minimize achievement gaps.

Additional opportunities for future studies include seeking other ways of using the program support strategies to help students meet expectations in other subjects. Future research opportunities might include exploring administrators' and teachers' perspectives of curriculum adoption and grading skills and opportunities for helping students meet expectations in other subject areas. Similar studies in literature have strengthened these recommendations for future research because recent studies have indicated that program resources supply strategies and professional training of teachers improved teachers and increased students' performances in science subjects (Mihindo et al., 2017; Olasehinde-Williams et al., 2018).

Future studies can explore other effective teaching styles that increase students' interest in other subjects. Further studies are required in which researchers should consider more schools, collect data regarding the science scores of ninth grade students at state and national level with a focus on science achievement gaps among ninth grade students within schools across the states and country of Nigeria. Quantitative and comparative studies may focus on establishing an accessible annual science score of ninth grade students at each school across years, state and country, including a benchmark for low performance or high performance. Future studies should also explore the perspectives of administrators and teachers regarding the impact of program practices on students' achievement gaps in other subjects, including a documentary review of public records of students' scores in the previous years to verify the gaps.

The basic science achievement gaps in the state, which scholars such as Nwafor (2012) and Akani (2016) found in 2009, 2010, 2011, 2012 and 2013 require further and more recent empirical studies, which focus on closing the gaps in basic science. The empirical data could focus on the ninth grade students' basic test and exam results for 2014, 2015, 2016, 2017, 2018, 2019, and 2020 to determine whether the basic science achievement gaps are narrowing or expanding.

Implications

Positive Social Change

Walden University's vision for social change encourages stakeholders who work together to enhance individual and community improvement through research, practice, and education (Walden University, 2020). Hence, this study may have a potential impact on positive social change for ninth grade basic science students, basic science teachers, administrators in southeast Nigeria and in Nigeria's education system. The findings in this study can contribute to positive social change by exploring ways program practices and strategies increase students' interest in basic science, improving student performance in basic science, and increasing the number of individuals with lifelong skills in the entire school and rural community. This study also has the potential to increase the professional skills of the administrators and teachers who explore how achievement gaps in basic science and other subjects can be reduced. Ayodele (2019) found that teachers' professional improvement influenced the basic science delivery methodology, which in turn influenced the state basic science achievement standards.

Fullan (2007) agreed that school improvement strategies which occur within the culture, practice, and stakeholders' experiences in a setting yielded a positive outcome. This study's implications included the administrators' and teachers' use of familiar program practices, experiences, and strategies, all of which they perceived improved the ninth grade students' basic science achievements. The study increased administrators' and teachers' accountability for program initiatives that enhanced the ninth grade students' scientific literacy.

Recommendations for Practice

Based on previous research and the findings of this study there is need for program supports and strategies for administrators and teachers who reduce disparities in basic science and other academic achievements in the Nigerian education system. The administrators and teachers should continue using program technology, kits, and resource professionals to enhance learning. Although the administrators indicated that they supplied all the available program resources, the teachers reported that the program resources supplied were not adequate. I recommend that a proper needs assessment or inventory of program resources needed should be compiled and noted on a timely manner. The teachers may take note of teaching resources needed and report to the administrator who may then present the need to the SUBEB. An additional recommendation is that administrators and teachers continue to employ professional training opportunities, which improve educators' skills for leading in diverse science learning environments. Although the administrators and teachers affirmed the practice of profession training, there was no mention of a professional training opportunities for the administrators. I recommend a joint professional training opportunity for both groups where the administrators and teachers are engaged in a workshop concerning the supply and use of the program resources. Additionally, there should be a separate training opportunity for the administrators concerning accountability or reporting procedures regarding the need and use of program resources. Other practices such as supervising teaching and assessment practices, evaluating the teaching and grading practices, using the basic science curriculum and scheme of work, adopting lesson plans, teaching and engaging students with effective teaching styles, and assessing science achievement with several grading practices are recommended for the improvement of science learning and students' academic achievements.

I recommend more professional training and workshops that center on several evaluation standards beyond the national, and state standards, so that educators can assess how students are progressing in basic science using diverse benchmarks. Evaluation experts abroad may be invited to discuss other assessment strategies for assessing basic science students who need to participate in the global community. Scholars also recommended assessment standards such as PISA, ILSA, GDM, and TIMSS (Addey et al., 2017; Kabiri et al., 2017; Stephens et al., 2016). Scholars recommended the use of PISA and TIMSS to investigate better national standards for science and technology (Shi et al., 2016).

Another recommendation includes the introduction of familiar program supports and strategies for administrators and teachers to use in helping students meet expectations in science and other subjects. The involvement of administrators and teachers who are experienced and familiar with program support strategies and resources would create positive learning environments which support students in meeting learning expectations. Findings in literature confirmed that the involvement of experienced administrators and teachers with similar practices of supplying adequate program resources and the advancement of professional training increased students' performances in science subjects (Mihindo et al., 2017; Olasehinde-Williams et al., 2018).

Conclusion

This study explored administrators' and teachers' perceptions regarding their practices and experiences of using the UBE program and their perceptions of how the program practices and experiences influenced ninth grade students' basic science achievement. The study explored the perspectives of administrators and teachers regarding program strategies used to support ninth grade students in meeting the MDG and basic science expectations. The study's intent was to explore the administrators' and teachers' program practices and strategies for minimizing the achievement gap in basic science.

Reported gaps across Nigeria's states showed disparities in basic science among the ninth grade students (Akani, 2016; Pepple & Ogologo, 2017). Fullan's (2007) framework and school improvement guided the study and supported the view that academic attainments in basic science should blend with administrators' and basic science teachers' program practices, conditions, and experiences for improving the ninth grade students' basic science achievement. The study methodology included collecting data from three administrators and eight basic science teachers via interviews guided by two major research questions. The data analysis involved the first cycle and second cycle coding process in which the administrators' and teachers' interview data were broken into codes, categories and themes next to the two research questions which represented the administrators' and teachers' perspectives of program practices and strategies and their influences in students' basic science achievement.

The findings indicated that administrators and basic science teachers perceived that their program practices, experience, and use of the program resources positively affected the ninth grade students' basic science achievement in the selected school. The findings also showed that administrators and basic science teachers perceived that their use program resources and strategies to support ninth grade students helped them in meeting expectations in basic science and MDG.

As the need to reduce basic science achievement disparities among the ninth grade students continues to exist, the importance of exploring administrators' and teachers' perspectives of program practices and strategies that reduce basic science achievement gaps among ninth grade students remain relevant because they provided the administrators and basic science teachers opportunities to improve student performance in other subjects. Although the influence of program practices and strategies on the ninth grade students' basic science attainment requires further studies, administrators and teachers perceived that their program practices and strategies helped students meet expectations in basic science and reduced basic science achievement disparities. The study may increase administrators' and basic science teachers' accountability for program initiatives, which may in turn increase the ninth grade students' performances in basic science and other subjects.

References

Abazaoglu, I., & Aztekin, S. (2016). The role of teacher morale and motivation on students' science and math achievement: Findings from Singapore, Japan, Finland and Turkey. *Universal Journal of Educational Research*, *4*(11), 2606–2617. https://doi.org/10.13189/ujer.2016.041114

Abbott, P., Sapsford, R., & Rwirahira, J. (2015). Rwanda's potential to achieve the millennium development goals for education. *International Journal of Educational Development*, *40*, 117–125. https://doi.org/10.1016/j.ijedudev.2014.12.007

Abubakar, B. G., & Njoku, J. N. (2017). Influence of Almajiri on school attendance and academic performance among students of Almajiri integrated model school, Sokoto State. *World Journal of Education*, *5*(4), 58–63. https://doi.org/10.5430/wje.v5n4p58

Ada, N. A., Odoh, C. O., & Angura, M. T. (2021). Enforcement of the national minimum standards specifications for implementation of the 3-year upper basic science and technology curriculum in North Central Nigeria. *VillageMath Educational Review*, *2*(1). https://doi.org/10.5281/zenodo.462498

Adams, S. O., & Onwadi., R. U. (2020). An empirical comparison of computer-assisted instruction and field trip instructional methods on teaching of basic science and technology curriculum in Nigeria. *International Journal of Social Sciences & Educational Studies*, *7*(4), 22–35. https://doi.org/10.23918/ijsses.v7i4p22

Addey, C., Sellar, S., Steiner-Khamsi, G., Lingard, B., & Verger, A. (2017). Forum: The rise of international large-scale assessments and rationales for participation. Compare: *A Journal of Comparative and International Education*, *47*(3), 434–452. https://doi.org/10.1080/03057925.2017.1301399

Adebule, S. O. (2017). Self-assessment in mathematics as correlate of performance of students in junior secondary school basic science in Ondo State, Nigeria. *European Journal of Education Studies,* 2(10). https://doi.org/10.5281/zenodo.29035

Adodo, S. O. (2013). Effects of two-tier multiple choice diagnostic assessment items on students' learning outcome in basic science technology (BST). *Academic Journal of Interdisciplinary Studies*, *2*(2), 201–201. https://doi.org/10.5901/ajis.2013.v2n2p201

Aduojo, T. (2018). Effects of teaching methods on basic science achievement and spatial ability of basic nine boys and girls in Kogi State, Nigeria. *Humanities and Social Sciences Letters*, *6*(4), 149–155. https://doi.org/10.18488/journal.73.2018.64.149.155

Agbidye, A. (2015). Challenges and prospects in the teaching of basic science at the upper basic level in Nigeria. *Journal of Qualitative Education*, *11*(1), 1–8.

Aja, S. N., Egwu, S. O., Aja-Okorie, U., Ani, T., & Amuta, N. C. (2018). Universal basic education (UBE) policy implementation challenges: The dilemma of junior secondary schools administrators in Nigeria. *International Journal of Educational Administration and Policy Studies*, *10*(7), 83–90.

Akani, A. P. O. (2016). An evaluation of classroom experiences of basic science teachers in secondary schools in the Ebonyi State of Nigeria. *British Journal of Education*, *4*(1), 64–76.

Akpan, C. P., & Ita, A. A. (2015). Teacher professional development and quality universal basic education in Lagos State, Nigeria. *Global Journal of Arts, Humanities and Social Sciences*, *3*(9), 65–76.

Akufo-Addo, N. (2018). SDGs can propel Africa beyond dependency on aid. *New African*, (583), 34-37.

Al Sultan, A., Henson, H., Jr., & Fadde, P. J. (2018). Pre-service elementary teachers' scientific literacy and self-efficacy in teaching science. *IAFOR Journal of Education*, *6*(1), 25–41. https://doi.org/10.22492/ije.6.1.02

Andrews, N. (2017). Book review: Africa and the millennium development goals: Progress, problems and prospects. *The Journal of Modern African Studies, 55*(2), 334-336. https://doi.org/10.1017/S0022278X16000884

Ango, M. L. (2002). Mastery of science process skills and their effective use in the teaching of science: An educology of science education in the Nigerian context. *International Journal of Educology*, *16*(1), 11–30.

Anil, Ö., Batdi, V., & Küçüközer, H. (2018). The effect of computer-supported education on student attitudes: A meta-analytical comparison for the period 2005-2015. *Educational Sciences: Theory and Practice*, *18*(1), 5–22. https://doi.org/10.12738/estp.2018.1.0285

Anunobi, V. N., Gambari, A. I., Alabi, T. O., & Abdullahi, M. B. (2017). Development and validation of web-based courseware for junior secondary school basic technology students in Nigeria. *The Online Journal of New Horizons in Education*, *7*(2), 62–73.

Archibong, E. P., Bassey, G. E., & Nwagbara, E. N. (2018). Gender mainstreaming and attainment of sustainable development goals: Does Nigeria have the political will to successfully work the talk? *Global Journal of Social Sciences,* 17, 21–29. https://doi.org/10.4314/gjss.v17i1.3

Atomatofa, R., Okoye, N., & Igwebuike, T. (2016). Learning environments as basis for cognitive achievements of students in basic science classrooms in Nigeria. *Universal Journal of Educational Research*, *4*(6), 1471–1478.

Atondo, G., Abah, J., & Naakaa, T. (2019). Continuous assessment as a predictor of students' achievement in mathematics at the junior secondary school level in Makurdi local government area of Benue State, Nigeria. *World Wide Journal of Multidisciplinary Research and Development*, 5(2), 18-29.

Ayeni, A. J. (2020). Principals' instructional time management and students' academic performance in secondary schools in Ondo north senatorial district of Ondo State, Nigeria. *Journal of Education and Learning (EduLearn*), 14(1), 123–133.

Ayodele, J. O. (2019). Nigeria as Africa's epicenter of terrorism against school children. *IFE Psychology IA*, 27(1), 17–35.

Baker, B. D., Farrie, D., & Sciarra, D. G. (2016). Mind the gap: 20 Years of progress and retrenchment in school funding and achievement gaps. Policy information report. ETS RR-16-15. *ETS Research Report Series*.

Bakhshi, P., Babulal, G. M., & Trani, J. F. (2017). Education of children with disabilities in New Delhi: When does exclusion occur? *PLoS ONE,* 12(9), 1–15. https://doi-org.ezp.waldenulibrary.org/10.1371/journal.pone.0183885

Bakhshi, P., Babulal, G. M., & Trani, J. F. (2018). Education and disability in a conflict affected context: Are children with disabilities less likely to learn and be protected in Darfur? *World Development*, *106*, 248–259. https://doi.org/10.1016/j.worlddev.2018.01.019

Baloyi, T. V., & Makhubele, J. C. (2018). Challenges impeding the successful implementation of early childhood development programs in South Africa: Implications for practice. *Gender & Behavior*, 16(1), 10773–10783.

Barrett, A. M. (2017). Making secondary education relevant for all: Reflections on science education in an expanding sub-sector. *Compare: A Journal of Comparative & International Education, 47*(6), 962–978. https://doi.org/10.1080/03057925.2017.1343127

Bello, I. (2020). Sustainable development goals (SDGs) for education in Nigeria: an examination of Etisalat corporate social responsibility in Nigeria's post-basic education sector. *International Journal of Lifelong Education,* 39(5/6), 562–575. https://doi.org/10.1080/02601370.2020.1836051

Benavot, A., & Naidoo, J. (2018). A new era for education in the global development agenda. *Childhood Education*, 94(3), 10-15. https://doi.org/10.1080/00094056.2018.1475676

Bowman, B. T., Comer, J. P., & Johns, D. J. (2018). Addressing the African American achievement gap. *YC: Young Children*, *73*(2), 14–23.

Brooks, C., & Gibson, S. (2012). Professional learning in a digital age. *Canadian Journal of Learning and Technology*, *38*(2), n2. https://eric.ed.gov/

Chen, P. (2008). Strategic leadership and school reform in Taiwan. *School Effectiveness and School Improvement*, *19*(3), 293-318. doi/abs/10.1080/09243450802332119

Chiekem, E. (2015). Grading practice as valid measures of academic achievement of secondary schools students for national development. *Journal of Education and Practice*, *6*(26), 24–28.

Cohodes, S. (2018). Charter schools and the achievement gap. *Future of Children*, 1–16.

Corrales, A., & Peters, M. L. (2017). Examining the relationship between school funding and academic achievement for charter schools. *Charter Schools Resource Journal*, *12*(1), 47–72.

Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches* (3 ed.). SAGE Publications.

Dingfielder, H. E., & Mandell, D. S. (2011). Bridging the research-to-practice gap in autism intervention: An application of diffusion of innovation theory. *Journal of Autism and Developmental Disorders, 41*(5), 597-609.

Ebbeck, M., & Chan, Y. Y. Y. (2011). Instituting change in early childhood education: Recent developments in Singapore. *Early Childhood Education Journal*, *38*(6), 457-463. https://link.springer.com/article/

Ejere, E. (2011). An examination of the critical problems associated with the implementation of the Universal Basic Education (UBE) program in Nigeria. *International Education Studies, 4*(1), 221 - 229.

http://www.ccsenet.org/journal/index.php/ies/article/view/

Ekwueme, C. O., Ekon, E. E., & Ezenwa-Nebife, D. C. (2016). Education for sustainability through academic freedom. *Global Journal of Educational Research*, *15*(1), 23–30. https://doi.org/10.4314/gjedr.v15i1.3

Enemarie, V., Ajayi, V. O., & Ogbeba, J. (2018). Students' achievement in basic science in basic education certificate examination as a predictor of their performance in biology in senior secondary certificate examination. *A Discussion on Educational Issues,* 281-295.

Enighe, J.-M., & Afangideh, M. E. (2018). Developing reading skills in beginning readers in Nigerian primary schools towards the millennium development goals. *Journal of Language Teaching & Research,* 9(6), 1160–1167. https://doi-org.ezp.waldenulibrary.org/10.17507/jltr.0906.05

Enslin, P., & Tjiattas, M. (2017). Getting the measure of measurement: Global educational opportunity. *Educational Philosophy & Theory,* 49(4), 347–361. https://doi.org/10.1080/00131857.2015.1048667

Enwelim, S. C. (2016). Teacher characteristics as correlates of students achievement in social studies: A case study in Nigeria. *Journal of Education and Practice*, 7(28), 110-114.

Franck, B., & Joshi, D. K. (2017). Including students with disabilities in education for all: *Lessons from Ethiopia. International Journal of Inclusive Education*, 21(4), 347-360. doi:10.1080/13603116.2016.1197320

Fullan, M. (2007). Change theory as a force for school improvement. In *Intelligent* *leadership* (pp. 27-39). Springer Netherlands. https://link.springer.com/chapter/10.1007%2F978-1-4020-6022-9_3

Fusch, P., Fusch, G. E., & Ness, L. R. (2018). Denzin's paradigm shift: Revisiting triangulation in qualitative research. *Journal of Social Change*, *10*(1), 19–32. https://doi-org.ezp.waldenulibrary.org/10.5590/JOSC.2018.10.1.02

Gacel-Ávila, J. (2012). Comprehensive internationalization in Latin America. *Higher education policy*, *25*(4), 493-510.

Gagnon, D. J., & Mattingly, M. J. (2018). Racial/ethnic test score gaps and the urban continuum. *Journal of Research in Rural Education*, *33*(2).

Gambari, A. I., & Yusuf, M. O. (2017). Relative effectiveness of computer-supported jigsaw II, STAD and TAI cooperative learning strategies on performance, attitude, and retention of secondary school students in physics. *Journal of Peer Learning*, *10*, 76–94.

Gao, S., & Wang, J. (2016). Do variations of science teaching approaches make difference in shaping student content and problem-solving achievement across different racial/ethnic groups? *International Journal of Environmental and Science Education*, *11*(12), 5404–5428.

Gimba, R. W., Hassan, A. M., Yaki, A. A., & Chado, A. M. (2018). Teachers' and students' perceptions on the problems of effective teaching and learning of science and technology in junior secondary schools. *Malaysian Online Journal of Educational Sciences*, *6*(1), 34–42.

Goddard, R. D., Skrla, L., & Salloum, S. J. (2017). The Role of collective efficacy in closing student achievement gaps: A mixed methods study of school leadership for excellence and equity. *Journal of Education for Students Placed at Risk*, *22*(4), 220–236. https://doi.org/10.1080/10824669.2017.1348900

Goy, S. C., Wong, Y. L., Low, W. Y., Noor, S. N. M., Fazli-Khalaf, Z., Onyeneho, N., Daniel, E., Azizan, S. A., Hasbullah, M., & Uzoigwe, A. G. (2018). Swimming against the tide in STEM education and gender equality: A problem of recruitment or retention in Malaysia. *Studies in Higher Education,* 43(11), 1793–1809. https://doi-org.ezp.waldenulibrary.org/10.1080/03075079.2016.1277383

Guba, E. G., & Lincoln, Y. S. (1981). *Effective evaluation.* Jossey – Bass.

Herrera, S., Zhou, C., & Petscher, Y. (2017). Examining school-level reading and math proficiency trends and changes in achievement gaps for grades 3-8 in Florida, Mississippi, and North Carolina. REL 2017-235. *Regional Educational Laboratory Southeast.*

Ige, O. A., & Hlalele, D. J. (2017). Effects of computer-aided and blended teaching strategies on students' achievement in civic education concepts in mountain learning ecologies. *Education and Information Technologies, 22*(6), 2693–2709.

Ikoro, I. S., & Ezeanyim, U. E. (2017). Basic education in Nigeria for global competitiveness: The way forward. *International journal of advance research and publications, 1*(5), 304-307.

Indian Scribes. (2020). A complete guide to interview transcription. https://www.indianscribes.com/interview-transcription-guide/

Jackson, K. E. (2017). From MDGs to SDGs: Where does education fit? *Online Journal* *of International Education*, *2*(2), 45–59.

Janesick, V. J. (2011). *"Stretching" exercises for qualitative researchers* (3rd.Ed). Sage Publications.

Kabiri, M., Ghazi-Tabatabaei, M., Bazargan, A., Shokoohi-Yekta, M., & Kharrazi, K. (2017). Diagnosing competency mastery in science: An application of GDM to TIMSS 2011 data. *Applied Measurement in Education*, *30*(1), 27–38.

Kelly, A. L. (2018). Standardization, assessment, and globalization. *Thresholds in Education*, *41*(1), 43–50.

King, K. (2016). The global targeting of education and skill: Policy history and comparative perspectives. *Compare: A Journal of Comparative & International Education, 46*(6), 952-975. doi:10.1080/03057925.2016.1216781

Kotok, S. (2017). Unfulfilled potential: High-achieving minority students and the high school achievement gap in math. *High School Journal*, *100*(3), 183–202.

Kumar, S., Kumar, N., & Vivekadhish, S. (2016). Millennium development goals (MDGs) to sustainable development goals (SDGs): Addressing unfinished agenda and strengthening sustainable development and partnership. *Indian Journal of Community Medicine*, 41(1), 1-4. doi:10.4103/0970-0218.170955

Kusimo, A. O., & Chidozie, F. C. (2019). Inclusive education and sustainable development goals: A study of the physically challenged in Nigeria. *Cogent Arts & Humanities*, *6*(1), Article 1684175. https://doi.org/10.1080/23311983.2019.1684175

Ladan, M. T. (2018). Achieving sustainable development goals through effective domestic laws and policies on environment and climate change. *Environmental Policy & Law*, *48*(1), 42–63. https://doi.org/10.3233/EPL-180049

Lay, Y. F., & Chandrasegaran, A. L. (2016). Availability of school resources and TIMSS grade 8 students' science achievement: A comparative study between Malaysia and Singapore. *International Journal of Environmental and Science Education*, *11*(9), 3065–3080.

Le Hebel, F., Montpied, P., Tiberghien, A., & Fontanieu, V. (2017). Sources of difficulty in assessment: Example of PISA science items. *International Journal of Science Education*, *39*(4), 468–487.

Lerman, S., & Adler, J. (2016). Policy and the standards debate: Mapping changes in assessment in mathematics. *Research in Mathematics Education*, *18*(2), 182–199.

Levin, J., Riel, M., Goeller, M., Beruta, M., Cohen, M., & Hiyake, N. (1986). Reflexibility in problem solving: The social context of expertise. In *Annual Conference of the Cognitive Science Society, Amherst, MA*.

London, T. (2018). Assessing competing perspectives: A critical analysis of Guyana's national grade six assessment. *Journal of Pan African Studies*, *11*(4), 121–138.

Lundvall, B. A. (Ed.). (2010). *National systems of innovation: Toward a theory of innovation and interactive learning.* Anthem Press.

Macklem, G. L. (2014). *Preventive mental health at school: evidence-based services for students*. Springer.

Marian, H., & Jackson, C. (2017). Inquiry-based learning: A framework for assessing science in the early years. *Early Child Development and Care*, *187*(2), 221–232.

Marshall, C., & Rossman, G. B. (2010). *Designing qualitative research* (5th ed.). Sage.

Mathis, W. J., Trujillo, T. M., & University of Colorado at Boulder, N. E. P. C. (2016). *Lessons from NCLB for Every Student Succeeds Act*. National Education Policy Center.

Matilda, U. O., & Helen, A. O. (2019). Effect of formative classroom assessment on students' academic achievement in junior secondary school basic science in Egor local government area of Edo state. *Journal of Education and Practice, 10*(15), 184-189.

Maxwell, J. A. (2013). *Qualitative research design: An interactive approach* (3rd ed.). SAGE Publications.

McCormick, L. K., Steckler, A. B., & McLeroy, K. R. (1995). Diffusion of innovations in schools: A study of adoption and implementation of school-based tobacco prevention curricula. *American Journal of Health Promotion, 9*(3), 210-219.

Merriam, S. B. (1998). *Qualitative research and case study applications in education* (Rev. ed.). Jossey-Bass.

Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation.* San Francisco, CA: John Wiley & Sons.

Mihindo, W. J., Wachanga, S. w., & Anditi, Z. O. (2017). Effects of computer-based simulations teaching approach on students' achievement in the learning of chemistry among secondary school students in Nakuru sub county, Kenya. *Journal of Education and Practice*, 8(5), 65–75.

Miles, M. B., Huberman, A. M., & Saldana, J. (2014). *Qualitative data analysis: A* *methods sourcebook* (3rd ed.). Thousand Oaks, CA: SAGE Publications Inc.

Mokoena, C., & Jegede, A. O. (2017). Sdgs as a framework for realizing the right to education of the girl child in South Africa: Challenges and possibilities. *Gender & Behavior*, *15*(4), 9873–9889.

Murray, C. E. (2009). Diffusion of innovation theory: A bridge for the research - practice gap in counseling. *Journal of Counseling and Development, 87*(1), 108-116.

Nakidien, T., Singh, M., & Sayed, Y. (2021). Teachers and teacher education: limitations and possibilities of attaining SDG 4 in South Africa. *Education Sciences, 11*.

National Bureau of Statistics. (2019). *The West African Examinations Council results statistics 2016-2018*. http://education.gov.ng/wp-content/uploads/2019/10/WAEC_RESULTS_STATISTICS_2016-2018.pdf

NimotaJibolaKadir, A., & AbiodunAkanbiGafar, J. (2018). Head teachers' role in managing science education towards sustainable development in north-central zone, Nigeria. *Malaysian Online Journal of Educational Sciences*, 6(3), 20–29.

Ntibi, A. P. J. E. E., & Edoho, E. A. (2017). Influence of school location on students' attitude towards mathematics and basic science. *British Journal of Education*, *5*(10), 76-85.

Nwafor, C. E., & Umoke, C. C. (2016). Evaluation of some approved basic science and technology textbooks in use in junior secondary schools in Nigeria. *Journal of Education and Practice*, *7*(14), 69–78.

Nwafor, D. (2012). Comparative study of students' academic performance in junior secondary school certificate basic science in public and private secondary schools in Ebonyi State Nigeria. *Journal of Education and Practice*. www. iiste.org.

Ogbaji, D. I. (2017). Teachers' perception of the utilization of instructional materials in teaching social studies in junior secondary schools in Calabar municipality, Cross River State, Nigeria. *Global Journal of Educational Research*, *16*(2), 95–100. https://doi.org/10.4314/gjedr.v16i2.3

Ogonnaya, U. P., Okafor, G., Abonyi, O. S., & Ugama, J. O. (2016). Effects of concept mapping instruction approach on students' achievement in basic science. *Journal of Education and Practice, 7*(8), 79-84.

Ogunode, N. J. (2019). Challenges facing implementation of science program in FCT secondary schools, Abuja, Nigeria. *Electronic Research Journal of Engineering, Computer and Applied Sciences, 1*(2019), 1-13.

Ojeje, M. A., & Adodo, A. (2018). Education infrastructure in Nigeria: An analysis of provision of school building facility in secondary schools in Delta State Nigeria. *Journal of Education and Entrepreneurship*, 5(3), 49-60.

Okoro, S. U. C. (2014). Universal Basic Education (UBE) for All-Problems and Prospects in Nigeria. *Journal of Teacher Perspective, 8*(3), 688-699.

Olasehinde-Williams, F., Yahaya, L., & Owolabi, H. (2018). Teachers' knowledge indices as predictors of secondary school students' academic achievement in Kwara State, Nigeria. *IAFOR Journal of Education*, *6*, 73–90.

Olayinka, A.-R. B. (2016). Effects of instructional materials on secondary schools students' academic achievement in social studies in Ekiti State, Nigeria. *World Journal of Education*, *6*(1), 32–39.

Oleribe, O. O., & Taylor-Robinson, S. D. (2016). Before sustainable development goals (SDG): Why Nigeria failed to achieve the millennium, development goals (MDGs). *Pan African Medical Journal*, *24*, 1–4. https://doi.org/10.11604/pamj.2016.24.156.8447

Ololube, N. P. (2007). The relationship between funding, ICT, selection processes, administration and planning and the standard of science teacher education in Nigeria. *In Asia-Pacific Forum on Science Learning and Teaching, 8* (1), 1-29.

Omiko, A., & Oketa, I. (2018). Effect of improvised and standard instructional materials on students' achievement in chemistry in secondary schools. *Journal of Education and Learning, 12*(1). doi: 10.11591/edulearn. v12i1.6628

Omilani, N. A., Akinyele, S. A., Durowoju, T. S., & Obideyi, E. I. (2019). The effect of the assessment of practical-based work on pupils' problem solving and achievement in basic science and technology in Odeda local government of Ogun state, Nigeria. *Education 3-13, 47*(6), 760–772.

Onanuga, P. A., & Saka, A. O. (2018). Trend analysis of students' academic performance in selected science, technology, engineering, and mathematics subjects in Ogun State Basic Education Certificate Examination (OG-BECE), Nigeria, from 2011 to 2015: A Projection for Five Years. *Science Education International, 29*(2), 110–116.

Opal Transcription Services. (2017). *Interview transcription services and how to transcribe an interview*. https://www.opaltranscriptionservices.com/interview-transcription

Osarenren-Osaghae, R. I., & Irabor, Q. O. (2018). Educational Policies and Programs Implementations: A Case Study of Education Funding, Universal Basic Education (UBE) and Teacher Education. *International Journal of Educational Administration and Policy Studies,* 10(8), 91-102.

Osokoya, M. M. (2013). Teaching methodology in basic science and technology classes in South-West Nigeria. *Asian Journal of Education and e-Learning*, 1(4).

Oviawe, J. I. (2020). Strategies for funding technical vocational education and training for achieving sustainable national development in Nigeria in a post-oil boom economy. *Vietnam Journal of Education, 4*(2), 1-10.

Ozowuba, G. U. (2018). *Relationship between English proficiency and academic achievement of Nigerian secondary school students* (Order No. 10815811) [Doctoral dissertation, Walden University]. ProQuest Dissertations & Theses Global.

Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3rd ed.). Thousand Oaks, CA: Sage Publications.

Pepple, T. F., & Ogologo, G. A. (2017). The effects of the Niger Delta crisis on educational resources, attitude to schooling, and academic achievement of basic science students in Rivers state, Nigeria. *Journal of the International Society for Teacher Education*, *21*(1), 67–76.

Perry, S. M., Catapano, M., & Ramon, O. G. (2016). Teaching, academic achievement, and attitudes toward mathematics in the United States and Nigeria. *Journal for Leadership and Instruction*, *15*(2), 5–12.

Peslak, A., Ceccucci, W., & Sendall, P. (2010). An empirical study of social networking behavior using diffusion of innovation theory. *Conference on Information Systems Applied Research.* 1526(3), 1-14.

Rambla, X., Verger, A., Edwards, D. B., Fontdevila, C., & Bonal, X. (2017). Meeting development goals: Evidence from the civil society education fund. *Development in Practice*, 27(6), 851–864. https://doi-org.ezp.waldenulibrary.org/10.1080/09614524.2017.1343275

Roby, J. L., Erickson, L., & Nagaishi, C. (2016). Education for children in sub-Saharan Africa: Predictors impacting school attendance. *Children & Youth Services Review*, *64*, 110–116. https://doi.org/10.1016/j.childyouth.2016.03.002

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York, NY: The Free Press.

Rusilowati, A., Kurniawati, L., Nugroho, S. E., & Widiyatmoko, A. (2016). Developing an instrument of scientific literacy assessment on the cycle theme. *International Journal of Environmental and Science Education*, *11*(12), 5718–5727.

Saiti, A. (2012). Leadership and quality management: An analysis of three key features of the Greek education system. *Quality Assurance in Education*, *20*(2), 110-138.

Samba, R. M. O., Achor, E. E., Bash, A. E., & Iortim, S. O. (2020). Fostering students' critical thinking and achievement in basic science using graphic organizer and experiential learning strategies with feedback. *Science Education International, 31*(2), 220–225.

Shamir, H., Feehan, K., Yoder, E., & Pocklington, D. (2018). Can CAI improve reading achievement in young ELL students? *Proceedings of the Multidisciplinary*

Academic Conference, 229–237. https://search-ebscohost-com.ezp.waldenulibrary.org/login.aspx?direct=true&db=a9h&AN=129852526&site=ehost-live&scope=site

Sherry, L., & Gibson, D. (2002). The path to teacher leadership in educational technology. *Contemporary Issues in Technology and Teacher Education, 2*(2), 178-203.

Shi, W. Z., He, X., Wang, Y., Fan, Z. G., & Guo, L. (2016). PISA and TIMSS science score: Which clock is more accurate to indicate national science and technology competitiveness? *EURASIA Journal of Mathematics, Science & Technology Education*, *12*(4), 965–974.

Stake, R. E. (1978). Case studies in science education, volume I: *The Case Reports*.

Stephens, M., Landeros, K., Perkins, R., & Tang, J. H. (2016). Highlights from TIMSS and TIMSS advanced 2015: Mathematics and science achievement of US students in grades 4 and 8 and in advanced courses at the end of high school in an international context. NCES 2017-002. *National Center for Education Statistics.*

Supporting young African scientists. (2018). *New Scientist*, *237*(3161), 55–55.

Tas, Y., & Balgalmis, E. (2016). Turkish mathematics and science teachers' technology use in their classroom instruction: Findings from TIMSS 2011. *Journal of Education in Science, Environment and Health*, *2*(2), 166–175.

Tella, A. (2017). Teacher variables as predictors of academic achievement of primary school pupils' mathematics. *International Electronic Journal of Elementary Education*, *1*(1), 16-33.

Usen, O. M. (2016). Teachers' utilization of school facilities and academic achievement of student nurses in human biology in schools of nursing in Akwa Ibom state, Nigeria. *Journal of Education and Practice*, *7*(16), 73–80.

Walden University. (2020). *A vision for social change*. https://www.waldenu.edu/about/social-change

Webber, C. F., & Scott, S. (2010). Mapping principal preparation in Alberta, Canada. *Journal of Education and Humanities*, *1*(Summer), 75-96.

Wells, C. M. (2012). Superintendents' perceptions of teacher leadership in selected districts. *International journal of educational leadership preparation*, *7*(2).

Yin, R. K. (2012). *Applications of case study research* (3rd ed.). Sage Publications, Inc.

Yin, R. K. (2017). *Case study research and applications: Design and methods*. Sage Publications.

Yogo, T. U. (2017). Assessing the effectiveness of foreign aid in the education sector in Africa: The case of primary education. *African Development Review, 29*(3), 389–402. https://doi.org/10.1111/1467-8268.12276

Appendix A: The Administrators Interview Data Collection Instrument

	Administrators Interview questions	Sources
1	How did you become a UBE program stakeholder? Are you using the UBE program in any of the subjects in your school?	
2	As an Administrator, how do you perceive the use of Universal Basic Education (UBE) program as they impact the achievement gap in basic science in the ninth grade?	Research Question 1
3	How are you supporting students in ninth grade to meet proficiency in basic science?	
4	How familiar are you with basic science teaching and learning and assessment in your schools? Probe: Probe for the current basic science teaching and learning and assessment practices for the ninth grade students of the school	Fullan (2007)
5	What strategies are teachers and administers using to support students meet proficiency in basic science while meeting the Millennium Development Goal in basic science?	Research Question 2
6	What stands out for you about the basic science achievement of the students in your school? Probe for global, state and local standards of assessment.	Literature/Basic Science Achievement Documents
7	How would you describe the grading process? Probe for PISA, TIMSS or other grading standards.	Basic Science Assessment Guidelines/Documents
8	How did you decide to grade the basic science the way you do? Probe: Probe for global, national, or state grading standards.	
9	When you think about recent basic science assessment, Are there successes or concerns you are experiencing in the implementation process? Probes	Basic Science Assessment Guidelines/Documents

	Probes: Are there other assessment concerns such achievement standards, achievement gaps, achievement factors, and predictors of achievement	
10	Are you using the UBE program resources?	
11	Tell me more about what influenced you to adopt the UBE program. Probe: Probe for the perceived achievement factors)	Fullan (2007) Literature
12	Would you say the UBE program is supporting basic science achievement in schools? Probe for material resources, computer support and other UBE related teaching resources.	
13	Describe a UBE program outcome for basic science? How are you getting to that outcome?	
14	What grading processes or grading scale has helped you bring about that outcome? Probe: Probe for perceived grading process influenced by the UBE program goal or objectives.	Basic Science Assessment Guidelines/Documents
15	Are there other concerns you want us to discuss about the influence of UBE program on students' basic science achievement?	Basic Science Assessment Guidelines/Documents
16	What are your recommendations for the basic science grading process in this school district?	Basic Science Assessment Guidelines/Documents

Appendix B: The Basic Science Teachers Interview Data Collection Instrument

	Interview Question	Sources
1	How did you become a basic science teacher? Are you using the UBE program resources? Probes: What aspect of the UBE program resources are you using?	
2	As a Basic Science teacher, how do you perceive the use of Universal Basic Education (UBE) program as they impact the achievement gap in basic science in the ninth grade?	Research Question 1
3	When did you start using the UBE program resources to teach basic science?	
4	Do you think your level of expertise is sufficient for teaching the basic science subject? Why or why not? Probe for educology of science, teacher quality, and disposition	
5	What strategies are you using to support students meet proficiency in basic science while meeting the Millennium Development Goal in basic science?	
6	What stands out for you about using the UBE program resources to teach basic science?	
7	What grading criteria are you using prior to adopting the UBE program?	Fullan (2007) Literature
8	How did the introduction of the UBE program in the school district influence your current grading process? How would you compare your current grading process with your former grading process? Describe the basic science achievement progress of your students for the past 3 years? Probe: Probe the difference between the previous achievement and the current achievement.	Fullan (2007) Literature

9	When you think about using the UBE program resources to teach basic science, are there successes or concerns you are experiencing in the implementation process? Probes: Are there other implementation concerns such basic science achievement concerns? Change of basic science grading process?	Research question Literature
10	Do you think the National basic science standards has influence on the basic science achievement of the students in your class? Are there global goals for the current grading process you are using? Probe for MDG, SDG.	
11	How is the grading process influencing the basic science achievement of your students? What is your perceived level of difficulty of teaching basic science using the UBE program resources?	Research Question 1
12	Are you currently adopting the UBE program?	
13	Tell me more about what influenced your using the UBE program resources to teach basic science in you class. Probe: Probe for the perceived outcome of using the UBE program resources to teach and grade students (assessment standards, assessment gaps, achievement factors, teachers experience and dispositions).	Research question 1
14	Would you say the UBE program is helping the basic science achievement of the students in basic science? Probe: Probe for changes in basic science results for about three years.	Literature
15	What would you describe as a UBE program outcome for basic science? How are you getting to that outcome?	Fullan (2007) Literature
16	What are your views on the barriers that hinder the basic science achievement of you students?	Literature

	Probe: Probe for teachers' perception of factors influencing the basic science achievement in the school.	
17	Are there other concerns you want us to discuss about the UBE program resources and how they can be used to improve basic science achievement in you school?	
18	What are your recommendations for the improvement of the implementation of the UBE program in this school district? How could the recommendations be used to improve the basic science achievement of the students in the school?	

Note: Every participant will be allowed to respond to all the questions as addressed above