UNIVERSITY OF EDUCATION WINNEBA

EFFECT OF DOUBLE TRACK ON TEACHING AND LEARNING OF INTEGRATED SCIENCE IN SOME SELECTED SCHOOLS IN ASHANTI REGION

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MASTER OF EDUCATION

2023

UNIVERSITY OF EDUCATION WINNEBA

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A dissertation in the Department of Science Education Faculty of Science Education, submitted to the School of Graduate Studies in partial fulfillment of the requirements for the award of the degree of Master of Education (Science Education) in the University of Education, Winneba

OCTOBER, 2023

DECLARATION

STUDENT'S DECLARATION

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

SIGNATURE:…….

DATE:…….

SUPERVISOR'S DECLARATION

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

NAME OF SUPERVISOR: DR. CHARLES K. KOOMSON

SIGNATURE:…….

DATE:…….

DEDICATION

This work is solely dedicated to my parents Mr. Robert Ansah and Mrs. Rebecca Manu.

ACKNOWLEDGEMENTS

I really appreciate the following personalities for the contribution towards this whole work. Mr. Obed Baah Yanney of Aburi Presby Women College of Education, Mr. Benjamin Eduful of Mfantipim SHS Cape Coast, my wife Mrs. Lydia Opuni Asantewah and Mrs. Lawrencia Effah Nyarko of Upper Denkyira East Municipal Assembly

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ABSTRACT

The double track system of education was introduced in the 2018/2019 academic year in 400 senior high schools across the country, Ghana. This was due to increase in students enrolments as existing facilities could not cater for the classroom demands and dormitory accommodation. The study explored the challenges and coping strategies facing management of double-track schools in selected schools in Ashanti Region of Ghana. The study employed the convergent mixed method research design. The target population for the study were management and second year students of three randomly selected double-track schools in Ashanti Region. Management were purposively and conveniently sampled and interviewed using timely interview schedules. The data was transcribed, coded and thematically analyzed. The students were also randomly sampled and given structured questionnaire to answer. The data was coded and entered into IBM SPSS Version 21, and analyzed with descriptive and inferential statistics. Drawing from the job Demand Resources Model and Robert Merton's theory on adaptation, the study found out that double track-track schools are faced with infrastructure challenges, inadequate human resource, untimely release of funds, inability to go for vacation. However, if the challenges are not timely met, they would affect effective delivery of education at the senior high school level. As a result of the effect of the challenges, management mostly adopted innovative strategies to cope with the situation at stake. The study therefore recommended that government and other agencies should try to provide the needed resources to nip these challenges in a bud.

CHAPTER ONE

INTRODUCTION

1.0 Overview

This chapter presents the background to the study, the statement of the problem, purpose of the study, the objectives and the research questions that guided the study. Again, it presents at the educational significance, delimitations, limitation and organization of the study.

1.1 Background to the Study

The history of European activity on the Gold Coast is directly related to the first history of official, western-style education in Ghana. The first Europeans to reach the Gold Coast were the Portuguese in 1471. The then governor of the Portuguese at the Elmina Castle was compelled by imperial orders in 1529 to teach the local inhabitants how to read, write, and practice religion.

However, some of the measures the Portuguese government used caused a number of issues in the educational system, and the current education reform was intended to address these issues. The Ghanaian government decided to overhaul Ghanaian education in 1973 to make it more practical and less intellectual (Adu-Agyem, 2017). The Dzobo Committee was consequently established to revamp the content and make it more applicable and culturally relevant to Ghana. This was done to empower the person to significantly contribute to the nation's economic progress. In order to pinpoint the system's flaws and determine the most effective way to fix them in order to ultimately promote high-quality education, they took into account the structure and content of the educational system at the time. The goal of the new education reform was to give each student a comprehensive, high-quality education. This would allow

educational outcomes to be self-fulfilling and contribute positively to the nation's socioeconomic development. Given this, it is essential to examine Ghana's recently reformatted educational system and talk about how to ensure the highest possible quality of education (Adu-Agyem, 2017).

They considered the structure and content of the previous educational system in order to identify anomalies in the system and how to best correct them in order to promote quality education. The rationale for the new education reform was to provide holistic and quality education to individuals. This would enable the products of education to be self-fulfilled and help contribute productively to the socioeconomic development of the country. In light of this, it is imperative to take a look at the newly reformed education system in Ghana and discuss how best-quality education can be achieved (Adu-Agyem, 2017). The learners receive a strategy of inquiry and a methodical approach to processing knowledge about the physical world through science education. This is why any knowledge-based initiative to advance health, nutrition, family planning, agriculture, and industry needs science education as a foundation (Copon & Kuhn, 2004).

There are two main goals for science education. The first goal is to increase citizens' scientific literacy in areas that directly impact their daily lives and society so that they can make informed decisions. This is crucial for the long-term growth of a contemporary, technological civilization. The second goal is to increase technical capabilities by educating students for scientific disciplines in higher education and careers in science and equipping the future workforce with fundamental science-based knowledge and skills. Giving all students access to high-quality science education will

have a significant impact on a country's development prospects, given the possible rewards (Copon & Kuhn, 2004).

Major policy changes are taking place in educational systems all across the world. One of these modifications is connected to the rise in student enrollment (Acedo, 2009). Policy changes have consequences, and these consequences or effects can be either beneficial or negative. Governments are responsible for ensuring that the majority of their population fully benefits from all of their initiatives. The government of Ghana implemented the Free Compulsory Universal Basic Education (FCUBE) policy in 2006, which resulted in a nearly doubling of the number of students enrolled in basic education from the 3.5 million students enrolled in the 1999–2000 academic year to the nearly 7 million students enrolled in the 2010–2011 academic year (Darvas and Balwanz, 2014). One of the long-lasting measures to strengthen the human capital base of the nation is the implementation of Ghana's Free SHS educational policy. The percentage of citizens who are literate has increased in nations that offer free education. However, they had to deal with the difficulties brought on by the rise in enrolment. Perhaps increases in enrolment are attributable to the elimination of school fees, which allowed more children to access an education.

Ghana's government implemented the free senior high school policy in September 2017. Many basic school dropouts are anticipated to benefit from the free SHS program by being able to enrol in second-cycle education. The free SHS policy makes a significant contribution to Ghana's Free Compulsory Universal Basic Education (FCUBE) strategy and goes a long way toward ensuring that all children have widespread access to education. According to the Ministry of Education's EMIS, 424,092 students were enrolled in Senior High School's first year during the first term

of the 2017–2018 academic year, which is an increase of around 63% over the 260,210 students enrolled during the previous academic year's first trimester (2015). It is predicted that in the coming years, secondary education will be the main method for enhancing the human capital of the nation.

According to the current study, it is reasonable to conclude that given the enormous increase in senior high school enrolment brought on by the implementation of the free senior high school policy, the double track system can realistically make use of the country's senior high schools' limited capacity to offer educational opportunities to thousands of students who would have otherwise been wallowing in the streets. Therefore, what is a two-track system? With the double track system, the entire student body and staff are split into two tracks, with one track attending class while the other is on vacation, and vice versa. While the second track is also known as the gold track, the first is known as the green track. There will be forty-one (41) days off between each track's eighty-one (81) day academic semester. Three distinct terms are included in the Ghana Education Service school calendar, which runs from September through July. The first term runs from September to December; the second from January to April; and the third from April/May to July. Under the present double-track system, the academic year is split into two semesters. While the second session begins in March and runs through July, the first session begins in September and concludes in December. It is significant to highlight that between December and March, third-year students will have access to an academic assistance program under the new educational system. According to the Ministry of Education, the double-track system is anticipated to close an enrolment deficit of 181,992. The Ministry noted that admissions to senior high schools increased significantly from 362,118 to 472,000 students during the 2018–19 academic year. There is now a shortage of 183,000

students nationwide due to the 290,737 total students enrolled in schools. The double-tracking school calendar, according to the ministry of education, will guarantee that the school can hold more kids than its initial capacity by more than 30%. That is, Ghana's senior high schools can accept up to an additional 30% of qualified pupils, depending on their current enrolment.

This should make up for the intake shortfall (Ministry of Education, 2018). The new arrangement increases the number of teaching hours from six per day to eight every pay day. Under the planned double-track system, teaching hours will rise from 1,080 hours per year under the single-track system's current configuration to 1,134 hours annually. It's also important to note that not all senior high schools in Ghana will use the double-track system, which is only available to first-year students for the 2018–19 academic year. It will likely be implemented in institutions with very large class sizes.

1.2 Statement of the Problem

The Ghanaian government's adoption of the Free SHS policy in September 2017 resulted in a 33.2% rise in enrolment (Partey, 2018). The Ministry of Education reports that the 521,710 candidates who registered and took the BECE in 2018 left a shortfall of 181,993 places in Ghanaian institutions. Approximately 24,880 students will not enrol, according to the ministry, down from 62,453 in 2017. (MoE, 2018). The Ghanaian government implemented a double-track system through the ministry of education and the Ghana Education Service in an effort to improve the current situation. There have been numerous educational interventions in Ghana. The adoption of the double-track system and free education at the SHS level, however, appear to be of utmost importance. The double track system is being implemented to enable the government to handle the extra enrolment and guarantee that the free SHS

is available and accessible to all eligible students (Offei, 2018). More pupils can enrol in the same school using the double enrolment system. For instance, instead of having all eight hundred (800) students on one track, a school with eight hundred (800) students may raise enrolment by about 30% to 1040 students and have 520 students on each track. Although the double-track system aims to address enrolment deficits, educational stakeholders, as well as NGOs, have expressed various concerns about the increased enrolment and its implications for senior high school administration and management and the quality of education in the nation. In light of this, the current study aimed to investigate how the teaching and learning of integrated science in a few chosen senior high schools in the Ashanti region might be affected by double tracking.

1.3 Purpose of the Study

The goal of the study was to determine how double track affected the teaching and learning of integrated science in a few chosen senior high schools in Ghana's Ashanti region. In a senior high school with two tracks of instruction, it also looked at possible solutions to problems with teaching and learning integrated science**.**

1.4 Research Objectives

The objectives of this study were to:

1. Investigate the extent to which double track education system is a challenge to teaching and learning of integrated science.
2. Determine the attitude of teachers and learners towards the implementation of double track education in senior high schools.
3. Determine the significance of double track educational system in senior schools.

4. Enumerate some solutions to challenges in teaching and learning of integrated science in a double track practicing senior high school.

1.5 Research Questions

1. The following research questions guided the study.
2. To what extent does double track education affect the teaching and learning of integrated science in senior schools?
3. What is the attitude of teachers and learners towards the implementation of double track education in senior high schools?
4. What is the significance of introducing double track educational in the selected senior high schools?
5. What is the solution to the challenges in teaching and learning of integrated science in senior high schools?

1.6 Significance of the Study

The results of this study will help practitioners understand how the dual-track educational system affects the teaching and learning of integrated science. The study will aid the Ghana Education Service in the execution of policies. The study will also add to the body of knowledge regarding Ghana's adoption of a double-track educational system and its impact on the delivery of integrated scientific instruction in senior high schools. The results of this study will again advise educational authorities and head teachers to design in-service training that will keep their instructors current with contemporary methods of teaching and learning in double-track schools, thereby enhancing instructors' instructional capabilities and resulting in higher levels of performance on the part of students.

1.7 Delimitation of the Study

Since the participants were chosen from one of Ghana's sixteen regions, one study cannot be extended to all senior high schools and integrated science teachers in Ghana. Once more, it was restricted to DTSEs in the Ashanti region's Double-Track senior high schools. Additionally, the study was limited to senior high school integrated science teachers alone**.**

1.8 Limitation

One obstacle the researcher ran into was some schools' reluctance to share crucial documents for the exercise. Because they feared being victimized, some teachers and students were hesitant to share information. Once more, the study area's dispersed school system made getting around difficult, making it challenging for the researcher to visit the chosen schools. This unfavourable effect made the data collection process take longer. Other restrictions were a lack of funding, inadequate time, bureaucratic guidelines to follow when doing research at some institutions, and the respondents' level of cooperation.

1.9 Organization of the Study

There are five chapters in the study. The background of the study, the problem statement, the purpose of the study, the research objectives, the research question, the significance of the study, the scope and limitations of the study, the delimitation of the study, and the organization of the study were all included in the first chapter's introduction of the research topic. The second chapter reviewed papers, journals, and other sources of literature that were pertinent to the study's subject. Additionally, the theoretical framework, conceptual framework, and empirical review were offered in this chapter. The third chapter presents the study's methodology. A description of the

research design, the population and sample, the sampling process, the research instruments, the testing of the validity and reliability of the instruments, and the data collection process are all included. An analysis of the findings from chapter three was offered in the fourth chapter. The summary, recommendations, and areas for additional research were discussed in the fifth chapter.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Theoretical Framework

The theory of the spacing effect and the school learning model serve as the foundation for this investigation. According to Carroll's Model of School Learning, students can learn if they are given the proper instruction. According to him, learning assignments that are divided into smaller ones and spread out over a long period of time enable kids to learn more successfully. In Carroll's paradigm, knowing how quickly kids are learning hinges on knowing how successful they have been over a predetermined amount of time. The "spacing effect," as defined by Vlach and Sandhofer (2012), is the discovery that learning events that are spaced out across time rather than those that occur in rapid succession improve long-term memory.

According to early proponents of spaced learning like Cepeda, Pashler, Vul, Wixted, and Rohrer (2006), the benefits of spaced learning extend beyond memory for particular material like lists of words or facts. Instead, spaced learning also improves students' ability to learn and apply new ideas. Additionally, the spacing effect is a component that might help many other educational approaches succeed (Vlach & Sandhofer, 2012). The principles of Carroll's School Learning and Spacing Model The double-track senior high educational system in Ghana, also known as year-round education or the multi-track education system, is related to the effect in that it is anticipated that teaching hours will rise from 1,080 per year under the old system to 1,134 hours under the new system. This suggests that the number of teaching hours per day grew from six to eight, with the possibility of learning taking place over an extended period of time.

2.2 Educational Reforms

Free, Compulsory Universal Basic Education is referred to as FCUBE. It is a comprehensive program created to offer all Ghanaian children of school age a high-quality education at the Basic Education Levels (Kindergarten, Primary, and Junior High School) (JHS). It is one of the educational policies of the Ministry of Education. On a fundamental level, the FCUBE program is similar to ongoing educational reform initiatives. Instead, it is to make those programs stronger in order to confront the major obstacles to reform at the primary and secondary levels.

According to J.H.S. Agbenyega (2007), the 1992 Ghanaian constitution recognized all Ghanaians' access to and support for education as a fundamental human right. According to Tagoe (2011), the free compulsory universal basic education (FCUBE) reform, which ran from 1995 to 2005, was put in place to address the 1987 reform's shortcomings. According to Tagoe (2011) and Sackery (2008), the strategy aims to enhance basic education access for girls and the less fortunate members of society while also enhancing teaching practices and student outcomes. According to the Ministry of Information and National Orientation (2007), the pre-tertiary education system was reduced from 17 to 12 years in 1996, when it included 2 years of optional kindergarten, 6 years of primary education, 3 years at junior secondary school, and 3 years at senior secondary school (SSS). After junior high school, pupils have a variety of possibilities, including technical or vocational schools, training institutions, polytechnics, or universities. Akyeampong et al. claim that (2007, P 10). The 1995 FCUBE reform encountered similar obstacles to the earlier reform in terms of how to maintain early enrolment gains and universalize basic education for all.

The difficulties, according to Bame (1999), were brought on by the emphasis placed too heavily on material inputs rather than how instructors' attitudes and behaviours in the current educational system were used to handle unexpected pedagogical dilemmas incorporated into the updated curriculum.

In Ghana's general elections of 2000, the New Patriotic Party (NPP) took the reins of government. After two years, the government established a commission to assess the educational system, which was headed by Professor Josephus Anamuah Mensah, vice chancellor of the University of Education, Winneba. The major tenets that guide the implementation of this reform are the improvement of science and technology, the preservation of traditional indigenous knowledge or creativity, and the development of human resources for industrial progress. The administration headed by John Agyekum Kuffour implemented a new educational system that not only revised the system's curriculum but also increased the length of senior high school from three (3) to four (4) years. It is important to remember that the first year of high school was spent studying "core topics" like English, math, integrated science, information and communication technology (ICT), and social studies.

According to the Anamuah Mensah report, nothing has changed since the reforms of 1987. The sole variation was the addition of two (2) years of kindergarten, bringing the total length of universal basic education to eleven (11) years. The Universal Basic Education structure consisted of two (2) years of kindergarten, six (6) years of primary education, and three (3) years of junior high school (JHS) (Akyeampong, 2007). According to Adamu-Issah et al. (2007), one of the 2007 reforms calls for the teaching of the Ghanaian language in kindergarten and lower primary. Also, emphasis was placed on literacy, numeracy, and creative arts at the basic level and the change

from three (3) years of senior secondary school (SSS) to four (4) years of senior high school (SHS). The committee's ideology for this change of years in SHS is to ensure that teachers should be able to finish the syllabus and also give students adequate time to prepare for the West African Secondary School Certificate Examination (WASSCE). It is worth noting that the 2008 general elections saw the New Democratic Congress (NDC) reversing the decision made by the NPP with respect to four (4) years in senior high school back to three (3) years.

Additionally, emphasis was placed on basic literacy, numeracy, and creative arts skills, and senior high school was changed from three to four years from senior secondary school (SSS), which was previously three years (SHS). To ensure that teachers can complete the curriculum and provide students with enough time to prepare for the West African Secondary School Certificate Examination, the committee's philosophy for this shift of years in SHS is to make sure that all parties are satisfied (WASSCE). It is noteworthy that following the 2008 general elections, the New Democratic Congress (NDC) changed the NPP's plan to reduce the length of senior high school from four (4) years to three (3) years. Every succeeding government in Ghana has placed a lot of faith in education as a key tool for accelerating social and economic growth, regardless of the anticipated shift in educational policies with changes in political administration. However, this emphasis on education has resulted in a number of adjustments to educational reform.

2.3 Empirical Review

Several studies that have been done in relation to the topic are presented in this portion of the thesis. These have been provided in accordance with the study's goals.

Background of students and teachers

Students' backgrounds included their ages, sexes, academic standing, and programs of study. For instructors, factors to consider include sex, age, amount of education, tenure at the position, and rank**.**

Sex of students and teachers

The data for the 2014–15 academic year, as reported by MOE (2015), showed that the proportion of female enrollment had increased during 2013–14 and had reached 47.4% out of a total enrollment of 750,706 students (MOE, 2014). Once more, in 2018, there were 1,008,237 students enrolled in SHS, with a female enrollment rate of 47.7%. (MOE, 2019). The number of teachers working in the nation as a whole is 361,343. Among them, women make up 61.2%. (MOE, 2018). In a study on the factors affecting equity in access to senior high school education in the Ghanaian educational system, Ahiatrogah and Bervel (2013) found that while more boys than girls were admitted to SHS, the gender gap in those who were accepted was not statistically significant**.**

In every industry, with the exception of education, women are underrepresented in leadership roles. Studies have offered explanations for why there are few women in leadership roles. According to Coffey and Delamont (2000), women may decide not to apply for promotions at work because of lack of essential aspirations, a lack of knowledge about the promotion system, or a lack of confidence in their ability to achieve (Coffey& Delamont, 2000). Another factor that limits many women's possibilities for leadership is the male majority in education administration (Limerick &Lingard, 1995).

Age of students and teachers

Ghana's educational system is separated into primary, secondary, and postsecondary levels. Kindergarten basics start when a child is four years old. Primary schooling lasts six years and begins at age six. The junior high education, which begins at age 12 and lasts for three years, is the last stage at the fundamental level. Secondary schooling lasts three years and starts at the age of 15. Beginning at age 19, tertiary or post-secondary education lasts between three and four years. According to MOE (2018), the majority of Ghanaian children frequently enroll in kindergarten when they are too old to do so. 42.0% of Ghanaians will be in pre-school at the age of six, when the majority of children should be in Primary 1. All other educational levels are subsequently impacted by this initial overage enrollment. Repetition of a grade when these students should be in the next would be another factor.

Again, out of the 361,341 teachers employed overall, 25.0% are between the ages of 18, 30. 25% are also between the ages of 31 and 35. Moreover, 12.0% of the population are between the ages of 41 and 45, 8.0% are between the ages of 46 and 50, 7.0% is between the ages of 51 and 55, and 6.0% are between the ages of 56 and 60. Hence, the workforce is 50.0% under 35. (MOE, 2018).

Programs of study of respondents

According to MOE (2018), SHS enrollment across programs from 2011 to 2014 showed that General Arts had the highest enrollment (44.10%) while Science enrollment (11.7%) tended to be the lowest. Enrollment in technical subjects was 3.3%, but it declined to 3.1 in 2014, while enrollment in visual arts was 6.4%. Consequently, 59.6% of students are enrolled in business and arts degrees, while 40% are in science and applied science programs (MOE, 2018).

2.4 Double- Track School System of Education

According to the Social Enterprise Development Foundation-Ghana (SEND-Ghana), the implementation of the free senior high school policy (FSHSP) increased senior high school enrollment. This translates to a 32.2% increase in enrollment from 300195 students in the 2016–17 school year to 396,951 students in the 2017–18 academic year. SEND-Ghana noted further that the logistical infrastructure problems were revealed by the free SHS. As a result, these difficulties impacted the policy's effective implementation and peaceful academic work (SEND-Ghana, as cited in ADDO, 2019).

According to Mensah (2019), teachers' perceptions of the double-track senior high school system in Ghana, the DTSE's implementation increased enrollment and decreased class size. Also, contact hours were extended, additional teachers were hired, and school resources were used effectively.

Mensah (2019) discovered that the necessary stakeholder consultation was not conducted prior to the DTSE's implementation. Once more, the Ghanaian government's allocation of cash and logistics was inadequate and tardy. Also, due to an increase in holidays and the inability to maintain school facilities, the quality of instruction was reduced along with the difficulty to complete the curriculum (Mensah, 2019).

The use of Extended Contact Hours

There was an increase in contact hours and a decrease in class sizes as part of the DTSE's operationalization. This section offers empirical research on larger class sizes and contact hours. In a study on the association between the quantity of contact hours and the school site standard test, Jez and Wassmer (2013) discovered a favorable

correlation between the two. Once more, the research showed that an extra week of classes or 15 minutes per day of instruction can boost academic progress for all children by 1.5% on average and by 1.0% for those from low-income households.

Once more, Dewey, Husted, and Kenny (2000) sampled 4,300 male students in the United States' 12th grade and looked at how the number of school days affected verbal and mathematical performance. The results of the study showed that verbal scores improved with a longer academic year. Regression-based research was done by Figlio (1999) on a sample of American high school pupils. According to the study, a 10% increase in contact hours was associated with a 5.0% improvement in science achievement.

On the other hand, Baker, Fabriga, Galindo, and Mishook (2004) conducted research on the connection between class time and student achievement. According to the study, changes in instructional time did not affect students' achievement, either favorably or adversely, unless they exceeded low or high amounts of time. Instead, curriculum and teaching quality appeared to have a significantly bigger impact on achievement.

It should be emphasized that teacher timeliness and the amount of time students spend focused on tasks in class can both affect how well a student is educated (Akaguri, 2011). Despite the fact that students are typically expected to be learning the entire time they are in a classroom, according to Abadzi (2009), this expectation is not always met because of teachers' inadequate subject-matter expertise. In the East Gonja District of Northern Ghana, Donkor and Kuusiemeh (2017) investigated the effects of teacher absence on students' performance at elementary schools. The study found that a decrease in contact hours was caused by teacher absenteeism. As a result,

teachers were unable to finish the requisite syllabus, which affected students' performance in exams. The loss of a teacher lowers academic progress, causes chaos in the school's administration, and represents a waste of money (Donkor & Kuusiemeh, 2017).

Moreover, Mary, Crystal, Nitara, and Wendy (2015) discovered that on any given school day, 25.0% of instructors in India's rural primary schools were missing. Low levels of student performance across the entire school as a result of this absenteeism, ranging from 40.0% to 50% in grade-level literacy and numeracy. In a study conducted in Botswana, Dunne and Leach (2005) discovered that teachers' lack of professionalism was one of the main reasons why children performed poorly. Many schools experienced problems with teacher tardiness, absenteeism, and refusal to teach even when the teachers were present at the school. The Bureau of Labor Statistics is one study that contests the idea that teacher absences have a detrimental impact on students' academic achievement (1996). In the study, urban instructors did not perceive teacher absence as a problem. That is, only 1.6% of professors believed that students' inability to attend class had a detrimental impact on their academic performance.

2.4.1 Effects of double-track system on teaching and learning

Previous research has demonstrated that a double- or multi-track educational system provides a number of benefits. According to Warrick-Harris (1995), one advantage of multi-track educational systems is that more students are eligible for school selection for various recreational and sporting activities. Ballinger (2000) argued that eliminating the enormous learning loss that takes place over the summer was the main justification for establishing a multi-track educational system. In order to determine

the effects of multi-track calendars in Wake County, NC, McMullen et al. (2015) employed a quantile regression approach to explore the distributional implications of a multi-track year-round educational system (USA). The researchers discovered that the year-round academic schedule had a positive impact on the academic achievement of the kids who performed the least well. Palmer and Bemis (1999) expanded on the benefits of multi-track education, listing them as (a) improved achievement, (b) improved teacher and student attendance, (c) decreased discipline issues, (d) lower levels of teacher stress, (e) higher levels of teacher and student motivation following more frequent breaks, and (f) more enrichment opportunities available during breaks. Additional benefits of multi-track educational systems include managing overcrowding, reducing class sizes, providing chances for teachers to work throughout the year, and making good use of resources with the potential to save money (Stenvall, 2000).

2.4.2 Perceived Challenges of the Double Track System

Some of the difficulties are clear despite the fact that the Double Track system began in September 2018, the first batch (Green Track) has finished its 41 days, and the second batch (Gold Track) started on November 10th. Resources, logistics, and the method used to choose students for the tracks are some of these. The Public Relations Officer of the Free SHS Secretariat confirmed these difficulties in a radio interview with Citi FM on November 13, she also stated that her organization was taking note of the difficulties and would work to have them remedied. The year-round schooling practically has no impact on the academic achievement of the ordinary student but primarily serves as a cure for those who do not have enough money for summer sessions, even if the impact of the double-track system on academic performance has not been objectively determined. According to S.C. Mcmullen &K.E. Rouse.

Additionally, choosing students for tracks without taking into account their observed talents or choosing them based on factors other than academic ones can significantly reduce the projected benefits of monitoring (R. Korthals, 2015). Adopting the double-tracking approach implies that since courses are always in session, maintenance of school infrastructure must be done at night and on weekends (E. Ferdinand 2018). When maintenance takes longer than 15 to 20 days to complete, it puts pressure on school administration and could cause disruptions in the classroom. In terms of a multi-tracking system, he continued, there is a reduction in total cost per student, but administrative costs have a propensity to rise.

In Ghana, this program was a key election campaign pledge, but there was little widespread national agreement on how to implement it. Key stakeholders were not asked for their opinions; therefore, they were unable to contribute. An NGO in Ghana, the Integrated Social Development Center (ISODEC), for instance, voiced concerns about the FSHSP's hurried implementation and lack of engagement. (Addo, 2019). The following conclusions were noted in the Public Interest and Accountability Committee's (PIAC, 2020) report on the results of the free SHS monitoring conducted in 51 schools across eight areas in 2018 and 2019: FSHSP had led to the prompt reporting of pupils at the start of every term. Again, there was a supply of jerseys and school uniforms in addition to the growth in enrolment. Also provided, if occasionally late, were fundamental textbooks. The initiatives had improved food diversity and quality overall, too (PIAC, 2020).

The Committee expressed worry, however, over the lack of healthy and high-quality supplies, delays in the delivery of food and other necessities, and an excess or

shortage of certain commodities. Once more, the elimination of cut-off grades resulted in the admittance of low-grade pupils to schools in disadvantaged areas.

Once more, students were not adequately informed that elective textbooks were not covered by the FSHSP. This made parents hesitant to buy textbooks for their children, which had an impact on both teaching and learning. Also, there were delays in the delivery of funds to schools. They often have to rely on money from other sources and receive it in batches. Also, there were once more insufficient classrooms, beds, labs, and equipment, a bedbug outbreak in student residence halls, poor or insufficient staff housing, a paucity of infirmaries, and where they were present, they lacked skilled medical staff. As a result, the committee advised school administrators to keep a close eye on the quality of food supply. Once more, in order to avoid under and oversupply, the school should issue orders for the supply of foods, along with guidance on the price and number of items.

Once more, PIAC (2020) advised that in order to avoid delay, the contract for school uniforms, vests, and jerseys should be issued promptly. Cut-off grades should also be reinstated. To prevent delays in the academic year, monies should be distributed quickly to the schools. In order to put a stop to the DTSE, infrastructure provision needs to be accelerated. PTA operations were ultimately streamlined, which was praised by the committee, but they should be permitted to continue as voluntary associations independent of the supervision of school authorities (PIAC, 2020).

According to studies, there are a number of obstacles that free secondary education must overcome, which lowers the standard of instruction. According to a research by Asumadu (2019) conducted in the Denkyembour District, senior high schools lacked suitable infrastructure because rising student enrollment did not match up with

comparable infrastructure and other facilities, which led to crowding and congestion. Asumadu (2019) identified the lack of suitable educational resources, including learning materials and teachers, as another issue. Likewise, the survey revealed that more students in SHS meant more work for teachers. Since enrollment increased without a corresponding infrastructure, delays in the allocation of money made it difficult for schools to implement their plans on time, which resulted in the operationalization of the DTSE.

2.4.3 Measures to mitigate the challenges of double track school system

Given the foregoing, it would be beneficial for Free SHS implementers (the Ministry of Education, via the Free SHS Secretariat) to think about reaching an agreement on a dependable and sustainable financing source specifically for the policy. Consider raising the value-added tax (VAT) or allocating a portion of petroleum earnings to the free SHS. Infrastructure might be enhanced with a steady source of money to stop the temporary double-track system caused by inadequate infrastructure. This will reduce the difficulties associated with the free SHS. Alternately, the program's administrators may carry out a careful analysis of the cost of secondary education for each student and provide coupons to all qualified students, which they could spend at either public or private senior high schools. This will increase the options available to parents and their children for school placement by utilizing the resources and infrastructure of private schools.

2.5 Teaching-Learning Principles

Knowledge and understanding of the psychology of learning are basic to making decisions about and using appropriate instructional strategies and techniques. Some understanding by the teacher of the conditions that stimulate learning and how

learning takes place is essential if instruction is to be effective. Teaching is best described as guiding and directing the learning process such that those who are learners acquire new knowledge, skills, or attitudes; increase their enthusiasm for learning; and develop further their skill as learners (Newcomb et al., 1986) There has been a tremendous attention given to research studies on teaching learning principles at the secondary level of instruction. Worsham and Stockton (1986, p. 7) said, "the most critical issue facing educators today is students' lack of adequate thinking skills for solving problem and making decision.''

Thirteen principles of teaching and learning which have helped to shed light on the process, were stated by Newcomb et al. (1986, p. 26-40) as follows:

1. When the subject matter to be learned possesses meaning, organization, and structure that is clear to students, learning proceeds more rapidly and is retained longer
2. Readiness is a prerequisite for learning. Subject matter and learning experiences must be provided that begin where the learner is.
3. Students must be motivated to learn. Learning activities should be provided that take into account the wants, needs, interests, and aspirations of students
4. Students are motivated through their involvement in setting goals and planning learning activities
5. Success is a strong motivating force
6. Students are motivated when they attempt tasks that fall in a range of challenge such that success is perceived to be possible but not certain
7. When students have knowledge of their learning progress, performance will be superior to what it would have been without such knowledge
8. Behaviours that are reinforced (rewarded) are more likely to be learned

9. To be most effective, reward (reinforcement) must follow as immediately as possible the desired behaviour and be clearly connected with that behaviour by the student.
10. Directed learning is more effective than undirected learning.
11. To maximize learning, students should "inquire into" rather than "be instructed in" the subject matter. Problem-oriented approaches to teaching improve learning
12. Students learn what they practice
13. Supervised practice that is most effective occurs in a functional educational experience.

These principles constitute the foundation for all phases of the instructional process, the organization and structure of subject matter, motivation of students, appropriate use of reward and reinforcement, and to the selection of teaching techniques.

Similarly, Tyler (1969, p. 65) proposed two general principles to guide teachers in selecting learning experiences namely, firstly, for a given objective to be attained, a student must have experiences that give him an opportunity to practice the kind of behaviour implied by the objective. For example, if one of the objectives is to develop skill in problem solving, this cannot be attained unless the learning experiences give the student ample opportunity to solve problems. Secondly, the learning experiences must be such that the student obtains satisfactions from carrying on the kind of behaviour implied by the objectives. In the same vein, Yelon (1996, p. 3) introduced the following ten powerful principles that excellent teachers should apply to the planning and selection of learning experiences for learning:

1. Meaningfulness. Motivate students by helping them connect the topic to be learned to their past, present, and future.
2. Prerequisites. Assess students' level of knowledge and skill adjust instruction carefully, so students are ready to learn the material at the next level.
3. Open Communication. Be sure students find out what they need to know so they can focus on what to learn.
4. Organized Essential Ideas. Help students focus on and structure the most important ideas, to be able to learn and recall those ideas.
5. Learning Aids. Help students use devices to learn quickly and easily.
6. Novelty. Vary the instructional stimuli to keep students' attention.
7. Modelling. Show students how to recall, think, act, and solve problems so that they are ready to practice.
8. Active Appropriate Practice. Provide practice in recalling, thinking, performing, and solving problems so that students apply and perfect their learning.
9. Pleasant Conditions and Consequences. Make learning pleasing, so that students associate comfort with what is learned; and make learning satisfying, so that students keep learning and using what is learned.
10. Consistency. Make objectives, tests, practice, content, and explanation consistent, so that students will learn what they need and will use what they have learned outside of the instructional setting. (Yelon, 1996, p. 3) He advised teachers to gain a basic understanding of these underlying principles and use them rather than imitate other people's teaching style (Yelon, 1996, pp. 3-4).

2.6 Summary

As we have seen all above methods have their pros and cons. But, effectiveness of teaching depends upon the method that teacher adopts. Group teaching does not happen over right. For effective teaching, knowledge of different methods of teaching science in essential. The teacher however must be free to choose any method that he thinks is suited to the students. For many decades now, which is not practiced i.e., creating excitement of science, use of new and innovative methods must be practiced now. Same are discussed here. In lecture-cum-discussion method is best suited for all lords of students. The basic purpose of this method is to disseminate and encourage them to take part in the discussion.

However, teacher has to see that all students are given equal chance or else this will lose its charm. In laboratory method, the student controls and observed the changes under investigation. Students learn by actual activity students learn many virtues through laboratory activity. Observation method encourages students to develop a keen power of observation and acquire knowledge. This aims at training students mind to store suitable experiences for reasoning and establish facts observation of nature develops a sense of satisfaction and develops awareness towards protection of nature. Project method has certain steps to be followed by students. This method in based on philosophy of pragmatism. The sense practicals develop an attitude to undertake the activity and complete it scientifically.

Problem solving method develop skill of finding solutions to the problem on their own. The students thinking on problem and their understanding of the science behind anything helps them to solve problems of their life objectivity. Students live in the real world and like to deal with concrete things. At the end, we can conclude that it is

you teachers who have to keep in mind, which method is suitable to which type of students under what circumstance. Every method has its merits and demerits. The choosing of methods depends upon your intelligence, resource fullness.

CHAPTER THREE

METHODOLOGY

3.0 Overview

Knowing which research methodology was most appropriate for this study was crucial since different research methodologies are compatible with various contexts. A variety of concepts and ideas are used in research methods to ascertain the reality of a situation through objective observation and analysis. How the study was carried out is described in this chapter. This aided the researcher in gathering data and selecting an analysis strategy for field data. The chapter also covered the numerous techniques used to collect data for research in order to address the research questions. The research design, study population, sample size and sampling technique, data collection tools, and data collection and analysis procedures are covered under the respective subheadings.

3.1 Research Design

A researcher must go through a number of options related to the study before beginning. The first choice to be made, in accordance with Palys (1992), is how to conduct an investigation based on options between qualitative and quantitative approaches. According to Derbile (2003), there has been opposition to these methodologies in the field of research into any topic, whether it be in the social or natural sciences. This can occasionally make it difficult to decide which method to use to conduct the study. It is crucial to choose between these two study approaches because they highlight various underlying epistemologies and research philosophies. This study used a mixed-methods technique to conduct its research. The mixed method approach was used to collect both quantitative and qualitative data, with the latter being obtained later to help explain many of the findings from the former

(Creswell et al., 2009). Because it addresses more comprehensive and in-depth research topics than a single research approach, the mixed method was employed (Creswell et al., 2006). In light of the study's objectives and the usefulness of mixed methods, the researcher used both qualitative and quantitative research techniques to create a research document that, unsurprisingly, provides a clear image and narrative of the relevant reality. Data collection techniques in the field included surveys and interviewing. The researcher interviewed people to gain information for a reference point and then ran a survey together information about problems related to the topic.

The type of research designs the researcher will choose is determined by the study's objectives and purpose (Katundu, 1998). A research design is the general method you use to bring the many elements of the study together logically and cogently (Kirshenblatt-Gimblett & Barbara, 2006). In addition, Koul (2003) described research design as a series of choices that must be made in relation to data gathering. Therefore, the design serves as a framework for data gathering, measurement, and analysis. According to Fink (2001), the research design includes all the steps and procedures needed to contact the respondents. A research design would often outline the methods to be utilized for data collection, the instruments to be employed, and the methods to be used for data analysis. Along with these, Creswell (2003) describes a study design as the strategy connecting the philosophical presumptions to particular procedures. Depending on their philosophies, different researchers employ various designs.

The mixed-methods sequential explanatory design was used for this investigation. This strategy combines quantitative and qualitative research techniques. In the opinion of Tashakkori and Teddlie (2003), multiple approaches are beneficial if they

give a researcher more chances to respond to their study questions. Stange et al. (2006) state that mixed-methods research entails combining quantitative and qualitative approaches to generate new knowledge, which can involve using these two groups of methodologies simultaneously or sequentially to pursue an area of interest. Or, to put it another way, Creswell et al. (2003) defined it as a strategy for combining quantitative and qualitative data gathering and analysis in a single research project or program of inquiry. According to Johnson et al. (2007), who added to the definitions above, mixed methods research is the kind of study in which a researcher or group of researchers combines aspects of qualitative and quantitative approaches (such as the use of qualitative and quantitative viewpoints, data collection, analysis, and inference techniques) for the sake of depth and breadth of understanding and corroboration. According to Creswell (2012), mixed-methods research is the methodical fusion of quantitative and qualitative techniques into a single investigation in order to gain a more comprehensive knowledge of a phenomenon.

The use of a mixed-methods approach enhances the possibility that the data gathered will be richer, more meaningful, and ultimately more effective in addressing the research questions. Mixed-methods research recognizes that all approaches have inherent biases and limitations (Creswell, 2012). A research approach known as "mixed methods" entails gathering, analysing, and combining both quantitative and qualitative data in a single study or over the course of a long-term program of investigation. In the literature, roughly forty mixed-methods research designs have been published, according to Tashakkori and Teddlie (2003). Three concurrent and three sequential designs are among the six most often utilized designs that Creswell et al. (2003) identified. As previously mentioned, the researcher will employ an explanatory design.

According to Ivankova et al. (2006), this approach is very common among researchers and entails gathering and interpreting data in two phases within a single study—first, quantitatively, and then qualitatively. In this design, quantitative data are first gathered and analysed among researchers and entails gathering and interpreting data in two phases within a single study—first, quantitatively, and then qualitatively. In this design, quantitative data are first gathered and analysed. The following gathering and analysis of qualitative data comes after the first step. The study's phase is set up so that it builds on the findings of the previous phase (Creswell & Clark, 2011). Priority is one important decision a researcher employing this design will need to make. Priority, according to Creswell (2003), relates to which quantitative or qualitative (or both) method or phase a researcher prioritizes during the data collection and analysis portion of the study. Depending on his or her interests and/or what they want to stress in the study, the researcher makes this choice. The researcher will prioritize the quantitative method for this particular investigation. The ultimate goal of this methodology is to clarify and explain those statistical results by deeply examining participants' perspectives, while the quantitative data and their analysis provide a general grasp of the research subject (Creswell, 2003). According to Morse (1991), this design is ideal for a study when a researcher needs qualitative data to explain significant (or nonsignificant) results, outlier results, or surprising results.

3.2 Study Area

One of the forty-three districts of Ghana's Ashanti region is the Bekwai Municipal Assembly. When Amansie East District was formed in 1988, an ordinary district assembly was formed from the former Amansie District Council. President John Agyekum Kufuor later divided the western portion of the district into Amansie Central District by executive order on November 12, 2003 (effective February 18,

2004); the remainder has remained as Amansie East District. On February 29, 2008, the district's eastern portion was divided off to become the Bosome Freho District; the remaining portion was upgraded to municipal district assembly status the same year and is now known as the Bekwai Municipal District. The municipality's capital city is Bekwai, which is situated in the southern portion of the Ashanti Region.

3.3 Population

The totality of cases that satisfy a predetermined set of criteria can be thought of as the population (Ary et al., 2006). It should be highlighted that the population always refers to the total collection of factors about which the researcher is interested in learning more and drawing conclusions, regardless of the fundamental unit. It can also be viewed as the intended audience for the researcher's information-gathering and inference-making efforts.

The participants in this study are the science teachers and students at SHS. The SHS Form 3 students and the integrated science instructor are the intended audience. Since they have completed the first and second years of the double-track educational system and will be in a better position to contribute to the study, I have chosen to use the Form 3 pupils. Again, the study will involve integrated science instructors who have worked with double-track students. This is also the case because they have a good understanding of the nature of the double track, and the researcher will benefit greatly from their insights.

3.4 Sampling Size and Sampling Procedure

There are five public schools in the municipality; however, only three of them use a double-track system. There are typically five integrated science teachers per school and 300 pupils overall. The teachers were open to taking part in the study. The

integrated science teachers in Form 3 were chosen using purposive sampling strategy. The third-year classes from all the schools were then chosen, one intact class from each. To make sure that everyone in the class learned from the lessons, entire classrooms were used. Additionally, Dimitrov and Rumrill (2003) argued that using intact groups preserves the participants' native environments while not interfering with the current research environment. As a result, it lessens the reactive impacts of the experimental process, enhancing the research design's external validity. There were 376 third-year students in the first school and 11 courses; 311 third-year students in the second school and 10 classes; and 322 third-year students in the third school. A minimum of 30 people per group is advised for experimental studies, according to Fraenkel et al. Each school's classes were set up in a sequential order. From each school, a class was chosen, and it was made sure that the class size met the criteria set by Fraenkel et al. After that, I met with the students of all the chosen classes 3 science students from School 1, 3 general arts 2 students from School 2, and 3 visual arts 2 students from School 3 and gave them a quick overview of the research. The consent form was freely filled out by interested students.

Table 1: Distribution of Students in Participation Schools

Name of schools	**Wesley High SHS**		**Oppong Memorial SHS**		**SDA SHS**	
Gender	N	%	N	%	N	%
Male(M)	28	62	20	57	19	58
Female (F)	17	38	15	43	14	42
Total	**45**	**100**	**35**	**100**	**33**	**100**

According to Table 2, there were 45 individuals from School 1 who were included in the study, with 28 men and 17 women and an average age of 17 years. School 3 had 33 participants with 19 males and 14 girls, whereas School 2 had 35 participants with

20 males, 15 females, and an average age of 18 years. A total of fifteen (15) senior high school integrated science teachers were used in the study, with five (5) representing 33.3% of the group being female and ten (10) representing 66.7% of the group being male. Out of the fifteen responders, a total of eleven (11) (73.3%) were under the age of forty (40), while four (26.6%) were over that age.

3.5 Data Collection Instruments

Qualitative Instruments

Interviews were employed in this study to gather qualitative data. Domegan and Fleming (2007) state that because so little is known about the subject at hand, qualitative research "aims to explore and to identify issues concerning the problem on the table." (p. 24). A problem's dimensions and attributes are typically ambiguous. Myers (2009) asserts that the goal of qualitative research is to better understand individuals and the social and cultural environments in which they live. These investigations make it possible to examine and portray the complexity and differences of the worlds being studied (Philip, 1998).

Interview

Interviews were used in the second phase of data collection for this study. As stated by Burns (1999) and Zohrabi (2013), conducting interviews is a common and extensively used method of gathering qualitative data. As part of the data collection process, the researcher collects firsthand knowledge from the intended respondents by conducting interviews. According to Flick (2006), an interview reveals current knowledge on a subject in a way that can be conveyed in the form of replies, making it possible for those answers to be interpreted. According to Zohrabi (2013), interviews can be performed in either one of two ways: one-on-one or in a group

setting. Both types of interviews, according to Merriam (1998), are a type of communication with a specific objective. Three themes dominated a semi-structured interview (Appendix C). The first is, "How much does double-track education effect integrated science teaching and learning in senior schools?" The second is, how do teachers and students feel about the introduction of dual enrolment in senior high schools? What is the purpose of implementing double-track education in the senior high schools that have been chosen?

Quantitative Instruments

Questionnaire

Two sets of questionnaires were made available, one for teachers and the other for students. Five portions of the surveys contained similar questions. Sections "A," "B," "C," "D," and "E" made up the group. These were the double-track policy system's perceptions held by the teachers. Teachers and students were asked to rate their level of agreement with a series of closed-ended questions based on the Likert scale. Strongly disagree, disagree, agree, and strongly agree were all options on the Likert scale. By using closed-ended questions, I was able to restrict the kinds of responses that fit within the parameters of this study and maintain emphasis on the problem statement and the study's main objective**.**

3.6 Data Collection Procedures

A consent form from the University of Education Winneba's Department of Scientific Education, signed by the supervisor, was brought by the researcher when she visited all of the participating schools. This form provided information on the study's goal. Following a discussion with the principals, they agreed to support the researcher in conducting the study in the schools and also informed the heads of the scientific

departments. Participants were made aware of what was needed for the study by the researcher. The integrated science instructors in the chosen schools were then given the questionnaire by the researcher. The researcher needed four weeks to gather quantitative data from the several chosen schools. The researcher withheld information such as the names of the participating schools, the names of the teachers, and other personal details in order to safeguard the anonymity and ensure the confidentiality of the identities of participants in this study.

The instrument's piloting was conducted with a few chosen schools in the Bosomtwe District of the Ashanti region, outside the target demographic. The questionnaires were answered by ten (10) integrated science instructors and one hundred (100) senior high school students from Adutwum and Jachie Pramso. As a result of the responses, statements that seemed unclear or deceptive were clarified, and elements that were trivial were replaced. In total, 75 surveys for integrated science teachers and 100 surveys for students were distributed. Of the 15 integrated science teachers, 14 responded to the surveys. When the questionnaire was given out, one of them was not present. 104 out of 113 students submitted the surveys, and the remaining pupils missed class. 93% of the respondents were teachers, and 92% were students. The reliability coefficient for the teacher questionnaire was 0.868, and the reliability coefficient for the student survey was 0.540. Since the two questionnaires produced reliability coefficients above 0.5, they were all quite reliable.

If an instrument's dependability coefficient is greater than 0.5, it is considered to be extremely dependable for a research study, according to Mugenda & Msugenda (2003). Four educational research specialists from the Department of Science Education at the University of Winneba examined the items to determine the items'

content validity. In addition, they analyzed the sections in which the items were put and conducted an analysis of confusing, biased, and deficient items. Their recommendations contributed to proving the accuracy of the products' contents and faces. Five instructors from each school—out of the fifteen total—were conveniently and purposefully selected for an interview using a structured interviewing process. In all, 15 participants were interviewed.

3.7 Data Processing and Analysis

For simple identification, the completed questionnaires were coded and serially numbered. Items were given a Likert scale score of 4, 3, 2, and 1 based on the following responses: strongly disagree, disagree, agree, and highly agree. Additionally, those that were binary received a score of "Yes/Able" = 1 and "No/Not able" = 0. Reverse coding was used for items in the negative. Data were examined using percentages and frequencies to address research questions 1, 2, and 3, while mean and standard deviation were used to address research question 4. Because the goal was to explain the current situation with respect to the construct of interest measured to address the three research questions, descriptive statistical approaches were employed.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Overview

This study sought to determine the effects of double track on the teaching and learning of integrated science in selected schools in Ghana's Ashanti Region. I gathered both qualitative and quantitative data using a sequential explanatory mixed-methods approach. The respondents were integrated science teachers and third-grade students from the selected double-track schools. I utilized IBM SPSS version 21 to analyse the respondents' data using inferential as well as descriptive statistics. I thematically analysed the qualitative data. Analyses and discussions were carried out continuously, building on the research topics of the project.

The questions were answered by each of the 15 integrated science teachers. Once more, 100 of the 113 students who were sampled returned the survey questions. In light of the results, the literature review and the underlying hypotheses for the study were also explored. The chapter's summary appears at the end.

4.1 Data of Respondents and Participants

The biodata of the teachers and pupils at the chosen double-track schools is shown in this section. I used frequencies and percentages to describe my analysis of the traits of both students and teachers.

Table 2: Distribution of Students by Sex

Sex	**Frequency**	**Percentage**
Male	59	59
Female	41	41
Total	**100**	**100**

Source: Field Survey (February, 2023)

As seen from Table 1, of the 100 students, 59% were male and 41% were females.

Table 3: Shows the Sex Distribution of Students in the Schools.

Age (in years)	Frequency	Percentage
12-16	15	15.00
17-20	75	75.00
21-24	10	10.00
Total	**100**	**100.00**

Source: Field Survey (February, 2023)

As seen from table 3, the bulk of the students were between the ages of 17 and 20. Fifteen (15.0%) pupils were in the 12 to 16 age range. Again, 10 (10.0%) of the population was between the ages of 21 and 24. Nobody was older than 25.

Table 4: Shows Track of Students

Track	Frequency	Percentages
Green	70	70.00
Gold	30	30.00
Total	**100**	**100.00**

Source: Field Survey (February, 2023)

As seen from Table 3, 30 (30.00%) students were on the gold track, while 70 (70.00%) were on the green track. Since there were only third-year green track students in the classroom at the time of data collection, the majority of the students were on that track. The pupils on the gold track were on vacation. The few gold track students, on the other hand, were present in class since they came to class on the first day of classes again and management was unable to send them home.

Table 5: Residential Status of Students

Status	Frequency	Percentage
Day	20	20.00
Boarder	80	80.00
Total	**100**	**100**

Source: Field Survey (February, 2023)

Table 4 shows that, of the 100 students, 20.00% of students were day whiles 80.00% were in the boarding house. This indicates that majority of the students were boarders.

Table 6: Shows Sex of the Teachers

Sex	Frequency	Percentages
Male	10	66.7
Female	5	33.3
Total	**15**	**100.00**

Source: Field Survey (February, 2023)

Table 5 shows the sex of teachers. Out of the 15 teachers, 10 (66.7%) were males and 5 (33.3) were females. This shows that females teachers in SHS are fewer than males.

Table 7: Distribution of Educational Qualification of Teachers

Qualification	Frequency	Percentage
Bachelor Degree	8	53.3
Master's Degree	7	46.7
Total	**15**	**100**

Source: Field Survey (February ,2023)

Table 6 shows that 8 (53.3%) of the teachers had bachelor's degrees, while 7 (46.7%) had master's degrees. Some of the teachers were enrolled in different courses leading to the award of master's degrees at the time the study's data was being collected. In GES, having a first degree is a prerequisite for teaching at the SHS level. Any more

credentials would put the person in a better position to be promoted to a higher office. In Table 10, the ranks of teachers are displayed.

Table 8: Shows Distribution of Teachers by Rank

Rank	Frequency	Percentage
Assistant Director II	8	53.3
Assistant Director I	6	40.00
Deputy Director	1	6.7
Total	**15**	**100**

Source: Field Survey (February, 2023)

On the rank of teachers, 8 (53.3%) were on the rank of Assistant Director II (AD II), 6 (40.00%) were on the rank of Assistant Director I (AD I), and 1 (6.7%) was Deputy Director (DD). This shows that teachers who participated in this study are experienced with so much teaching experience.

To what extent does Double Track System affect the Teaching and Learning of Integrated Science in Senior Schools?

Infrastructural challenges

The difficulties with the infrastructure include the lack of proper classrooms, dormitories, desks, textbooks, and dining facilities. Charts were created after the analysis of the results. Students' opinions on whether or not the classroom had enough desks are shown in Figure 1.

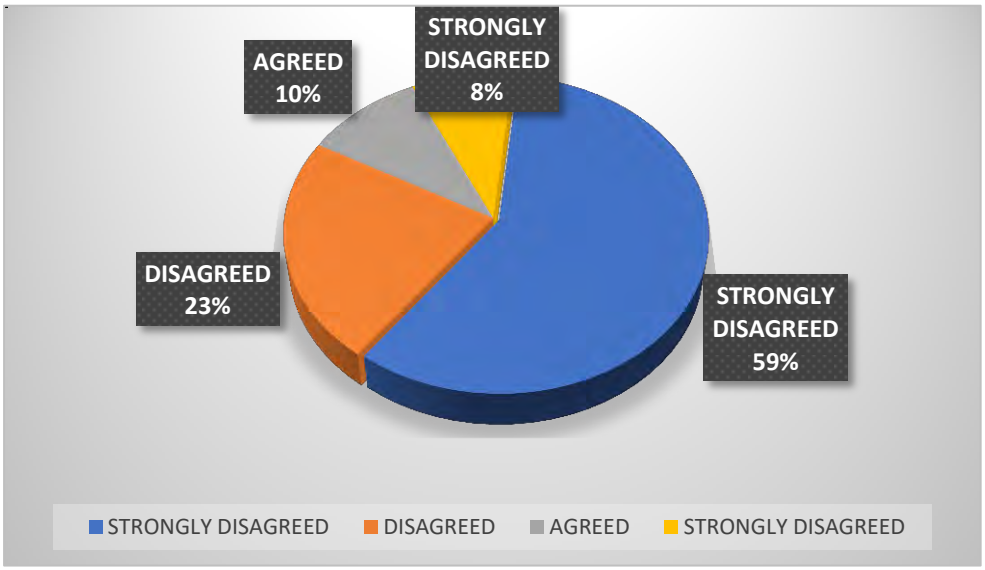

Figure 1: Student's response whether there is enough desk or not

Source: Field Data (February, 2023)

Figure 1 shows the findings on the number of desks available for pupils in the classroom. To ascertain whether there were enough mono-desks for students, twenty-five (25%) of the responders, or 45 (45%), strongly disagreed that there were enough desks in the classes. Additionally, 12 (12%) highly agreed, and 18 (18%) agreed. As a result, the majority of pupils disagreed vehemently that there were enough desks in the classes. This meant that even though there was a huge demand for desks, there weren't enough of them.

Figure 2 illustrates the results of teacher on whether there were enough desks in the classrooms or not.

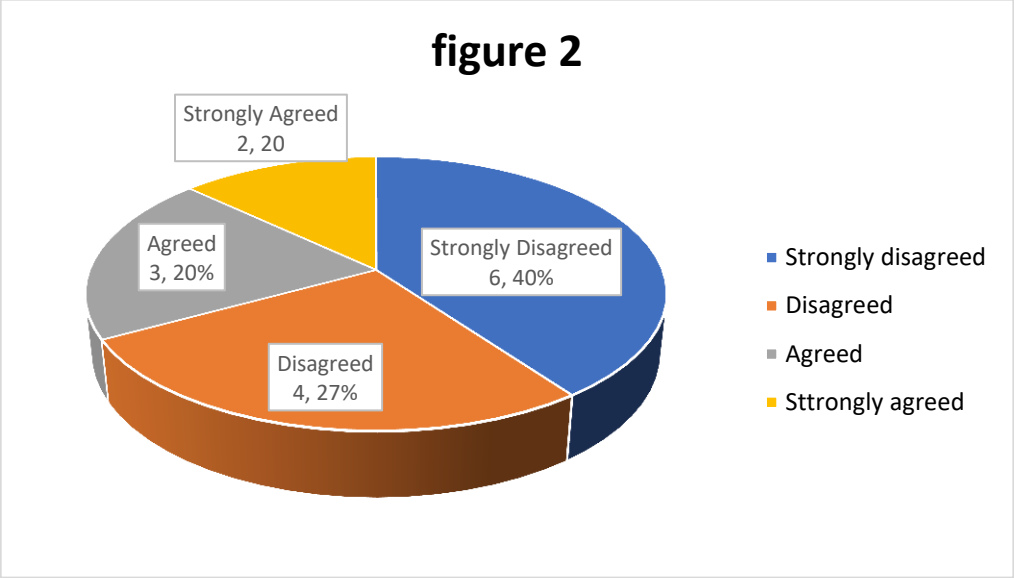

Figure 2: Illustrates the results of teachers on whether there was enough desk in classroom or not.

Field Survey (February, 2023)

Figure 2 shows the results of teachers' responses on whether there was enough desk in the classroom. It was revealed that 6 (40%) strongly disagreed, 4(27%) disagreed, also 3(20%) agreed and 2(13%) strongly agreed. This shows that desk was not enough in the classrooms. This tells that both students and teachers revealed that the desks in the classroom were not enough.

Figure 3 shows students results of overcrowding in the classroom.

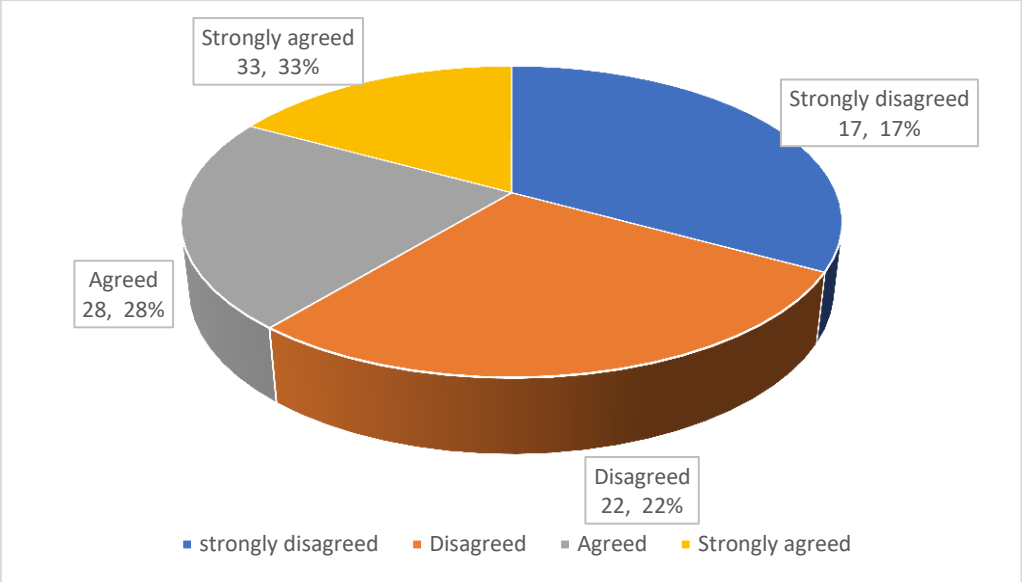

Figure 3: Students Responses whether classrooms are overcrowded

Source: Field Survey (February, 2023)

In figure 3, it could be seen that 17, (17%) of the students strongly disagreed that their classrooms were overcrowded whiles 22 (22%) also disagreed. However, 28 (28%) agreed and 33(33%) strongly agreed. It can, therefore be concluded that the classrooms were overcrowded. Figure 4 presents teachers' responses on overcrowding in classrooms.

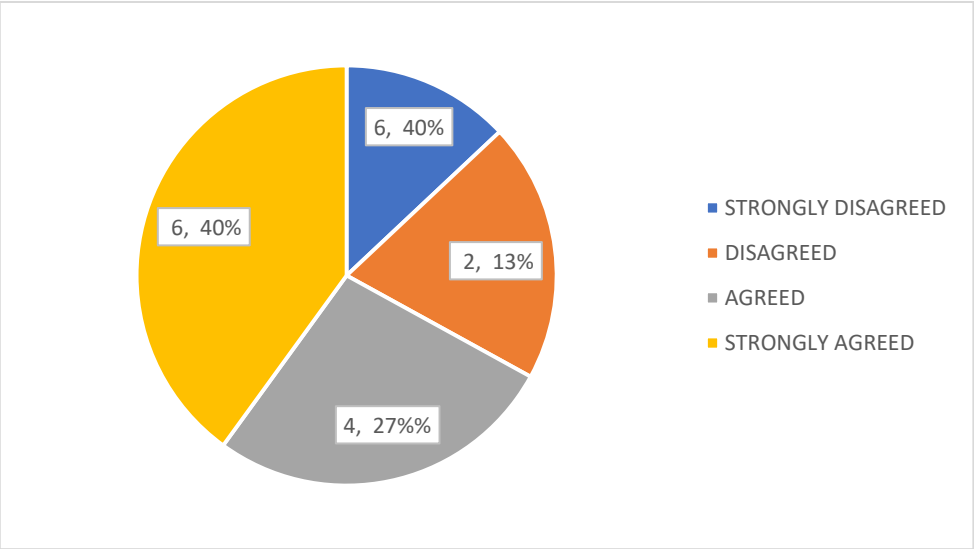

Figure 4: Teachers responses on overcrowding in classrooms or not.

Field Survey (February, 2023)

Figure 4 shows results of teachers' responses on overcrowding in the classrooms. A total of 3, 20%% of the teachers strongly disagreed and 2, 13% disagreed that classrooms were overcrowded. However, 4, 27% agreed and 6, 40% strongly agreed. That is, majority of the teachers believed that classrooms were overcrowded. The results of both teachers and students believe that classrooms were overcrowded.

Figure 5 presents students results on having personal beds in their dormitories.

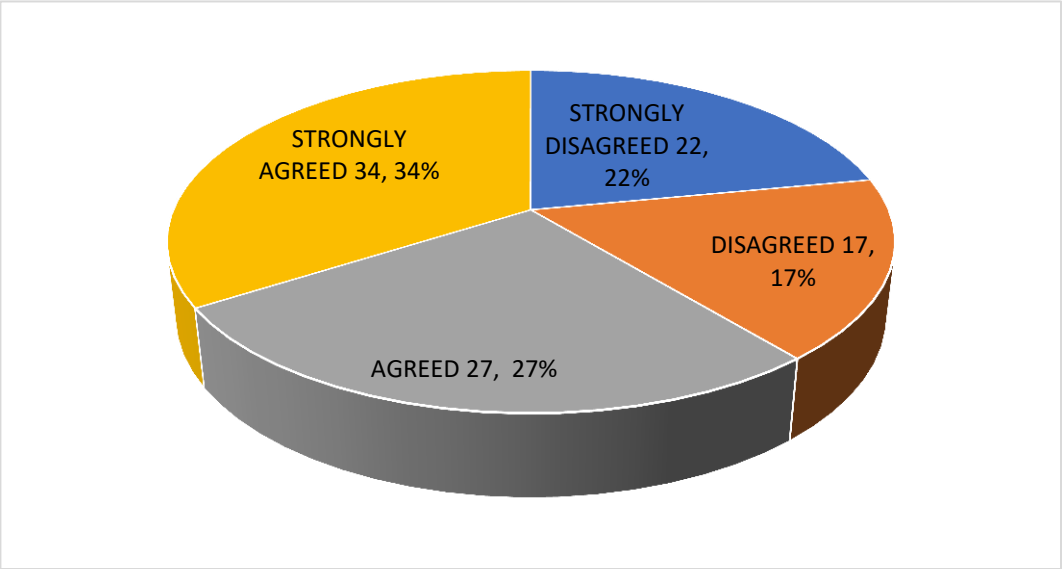

Figure 5: students' responses whether they have beds. Source:

Field Survey (February, 2023)

Figure 5 shows that 17 (17%) and 22 (22% of respondents) strongly objected to having mattresses in their personal residences. However, 34 (34%) strongly disagreed with the assertion, while 27 (27%) agreed. This demonstrates that some people had dormitory beds while others did not. However, there were more people without beds than with beds.

Figure 6 shows teachers' responses on students having individual beds.

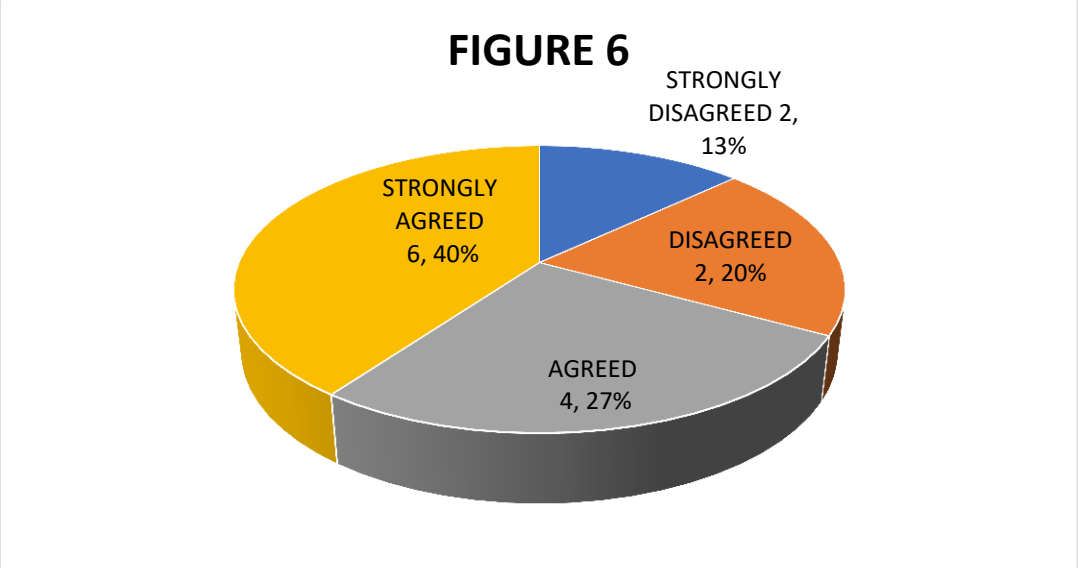

Figure 6: Teachers responses on whether students have beds or not. Sources: Field (February, 2023)

Figure 6 shows that out of the 15 teachers who responded 2(13%) strongly disagreed and 3 (20%) disagreed. However, 4 (27%) agreed and 6, (40%) strongly agreed. That is, majority of the teachers responded that students were not having beds in the dormitories. Patricia a teacher explained that there were not enough beds.

What is the Attitude of Teachers and Learners Towards the Implementation of Double Track Education in Senior High Schools?

This part presented the results and discussion on the attitude of teachers and learners towards the implementation of double track education in senior high schools. I have analyzed the responses of students and teachers descriptively and have presented the findings in tabular forms. Table 11: is the results of the attitude of teachers and learners towards the implementation of double track education in senior high schools as responded by students.

Table 9: Distribution of Attitudes of Teachers and Learners Towards the Implementation of Double Track

Items	N	Min	Max	Mean	SD
Teachers do mark pupils' exercises	100	1.00	2.00	1.54	.38
Teachers always come to class on time	100	1.00	2.00	1.32	.23
Teachers give assignments always when they are absent from class	100	1.00	2.00	1.65	.28
Teachers are readily available for clarification	100	1.00	2.00	1.65	.29
Contact hours are being effectively used	100	1.00	2.00	1.63	.33
We study when teachers are not in class	100	1.00	2.00	1.59	.39
We play in class most of the time	100	1.00	2.00	1.63	.35

Source: Field (February, 2023)

A Likert scale was created for the students in this part, ranging from 1-4. Its purpose was to gauge how students and teachers felt about the introduction of double-track schooling in senior high schools. The total number of respondents who responded to the survey is denoted by the letter "N.". There were 100 of them. The minimum value was 1.00, while the maximum value was 2.00. According to Table 11, the majority of the students strongly agreed with the assertion that teachers mark their students' homework, with a mean of 1.54 (0.38 standard deviation). Teachers regularly arrive early for class. Additionally, the majority of students agreed and strongly agreed to this, with a mean of 1.32 (SD=0.23). When students are missing from class, teachers always assign work, with a mean of 1.65 (SD=0.28). Students both agreed and strongly agreed that teachers are frequently available for clarification, with a mean of 1.65 (SD=0.29). In other words, teachers were always on hand to help pupils if they needed more explanation for whatever they had learned or if they had questions about anything else. With a mean of 1.63 (SD=0.33), which indicates that the majority of

students agreed and strongly agreed that contact hours are being spent efficiently, with a mean of 1.59 (SD=0.39), the majority of students highly agreed that they study when the teachers are not in the classroom. Although most of the students strongly opposed and disagreed that they played in class most of the time, we play in class most of the time. The mean of this was 1.63 (SD=0.35).

Table 10: Shows Attitude of Teachers and Learners Towards the Implementation of Double Track Education

Item	N	Min	Max	Mean	SD
Teachers do mark pupils' exercises	15	1.00	2.00	1.23	.25
Teachers always come to class on time	15	1.00	2.00	1.34	.23
Teachers give assignments always when they are absent from class	15	1.00	2.00	1.25	.15
Teachers are readily available for clarification	15	1.00	2.00	1.13	.29
Contact hours are being effectively used	15	1.00	2.00	1.12	.32
We study when teachers are not in class	15	1.00	2.00	1.10	.24
We play in class most of the time	15	1.00	2.00	1.16	.30

Source: Field Survey (February, 2023)

A Likert scale with a 1-4 rating was created for teachers in this area. Its purpose was to gauge how students and teachers felt about the introduction of double-track schooling in senior high schools. The total number of respondents who filled out the survey is listed under "N" and consisted of 15 teachers. The minimum and maximum scores were 1.00 and 2.00, respectively. Table 18 shows that all of the teachers agreed indeed, they highly agreed with the way that teachers and students felt about the introduction of double-track education in senior high schools.

The academic intervention programs were one theme that was also identified. Academic programs were used as an intervention to support underachieving, medium-

achieving, and above-average children. Each school had to come up with its own strategy for carrying out the extra-class intervention. The intervention period was supported by the government. Teachers believed that the intervention's budget, commonly referred to as "intervention money," was insufficient.

The goal of the intervention is to inspire teachers to take on the responsibility of supporting weaker students. Our intervention program for Form 2students is in place here. For instance, during the morning prep sessions, the average students will prepare as usual, and the teachers will assemble the weaker students to assist them. However, I will return to the topic of fatigue. The instructor, who has never had time to rest for the entire year, will occasionally have to get to school at 6 or 7 in the morning and attend an assembly, which is not an easy task. Even though your intervention session starts at 7:30 a.m., unlike regular classes, you still need time to recover because teachers must be at class from 5 to 6:30 p.m. before heading home exhausted.

Determine the significance of double track educational system in senior schools.

Research Question three presents the results on the extent at which double track system affect the teaching and learning of integrated science in senior high schools of students and teachers. Likert Scale was developed from the scale of 1-4 to assess the extent the double track system affects the teaching and learning of integrated science in senior high school. Figures were assigned to the various responses on the Likert Scale, where 1 meant Strongly Disagree (SD), 2 Disagree (D), 3 Agree (A), and 4 Strongly Agree (SA). I have presented the results descriptively, that is, in frequencies and percentages and have also discussed the results of the qualitative data alongside.

Table 11 shows students' responses on how the double track system affect the teaching and learning of integrated science in senior high school.

Table 11: Effects of Double Track System on Teaching and Learning of Integrated Science

Double track system affects the teaching and learning of integrated science	**Frequency**	**Percentage**
Strongly Disagree	40	40.00
Disagree	30	30.00
Agreed	17	17.00
Strongly Agree	13	13.00
Total	**100**	**100.00**

Source: Field Survey (February, 2023)

When students were asked to respond to the test item "Double track system affects the teaching and learning of integrated science" 40 (40.00%) of them strongly disagreed to the statement, 30 (30.00%) also disagreed to the statement, while 17 (17.00%) agreed and 13 (13.00%) strongly agreed to the statement. Thus, majority of the students strongly disagreed. That is, they like everything about the double track system.

Table 12: Shows Students Responses on Whether Double Track System Helped Them to Gain Admission

double track system helps them to gain Admission	**Frequency**	**Percentage**
Strongly Disagree	15	15.00
Disagree	30	30.00
Agreed	10	10.00
Strongly Agree	45	45.00
Total	**100**	**100.00**

Source: Field Survey (February,2023)

Table 11 shows that, 15 (15.00%) strongly disagreed, 30 (30.00%) disagreed, 10 (10.00%) agreed and 45 (45.00%) also strongly agreed. It can infer that majority of the students agree and strongly agree that double track system helps them to gain admission. Through the double track system, a lot of students were able to enroll in senior high schools

Table 13: Shows Teachers Responses on Whether Double Track System help them to Gain Admission or Not

double track system helps them to gain Admission	**Frequency**	**Percentage**
Strongly Disagree	3	20.00
Disagree	2	13.33
Agreed	4	26.67
Strongly Agree	6	40.00
Total	**15**	**100.00**

Source: Field Survey (February, 2023)

In Table 11, it can be seen that 3(20.00%) of the teachers strongly disagreed to the statements that "The double track system has helped to enroll more students", 2 (13.33%) disagree to the statement. Again, 4 (26.67%) agreed and 6 (40.00%) strongly agreed. That is, majority of teachers agreed and strongly agreed that the double track system help students to gain admission more.

Table 14: Students' Responses on Whether the Double Track System should be Continued or Not

I want it done all times	Frequency	Percentage
Strongly Disagree	44	44.00
Disagree	26	26.00
Agreed	20	20.00
Strongly Agree	10	10.00
Total	**100**	**100.00**

Source: Field Survey (February,2023)

From Table 12: it could be seen that 44(44.00%) strongly disagreed that they want the double track system to be done at all times, 26(26.00%) also disagreed. Again, 20(20.00%) agreed whiles 10(10.00%) strongly agreed. Consequently, majority strongly disagreed that the double track system should be done at all times and it ought to be discontinued at a point in times.

Table 15: Shows Teachers' Responses on whether the Double Track System should be Continued or not

I want it done all times	Frequency	Percentage
Strongly Disagree	6	40.00
Disagree	4	26.67
Agreed	3	20.00
Strongly Agree	2	13.33
Total	**15**	**100.00**

Source: Field Survey (February, 2023)

From Table 13, it could be seen that 6(40.00%) strongly disagreed that they wanted the double track system to be done at all times, as 4(26.67%) also disagreed. Again 3(20.00%) agreed and 2(13.33%) strongly agreed. Consequently, majority strongly disagreed that double track system should be done at all times.

This section presents the findings of the qualitative data collected from teachers regarding the impact of the double track system on the teaching and learning of integrated science in senior high schools. The double-track approach was advantageous because it led to more students enrolling, according to the themes that emerged from the interviews. However, there were infrastructure challenges that put pressure on all of the buildings, disciplinary problems resulting from the high enrolment, and parents who were reluctant to contribute to the initiatives that the schools were working on. Due to the double-track system's higher enrolment, it was a good idea. Many individuals who previously could not attend secondary school are now able to do so as a result of it. Teacher Simon explained:

The enrolment issue has been resolved. Since many students would have been excluded, many pupils are now able to access secondary education. One group is enrolled in school and another is not because of the numbers. We had roughly 1,000 students at that time. However, we are currently very close to 3,000 students.

The system had extremely good intentions when it boosted enrolment since it gave every student a chance despite the restricted funding. It is a good idea in theory. Everybody now has the opportunity to attend school.

Parents who previously couldn't afford to send their children to school can now do so. I can confirm that many students have registered at second-cycle institutions, which was problematic back when admission was difficult to come by.

The double-track system's creation of access for everyone who wished to pursue secondary school was one of its primary goals. Once more, the establishment of the free senior high school policy in the 2017–2018 academic year led to the operationalization of the double track system. In other words, the number of students

who were admitted to senior high schools increased to a point where the current institutions' capacities could not handle it. Another subject was the pressure on school infrastructure. The huge enrolment and ongoing use of the infrastructure, according to the teachers, put pressure on all facilities. Mercy also espoused that the lack of furniture was making teaching and learning very difficult. She, thus said:

Teaching and learning are exceedingly challenging because of the lack of furniture. While in class, some people stand. The facilities are under pressure. The laboratories are under pressure, and once again, due to a lack of furniture, students sit on the floor.

George, a teacher, added that there were too many people living in the dormitories. Due to the intense heat in the dormitories, several students choose to sleep outside or on the floor at night. He stated:

Our infrastructure is subpar. The dormitories are very full. Since they might object, new beds have been provided for the first-year students to sleep on. Forms two and three, however, are overflowing. Some people are sleeping on the ground, while others opt to sleep outside because it's so hot there. Some kids in the classroom sit on the floor, while others stand near the pavilion. We use a shift system in the dining room.

The double-track system was also creating disciplinary issues for teachers. Students were becoming difficult to contain due to the increase in enrolment. George said issues of discipline came up almost every day. He said:

We learn about new cases and developments every day. Only the previous week had gone by without any news. We ought to be permitted to look after the students.

Rutherford cited the Ghana Education Service as the root of the problem. This occurred as a result of the MOE's policy prohibiting the caning of students. Rutherford stated:

However, I won't associate the discipline issue with the two-track system. I would prefer to connect it to national and possibly worldwide policies. Human rights campaigners argue that we should not follow the Bible's instruction to "spare the rod and spoil the child." The double-track system has brought about a lot of immoral actions, resulting in adolescent pregnancies as they travel home frequently, and we do not have full control over them in order to monitor them since they come and depart in the shortest time. Having their own phones and attending vacation classes, however, does not help their behaviour.

The unwillingness of parents to support both their children's education and the school as a whole was another recurring theme. Robert, the instructor, said:

The parents don't bother to visit and inquire about the welfare of their own wards because it is free. They choose not to. Only after you have requested an indefinite suspension, a time of home attendance, or another action will the parents visit this location and offer their apologies. However, occasionally a parent would approach you when they were paying fees and say, "My ward is here; I'm coming to pay his fees and find out how well he is doing academically." And they are bothered by this since, possibly, they are not being paid.

One could say that parents were hesitant to even visit their children's schools. This might be because they didn't have to go to the school because it was free.

What are the Solutions to the Challenges in Teaching and Learning of Integrated Science in Senior High Schools?

This part looked for solutions to the problems with integrated scientific teaching and learning in senior high schools. The difficulties were with the Infrastructure, Dormitories, Dining Hall, and Classrooms. Inferential statistics were used to analyse the quantitative data of the pupils and the teachers. I used one-way ANOVA (analysis of variance) to examine the approaches to the problems in integrated scientific teaching and learning in senior high schools. The schools fell into the "A," "B," and "C" categories. An ANOVA table was used to display the findings of the analysis.

There was a significant value (p-value) and an alpha value of 0.05 in each of the tables. It was important for interpretation that the columns were labeled "Sum of Squares" (ss), "d" (degree of freedom), "Mean Square" (MS), "F" (for "F" Ratio), and "sig" (significance level). When the significant value exceeded the alpha value (0.05), there was no statistical significance or effect, according to the interpretation. However, there was statistical significance when the significant value was lower than the alpha value. The difference in means was significant if it was greater than what would be predicted by pure chance. As a result, a post hoc analysis would be necessary because the table would not provide much information about the impacts or the size of different measures.

Effects of Infrastructural Challenges

The effects of the infrastructural problems were contained by this. Students' data were evaluated using a one-way ANOVA, whereas teachers' data were manually processed. Table 19 shows student responses from an ANOVA test on the detrimental effects of obstacles in the classroom.

Table 16: ANOVA Showing Negative Effect of Challenges in Classroom

	Sum of squares	D.F	Mean square	F	Sig.
Between Group	5.29	1	5.29	1.198	3.9
Within Groups	441.43	100	4.4143		
Total	**446.72**	**101**			

Source: Field survey (February, 2023)

From Table 14, the findings from a one-way ANOVA were used to determine whether the type of school had an impact on the difficultiee students had in the classroom. It was discovered, though, that the detrimental impact of classroom difficulties was independent of the type of school. That is, there was no discernible relationship between the type of school and the detrimental impact of having insufficient desk space in the classroom. 3.92 > 0.05 because the significant value (p> 0.05) was bigger than the alpha value.

All schools experienced the detrimental effects of not having enough desks in the classrooms. Each school suffered a setback. This can be because there are more kids than there are available desks in the classrooms. Table 20 displays the results of an ANOVA test on the detrimental impact of classroom problems on teachers.

Table 17: ANOVA Statistic Showing Negative Effects of Classroom Challenges

	Sum of Squares	D.F.	Mean Square	F	Sig.
Between Groups	3.12	1	3.12	0.2123	4.54
Within Groups	220.432	15	14.696		
Total	**223.552**	**16**			

Source: Field Survey (February, 2023)

The group of schools and the difficulties were not statistically different in Table 15. The alpha value of 0.05 was less than the significant value of 4.54, hence 4.54 > 0.05.

The difficulties in the classroom had an adverse effect on all types of schools. Students couldn't sit comfortably in class, according to one teacher named Charles.

For the purpose of learning, students cannot sit comfortably. They don't have enough tables and chairs for their books and writing surfaces.

Additionally, Aristotle claimed that some pupils choose to sit on the floor while in class.

Some students in the classroom sit on the floor, while others stand at the pavilion, and yet others sit on the dwarf wall. The results of an ANOVA test on the detrimental impacts of dormitory difficulties are shown in Table 21 for students.

Table 18: ANOVA Test of Students Responses for Negative Effect of Dormitory

	Sum of Squares	**D.F**	**Mean Squares**	**F**	**Sig.**
Between Groups	4.32	1	4.32	0.7547	4.5
Within Groups	572.342	100	5.72342		
Total	**576.662**	**101**			

Sources: Field Survey (February, 2023)

According to Table 16, the negative effects of the obstacles in the dorm and the negative impact of not having enough desks in the classroom are both dependent on the type of school. The significance value (4.5 > 0.05) is higher than the alpha value of 0.05.

Table 17 presents teachers results on the negative effects of dormitory challenges.

Table 19: Shows ANOVA Test for Teachers on Dormitory challenges

	Sum of Squares	D.F	Mean Square	F	Sig.
Between Groups	2.345	1	2.345	1.164	4.5
Within Groups	30.221	15	2.015		
Total	**32.566**	**16**			

Sources: Field Survey (February, 2023)

Table 17 shows that there was no statistically significant relationship between the type of school and the detrimental impacts of Dormitory problems. In other words, the alpha value of 0.05 was smaller than the significant value of 4.5. The difficulties in the dorm can be brought on by the congestion and bad luck with beds. There was also the issue of bed bugs. As a result, the problems with Dormitory were very serious. A teacher named Mensah explained:

Additionally, there is a lot of congestion in the dormitory. Some of the pupils choose to sleep outside due to the large number and the lack of a ceiling fan or enough ventilation. They prefer to sleep on the veranda because it becomes nice and warm there. They are bothered by the bedbugs.

4.2 Chapter Summary

The chapter presented and discussed the results of the study: effect of double track on teaching and learning of integrated science in some selected schools in Ashanti region. The study was guided by four research questions. Research Question one (1) was to what extent double track education affects the teaching and learning of integrated science in senior schools. Research Question Two (2) was what is the attitude of teachers and learners towards the implementation of double track education in senior high schools. Research Question Three (3) was what is the significance of

introducing double track educational in the selected senior high schools. Research Question Four (4) was what is the solution to the challenges in teaching and learning of integrated science in senior high schools.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter is the final phase of the study, effect of double track on teaching and learning of integrated science in some selected schools in Ashanti region. The chapter thus, provides the summary of the research process and draws conclusions. The chapter then provides recommendations arising out of the study and suggests other areas where research can be conducted.

5.2 Summary of the Research Process

The study explores the effect of double track on teaching and learning of integrated science in some selected schools in Ashanti region. The study's goal was to close the knowledge gap on the double track in the Ashanti region by highlighting some of the difficulties faced by teachers there as well as how they are addressing them.

I used a mixed-methods approach in the research. Here, I simultaneously collected qualitative and quantitative data. I picked the entire faculty and a random sample of third-year students from three Ashanti double-track schools. The schools were Oppong Memorial Senior High School, Seventh Day Adventist Senior High School, and Wesley High School. I take a random sample of 113 students from the schools, and among the three double-track schools I chose, 100 students and 15 integrated science teachers submit their questionnaires. A series of questionnaires were filled out by each student, and interviews were conducted with the scientific teachers. I conducted a descriptive and inferential analysis of the quantitative data. Although it was done manually, the qualitative data from the teachers was based on themes. The

topics came from the goals of the study. I have outlined the main findings in the section that follows.

5.3 Summary of the Key Findings

In this part, the major findings from the study have been discussed.

1. On the perception of the double-track system, integrated science teacher and students were of the view that it was good and helped to enroll more students. Moreover, they wanted everyone to benefit. They however, felt that the DTSE should be done at all times. Integrated science teachers in addition, also saw the DTSE to be good since it had increased enrolment. However, due to the increase in enrollment and limited resources, there was pressure on all facilities. The high enrollment also brought attendant problems such as disciplinary. Furthermore, parents were not ready to contribute to assist schools' projects. Again, students have adopted poor attitudes towards academic work.
2. The study also revealed that there was lack or inadequate consultation on the implementation of the DTSE. The Green Track students were benefiting more than the Gold Track students. Finally, integrated science teachers could not go for vacation because they had to be at pose throughout the year.
3. Another objective was on how the extended contact hours were effectively being used. It emerged from the study that the extended contact hours were being used effectively. This was because science teachers were always in class and in time. However, if a teacher could not go to class, the teacher gave assignment to occupy the students in his absence. The teachers again, made up for lessons that were lost. On the part of integrated science teachers, it was found out that the contact hours had been increased from 40 minutes per

period to 60 minutes per period. However, teachers were meeting students four times in a week instead of six times in the previous contact hours. As a result, contact hours though had been increased was not different from the previous one since the contact hours in both instances were 240 minutes in a week. Again, the extended contact hours were making students and teachers tired. This is because students were not used to sitting for long hours, as teachers were also not familiar with teaching for longer hours. Furthermore, academic intervention activities were ongoing, though was practiced differently in each school.

4. The study revealed that infrastructure was a major challenge facing double-track schools. These were inadequate classroom and desks. Classrooms were overcrowded and desk were in short supply. Moreover, dormitories and dining halls could not accommodate the students. In the dormitories, some students were not having beds and were sleeping on the floor. Again, in the dining hall, students were going there on shift basis since the hall could not contain all them at the same time.
5. Once again, the central government delayed the transfer of funding. Departments were unable to start their activities as a result. Additionally, there was not enough teaching and support staff to handle the growing number of students. Co-curricular activities were challenging to plan as well. This occurred because co-curricular activities were not taken into account by the academic calendar planners. Additionally, although some foods were oversupplied, others were undersupplied. Once again, the majority of the food items provided were unhealthy.

6. Both pupils and teachers suffered from these difficulties. Academic teaching and learning were significantly impacted by the infrastructure issues. Students suffered from a lack of textbooks and exercise materials as well. Furthermore, the smooth operation of the schools was hampered by the central government's delayed transfer of finances.
7. The majority of the pupils shared desks in the classroom when it came to coping mechanisms. Once more, some students were sleeping on the floor in place of proper mattresses and dorms. In addition to the food eaten in the dining hall, students had also purchased additional supplies.

5.4 Conclusions

1. It may be said that the double-track system of education has made it possible for any JHS graduate who wants to attend secondary school to do so.
1. It can once again be said that key players in the education industry were not consulted before the double-track system was introduced.
2. Once more, it is clear that the number of teaching hours has not changed; hence, the argument that the number of contact hours has grown is unsupported by the study.
3. Since there was no time for extracurricular activities and insufficient personnel resources, the issues with the double-track schools were more severe than those with the prior system. These difficulties had a negative impact on academic work.

5.5 Recommendations

The study therefore makes the following recommendations base on the findings**:**

1. This study found that … hence it is recommended that … If a significant intervention in the education system is implemented, major stakeholders should once again be consulted. Teacher unions like Ghana National Association of Teachers (GNAT), National Association of Graduate Teachers (NAGRAT), Teachers and Educational Workers Union (TEWU), University Teachers Association of Ghana (UTAG), Polytechnic Teachers Association of Ghana (POTAG), civil society organization like IMANI, Centre for Democratic Development (CDD), and leadership of Parent teacher Association (PTA) ought to be consulted in the event of a policy intervention. The involvement will provide education to the citizenry as far as the policy is concerned.
2. This study found that integrated science teachers at SHS are not given the freedom to make decisions about their schools independently of the central government hence it is recommended that Teachers should be vetted by their individual education directorates before being given the space.
3. This study found that the government, local authorities, churches, and communities should contribute the necessary remittances to assist government initiatives hence it is recommended that senior high schools need to be provided with more dining hall space, dorms, and classrooms with desks. Once more, the government should permit the PTAs at the various schools to work together with it to provide infrastructure. The prompt release of cash is also advised.

4. This study found that there are few teachers with overload of academic with increase in students population as such impedes teaching and learning hence it is recommended that GES should employ more teachers to deal with the increase in senior high school enrolments.

5.6 Suggestions for Further Research

Since the study was conducted in three schools in the Ashanti Region, I propose that similar studies can be conducted in other regions with more schools. It is therefore, recommended that the views of parents, civil society organizations, as well as other stakeholders in education should be considered for further research.

Additionally, I recommend that a study be done to determine how the following issues human resources, co-curricular activities, and work environment affect academic achievement. When the results of the double-track system of education are announced, additional study can be done by comparing the West Africa Senior High Examination results from the single-track SHS and the double-track system of education.

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APPENDIX A

QUESTIONNAIRE FOR STUDENTS

UNIVERSITY OF EDUCATION, WINNEBA

COLLEGE OF EDUCATION

FACULTY OF SCIENCE EDUCATION

DEPARTMENT OF SCIENCE EDUCATION

Questionnaire for students

The questionnaire has been developed by a master student undertaking a research on the topic "Effect of double-track on teaching and learning of integrated science in some selected schools in Ashanti region**".** I kindly request your assistance to help fill the questionnaire frankly and honestly. The information provided will be used solely for academic purposes. Thank you for your time.

SECTION A:

1. Sex of students: male ( ) female ( )
2. Age: 12-16 [ ] 17-20 [ ] 21-24 [ ]
3. Track: Gold [ ] Green [ ]
4. Programs of study: General Arts [ ] General Science [ ] Business [ ] Agricultural Science [ ] Visual Arts [ ] Home Economics [ ] Technical [ ] others [ ]
5. Status: Boarder [ ] Day [ ]

SECTION B: STUDENTS PERCEPTION OF DOUBLE-TRACK SYYTEM

This section relates to the perception of the Double-Track System. Please, indicate the extent to which you agree or disagree with the following statements by ticking (✓)

1=Strongly Disagree (SD), 2=Disagree (D), 3= Agree (A) and 4= Strongly Agree (SA)

SN	General	SD	D	A	SA
		1	2	3	4
6	I like everything about Double-Track System (DTSE).				
7	The DTSE helped me to gain admission.				
8	I want it to be done at all times.				
9	I want everyone to benefit.				

SECTION C: EXTENDED USE OF CONTACT HOURS

		SD	**D**	**A**	**SA**
		1	**2**	**3**	**4**
10	Teachers do mark pupils' exercises				
11	Teachers always come to class on time				
12	Teachers give assignments always when they are absent from class				
13	Teachers are readily available for clarification				
14	Contact hours are being effectively used				
15	We study when teachers are not in class				
16	We play in class most of the time				

SECTION D: CHALLENGES OF THE DOUBLE-TRACK SYSTEM

a. Dormitory

		SD	D	A	SA
		1	2	3	4
17	I have my personal bed in the dormitory				
18	The lights are not working in the dormitories.				
19	We are over-crowded in the dormitory.				

b. Classroom

		SD	D	A	SA
		1	2	3	4
20	There are enough desks in the classrooms.				
21	I have a personal desk to sit on.				
22	We are over-crowded in the classrooms.				

SECTION E: EFFECTS OF THE CHALLENGES

		SD	D	A	SA
		1	2	3	4
23	The challenges in the classroom negatively affect my studies.				
24	The challenges with the Dormitory negatively affect my studies.				
25	The challenges with the Dining Hall negatively affect my studies.				

SECTION F: COPING STRATEGIES

		SD	D	A	SA
		1	2	3	4
26	My parents have been given me provision to supplement food form the dining hall.				
27	I have additional books to supplements what we get from school.				
28	I have increased personal time for studies.				
29	I sleep on the floor in the dormitories.				
30	I attend vacation classes.				

APPENDIX B

QUESTIONNAIRE FOR INTEGRATED SCIENCE TEACHERS

UNIVERSITY OF EDUCATION, WINNEBA

COLLEGE OF SCIENCE EDUCATION

FACULTY OF SCIENCE EDUCATION

DEPARTMENT OF SCIENCE

Questionnaire has been prepared by a master student undertaking a research on the topic "Effect of double-track on teaching and learning of integrated science in some selected schools in Ashanti region**".** I kindly request your assistance to help fill the questionnaire frankly and honestly. The information provided will be used solely for academic purposes. Thank you for your time.

SECTION A: BIO DATA

1. Sex: male ( ) female ( )
2. Age: 35-39 [ ] 40-44 [ ] 45-49 [ ] 50-54 [ ] 55-60 [ ] above 60 [ ].
3. Level of education: Bachelor's Degree [] Master's Degree [ ] Doctorate Degree [ ] Other; please specify……
4. Rank: Principal Superintendent [ ] Assistant Director 11 [ ] Assistant Director 1 [ ] Deputy Director [ ] other: please specify…….
5. Number of years at post: 0-2years [ ] 3-5years [ ] 6-8years [ ] 9 and above [ ].

SECTION B: INTEGRATED SCIENCE TEACHERS VIEWS ON DOUBLE-TRACK SYSTEM

This section relates to perception of the Double-Track System. Please, indicate the extent to which you agree or disagree with the following statement by ticking (✓) 1=Strongly Disagree (SD), 2= Disagree (D), 3= Agree (A) and 4= Strongly Agree (SA).

SN	General	SD	D	A	SA
		1	2	3	4
6	I like everything about double-track system (DTSE)				
7	The DTSE helped me to gain admission.				
8	I want it to be done at all times.				
9	I want everyone to benefit.				

SECTION C: EXTENDED USE OF CONTACT HOURS

		SD	D	A	SA
		1	2	3	4
10	Teachers do mark pupils' exercises				
11	Teachers always come to class on time				
12	Teachers give assignments always when they are absent from class				
13	Teachers are readily available for clarification				
14	Contact hours are being effectively used				
15	We study when teachers are not in class				
16	We play in class most of the time				

SECTION D: CHALLENGES OF THE DOUBLE-TRACK SYSTEM

		SD	D	A	SA
		1	2	3	4
17	I have my personal bed in the dormitory				
18	The lights are not working in the dormitories.				
19	We are over-crowded in the dormitory.				

b. Classroom

		SD	D	A	SA
		1	2	3	4
20	There are enough desks in the classrooms.				
21	I have a personal desk to sit on.				
22	We are over-crowded in the classrooms.				

SECTION E: EFFECTS OF THE CHALLENGES

		SD	D	A	SA
		1	2	3	4
23	The challenges in the classroom negatively affect my studies.				
24	The challenges with the Dormitory negatively affect my studies.				
25	The challenges with the Dining Hall negatively affect my studies.				

SECTION F: COPING STRATEGIES

		SD	D	A	SA
		1	2	3	4
26	My parents have been given me provision to supplement food form the dining hall.				
27	I have additional books to supplements what we get from school.				
28	I have increased personal time for studies.				
29	I sleep on the floor in the dormitories.				
30	I attend vacation classes.				

APPENDIX C

INTERVIEW SCHEDULE FOR INTEGRATED SCIENCE TEACHERS

UNIVERSITY OF EDUCATION, WINNEBA

COLLEGE OF SCIENCE EDUCATION

DEPARTMENT OF SCIENCE EDUCATION

INTERVIEW GUIDE FOR TEACHERS

The interview Guide has been developed prepared by a master student undertaking a research on the topic "Effect of double-track on teaching and learning of integrated science in some selected schools in Ashanti region**".** I kindly request your assistance to help fill the questionnaire frankly and honestly. The information provided will be used solely for academic purposes. Thank you for your time.

SECTION A: BIODATA

1. Sex: Male [ ] Female [ ]
2. Age……....
3. Educational Level……
4. Rank……
5. How long have you held the position in this school?

SECTION B: VIEWS ON THE DOUBLE -TRACK SYSTEM

6. What is your view about the DTSE?
7. What are the advantages of the DTSE?
8. What do you make of the way DTSE was implemented?
9. What are some of the disadvantages associated with the DTSE?
10. What have been your experience with the DTSE?

SECTION C: USAGE OF THE EXTENDED CONTACT HOURS

11. How does the previous time allocation differ from the current contact hours?

12. How are the contact hours being effectively used?

13. Are teachers always in class?

SECTION D: CHALLENGES FACING INTEGRATED SCIENCE TEACHERS IN DOUBLE-TRACK SCHOOLS

14. How does the following constitute a challenge in the Double-Track System;

a. Funding,

b. Infrastructure

c. Co-curricular activities

d. Work load

SECTION E: THE EFFECTS OF THE CHALLENGES ON THE OUTPUT OF TEACHERS AND STUDENTS

15. How do these challenges affect the work of integrated science teacher;

a) infrastructure,

b) Funding,

c) Co-curricular activities

d) Work load